Job Characteristics and Leisure Physical Activity

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Objectives: This study employs a sample population of older workers to estimate an empirical model of leisure exercise activity. Alternative theories relating work and leisure attitudes relevant for understanding the exercise behavior of older workers are tested empirically. **Methods:** Responses of 6,433 full-time older workers (51 to 61 years old) from the 1992 Health and Retirement Study (HRS) are grouped into two white-collar and blue-collar worker categories and are analyzed to test whether self-reported levels of regular physical activity are associated with the physical demands and stress associated with one's job. **Results:** Although the white-collar workers, whose jobs involve more physical efforts, are more likely to do light physical activity, the blue-collar workers, whose jobs are more physically demanding, tend to engage in more vigorous exercise. **Discussion:** The empirical results are most supportive of the *generalization* theory, and they also illustrate the complexity of relationships between work and leisure physical activity.

During the past several decades, U.S. society has been moving from an industrial to a service economy. The vast majority of new jobs are in the provision of services rather than the production of goods, and the proportion of service jobs continues to grow (Kelly & Godbey, 1992). Automation and other technological developments have contributed greatly to the reduction of physical activity at work. People are more

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sedentary in the workplace than ever before, and this trend is likely to continue in the future. Physical inactivity outside of the workplace among the U.S. population is believed to be fairly widespread. National surveys have found that about one in four adults (more women than men) currently has a sedentary lifestyle with no leisure-time physical activity. An additional one third of adults have activity levels that are insufficient to achieve health benefits (National Institutes of Health [NIH] Consensus Conference, 1996; U.S. Department of Health and Human Services, 1996).

Because inactivity has been linked to hypertension, chronic fatigue, and physiological and mental inefficiency (Ardell, 1986), there may be high costs associated with an inactive lifestyle. In addition to any costs associated with loss of work time, Americans are spending billions of dollars each year on health care, a figure that represents more than 10% of the Gross National Product (Wilson, 1991). As a consequence of demographic trends, workers 51 and older comprise an increasing proportion of the workforce. Due to age, many of these workers are at much greater risk for the onset of a variety of chronic diseases, for which physical inactivity is a significant risk factor (Le Marchand, Wilkens, Kolonel, Hankin, & Lyu, 1997; Shephard, 1997).

The likely impact of a more sedentary workplace on health may depend very much on what physical activity workers do in their leisure time. If persons with more sedentary jobs compensate for workplace inactivity with greater leisure physical activity, the impact of a more sedentary service economy may be modest. Three theories of interaction between work and leisure attitudes have been proposed in the literature (Gordon, Gaitz, & Scott, 1976; Kirkcaldy & Cooper, 1993). Under the theory labeled *generalization*, work attitudes transfer or spill over to other life experiences such as the leisure domain. This theory predicts positive correlations between work and leisure attitudes so that a service economy portends a future of less exercise and worse health. The alternative *compensation* theory posits that individuals gravitate toward off-work activities that are counterpoised to work to make up for the deficits in their work. It predicts negative correlations between work and leisure attitudes, suggesting that leisure offers a reaction or compensation for work that is monotonous, stressful, or unsatisfying. Finally, under the *segmentation* theory, leisure

and work represent independent, unrelated, or neutral areas. This theory predicts no association between work and leisure activity in instances where job commitment is not necessarily high and the deleterious effects of work are not present.

Previous studies have identified factors such as self-rated health, socioeconomic status, occupational status, and stress to be associated with physical leisure activity (Fasting, 1982; Gordon et al., 1976; McAuley & Rudolph, 1995; Ruuskanen & Ruoppila, 1995; Wilson, 1991). Any inferences toward the generalization, compensation, and segmentation theories of work and leisure activity are difficult to draw, given the way work activity level has been typically specified in these studies, however. Simple occupational status variables (e.g., blue-collar vs. white-collar occupations) have been used as proxy measures for physical efforts associated with the job. Although white-collar work historically has required more mental capacity and less physical effort than blue-collar work, such classifications may not reflect a job's physical requirements very well with technological changes affecting the workplace. Furthermore, these same job characteristics have served as the basis for the claim of a higher social status for white-collar workers relative to blue-collar workers (Mills, 1953). Finally, traditional occupational status measures do not distinguish stress levels associated with various jobs. Stress level of a job may be as important as its physical requirements in influencing leisure physical activity level (Kirkcaldy & Cooper, 1993; Sutherland & Cooper, 1990). Consequently, the effects of physical job requirements, stress, and social status on physical leisure activity are muddled together in much of the previous research.

This article reports on an empirical analysis of factors associated with physical leisure activity level that have direct implications with regard to the alternative theories of work and leisure. In contrast to past research, we distinguish physical job requirements and job stress from effects of occupational status by estimating separate models of physical leisure activity levels for blue- and white-collar workers. Separate variables are specified for the intensity of the physical requirements of the job and the intensity of stress associated with an individual's job. A study population comprised of workers aged 51 to 61 years is employed. Three main research questions are addressed. First, are the workers with sedentary jobs more likely to choose

physical activity in their leisure time than those workers with jobs having more demanding physical requirements? Second, are the workers with more stressful jobs more likely to participate in leisure-time physical activity? Finally, do traditional blue-collar/white-collar occupational status categories indicate social status effects on levels of leisure-time physical activity once the physical requirements and the stress level of an individual's job are controlled for?

Literature Review

Numerous studies have investigated relationships between regular exercise and health. A positive association between them has been interpreted as evidence of the beneficial effects of exercise on health (Caldwell, 1996; Emery, Hauck, & Blumenthal, 1992; Fontane, 1996; Horgan, 1987; McAuley & Rudolph, 1995; Morgan, Dallosso, Bassey, Ebrahim, & Fentem, 1991; Wolinsky, Stump, & Clark, 1995). Physical activity improves strength, flexibility, endurance, cardiovascular health, self-satisfaction, and task performance. Furthermore, it often reduces the intensity of the stress response and/or improves stress management (Wilson, 1991). Although some caution may be warranted due to possible self-selection effects (Kirkcaldy & Cooper, 1993), most studies suggest the positive health benefits of exercise.

Previous research has shown leisure physical activity levels to vary with factors such as age (Crespo, Keteyian, Heath, & Sempos, 1996; Gordon et al., 1976; Mills, Stewart, King, Roitz, & Sepsis, 1996; Ruuskanen & Ruoppila, 1995), gender (Conrad, Riedel, & Gibbs, 1990; Davis, Jackson, Kronenfeld, & Blair, 1987; McAuley & Rudolph, 1995; Sloan & Gruman, 1988), and health status (Fasting, 1982; Le Marchand et al., 1997; Salminen, 1985). Past research has yielded mixed findings with respect to the relationship between work and leisure physical activity. Desmond, Conrad, Montgomery, and Simon (1993) found that male blue-collar workers (defined as employees performing unskilled or skilled labor for an hourly wage) participated more in leisure-time activities than male white-collar (salaried) employees in a large Midwestern public utility company. In contrast, Oldridge (1982) found that blue-collar workers, regardless of gender, were less likely than white-collar workers to engage in

vigorous leisure-time physical activities. Kari's (1982) analysis of responses from a large national sample of Norwegians aged 15 to 87 years old also found that respondents with white-collar occupations were more likely to participate in leisure sports activities.

Featherstone (1987) found that attitudinal differences between the traditional working class and new middle-class workers (the latter defined as occupations involving representational and presentational skills such as the media, advertising, and helping professionals) influenced how one spends one's leisure time and the kinds of physical activities pursued. He found working-class activities were more youth-oriented, aimed at enhancing masculinity, whereas the middle-class activities were more health-directed, especially for older age groups. Similarly, Ford et al. (1991) found differences between respondents of different socioeconomic status in their mix and level of physical activity. Higher status women spent significantly more time each week in leisure-time physical activity, job-related physical activity, and household physical activity than did lower status women. Whereas lower status men spent significantly more time each week walking and doing household chores, higher status men engaged in more leisure-time physical activity.

Inferences toward the generalization, compensation, and segmentation theories of work and leisure activity are difficult to draw from these studies, given the muddling of social status and physical job requirements in many jobs. In this study, three separate variables will be used to characterize the multidimensional aspects of employment: a job's physical requirements, the degree of stress associated with a job, and white-collar versus blue-collar occupational classification. This should permit us to distinguish the physical and mental dimensions of job activities from the social status effects.

Method

DATA AND METHODOLOGY

The Health and Retirement Study (HRS) is a longitudinal survey of a representative sample of individuals aged 51 to 61 years and their spouses/partners with comprehensive information on behavior,

health, and economic well-being (Burkhauser & Gertler, 1995). This study uses the first wave of the HRS for 1992. Many past studies of physical activity have surveyed relatively small samples of enrollees in formal exercise programs, which limits their generalizability; a major strength of the HRS data is that it is a large, representative national sample. However, because the HRS survey instrument was not developed specifically for the study of exercise behavior, the scope of participant variables is somewhat limited. Given this study's focus on an individual's current job demands and occupational status, the study sample is restricted to 6,433 respondents who reported to be fully employed at 35 hours or more per week.

THEORETICAL MODEL

Costs and benefits are the basic constraints and needs of human behavior. Within a rational decision-making framework, the decision to participate in leisure physical activity should be determined by comparing the expected benefits resulting from physical activity with the opportunity costs of time and energy associated with it. Because people's perceived benefits and costs of doing exercise cannot be directly observed, the expected level of exercise will be specified as a function of various observable factors associated with expected benefits and opportunity costs of doing exercise.

According to the compensation theory, if a worker has a job with low physical demands, the worker should appreciate the benefits of exercise in their leisure time. On the other hand, according to the generalization theory, if respondents exert considerable physical efforts in their work, they should reduce leisure-time physical activity. However, the stress level associated with a job may have a different effect on a worker's propensity to exercise than the physical effort of a job. Those who have jobs with high stress levels are likely to appreciate the benefits of exercise as a way to alleviate stress.

In addition to job-related factors, which are the main focus of this study, this study follows the approach of Wolinsky et al. (1995) by positing that decisions about exercise are associated with predisposing and enabling factors. Predisposing factors are exogenous factors that lead a person to be more or less disposed to physical exercise. They include demographic attributes and health attitudes. Enabling

factors are those which facilitate or impede exercise. They include health conditions, as well as competing demands for a person's time and energy.

DEPENDENT VARIABLE SPECIFICATION

Table 1 contains the summary of variables, coding algorithms, and expected signs. The HRS contains two relevant questions about leisure physical activity. One pertains to light physical activity (e.g., including walking, dancing, gardening, golfing, bowling, etc.). The other refers to vigorous physical exercise (e.g., aerobics, running, swimming, or bicycling). The respondents were asked how often they participate in each kind of physical activity: three or more times a week, one or two times a week, one to three times a month, less than once a month, or never. The light and heavy exercise had only moderate association (gamma = 0.42) and were treated as separate measures of physical activity.

INDEPENDENT VARIABLES

Job-Associated Characteristics

The effects of occupational status were addressed by the stratifying the sample population into blue-collar and white-collar occupational subgroups. Blue-collar and white-collar occupations were distinguished using codes from the *Standard Occupational Classification Manual* (U.S. Department of Commerce, 1980) from the U.S. Department of Commerce. White-collar occupations include managerial and professional specialty occupations and technical, sales, and administrative support occupations. Blue-collar workers include workers in labor, manufacturing, industry, farming, forestry, construction, mechanics, transportation, and production-oriented tasks, as well as those in service and household occupations.

The other two job variables, which are the main focus of this study, are (a) a job's physical requirements and (b) the level of stress associated with a job. These variables were specified through variables reflecting the self-reported subjective assessments of workers. Previous

Table 1
Summary of Variables and Expected Effect

Variable	*Coding Algorithm*	*Expected Sign on*	
		Light	*Vigorous*
Dependent variables			
Light physical activity (5 items)	5 = 3+ times a week 4 = 1-2 times a week 3 = 1-3 times a month 2 = less than once a month 1 = never		
Vigorous exercise (5 items)	5 = 3+ times a week 4 = 1-2 times a week 3 = 1-3 times a month 2 = less than once a month 1 = never		
Job characteristics			
White-collar worker[a]	1 = white collar, 0 = blue collar	+	+
Requirement of physical effort (4 items)	4 = all or almost all of the time 3 = most of the time 2 = some of the time 1 = none or almost none of the time	?	?
A lot of stress (4 items)	4 = *strongly agree* 3 = *agree* 2 = *disagree* 1 = *strongly disagree*	?	?
Predisposing characteristics			
Age	Number of years	?	—
Education	Actual number years of education	+	+
Gender	1 = male, 0 = female	?	?
White	1 = White, 0 = others	+	+
Black	1 = Black, 0 = others	—	—
Health attitudes			
Heavy drinking	1 = 3-4 drinks a day or more, 0 = otherwise	—	—
Moderate drinking	1 = 1-2 drinks a day or less, 0 = otherwise	?	?
Heavy smoking	1 = smoke 20 cigarettes or more one day, 0 = otherwise	—	—
Moderate smoking	1 = smoke less than 20 cigarettes one day, 0 = otherwise	—	—
Self-Reported health conditions			
Excellent	1 = *excellent*, 0 = others	+	+
Very good	1 = *very good*, 0 = others	+	+
Good	1 = *good*, 0 = others	+	+
Fair	1 = *fair*, 0 = others	—	—
Family/work constraints/offset			
Work hours (hours/week): reported hours of work per week		—	—

(continued)

Table 1 Continued

Variable	*Coding Algorithm*	*Expected Sign on* *Light*	*Vigorous*
Any children younger than 18 at home	1 = yes, 0 = no	—	—
Have spouse/partner	1 = yes, 0 = no	?	?
Spouse working	1 = yes, 0 = no	—	—
Motivation factor			
Spouse exercise level[b] (3 items)	2 = heavy exercise 1 = moderate exercise 0 = little or no exercise	+	+

a. The distinction of white- and blue-collar categories is defined in the text.
b. The three categories of the Spouse Exercise Level variable were defined in terms of spouse responses to both vigorous exercise and light physical activity questions. The variable Exercise contains high level exercise, moderate level exercise, and no exercise. The category High Level Exercise is made up of respondents who do vigorous exercise at least once a week, regardless of level of light physical activity. The Little or No Exercise category contains two groups of respondents: respondents who do both vigorous exercise and light physical activity less than once a month and respondents who never exercise vigorously and perform light physical activity one to three times a month. The Moderate Exercise category was composed of all of the rest of the participants of vigorous exercise and light physical activity.

research has shown that subjective measures similar to those employed here yield empirical relationships with high levels of construct validity (e.g., Boey, 1998). The job physical requirement variable was derived from the HRS question asking how often the statement "My job requires lots of physical effort" is true. It was coded as 4 if *all or almost all of the time*, 3 if *most of the time*, 2 if *some of the time*, 1 if *none or almost none of the time*. Under the generalization theory of work and leisure attitudes, people whose jobs have the highest physical demands will be more likely to engage in physical activities in their leisure time. A negative association is expected under the alternative compensation theory. The variable job-related stress was derived from the HRS question: "My job involves a lot of stress. Do you strongly agree, agree, disagree, or strongly disagree?" *Strongly disagree* is recoded as 1, *disagree* as 2, *agree* as 3, and *strongly agree* as 4. Because the stress associated with a job is different from its physical requirements, generalization and compensation theories of work and leisure attitudes do not have direct implications on the expected sign for this variable. In general, it is not clear whether workers with jobs producing a lot of stress would be more likely to

exercise to alleviate stress or would be less likely to exercise because of fatigue or lack of time.

PREDISPOSING CHARACTERISTICS

Two groups of predisposing factors are specified to control for other variables that may potentially confound relationships between leisure activity and physical job demands: sociodemographics and health attitudes. Sociodemographic variables include age, education, gender, race, and white- or blue-collar occupational status. Studies have shown that involvement in physical activity tends to diminish with increasing age (Gordon et al., 1976; Mills et al., 1996; Ruuskanen & Ruoppila, 1995). However, among the middle-aged population, persons approaching the retirement age may be more aware of their health and may be more likely to do light exercise than the younger middle-aged population.

People with higher levels of education are expected to be more aware of the importance of the health benefits of exercise and are expected to do more light and vigorous exercise than people with less education. Several studies have shown that higher levels of education were associated with frequent participation in exercise (Bennett, 1995; Clark, 1995; Folsom et al., 1991). Education was not a significant factor distinguishing participants of formal exercise programs, however (Mills, et al., 1996; O'Neill & Reid, 1991).

Empirical evidence on gender differences is mixed. Some studies have shown that men are more likely than women to participate in physical activity (Conrad, et al., 1990; Davis et al., 1987; McAuley & Rudolph, 1995; Sloan & Gruman, 1988). Other studies have found gender to be insignificant or only affecting the type of leisure activity performed (Emery et al., 1992; Kuh & Cooper, 1992; O'Neill & Reid, 1991). At least one study found females to have a higher participation rate in health promotion programs than males (Conrad, et al., 1990).

Although one study found no significant racial differences in participation in exercise programs (Mills et al., 1996), several studies have found Blacks to be less likely than Whites to exercise (Burke, et al., 1992; Duelberg, 1992; Folsom, et al., 1991), especially among older women (Washburn, Kline, Lackland, & Wheeler, 1992). Three racial categories (White, Black, other non-White) were characterized by

two dummy variables: White and Black. Other non-White race, composed of Hispanics, Asians, and Native American Indians, served as the omitted racial category. The study sample was too small to permit separate variables for these individual racial groups.

Health attitudes are specified through self-reported measures of drinking and smoking behavior. Drinking behavior is specified through two dummy variables based on the self-reported amount of alcoholic drinks typically consumed per day. Heavy drinking was coded as 1 if one reported 3 or more drinks a day; otherwise it was coded as 0. The moderate drinking variable was coded as 1 if one reported drinking, but no more than 1 to 2 drinks a day; otherwise it is coded as 0. Nondrinkers served as the omitted reference group. Smoking behavior was specified through heavy smoking and moderate smoking dummy variables. Heavy smoking was coded as 1 if one reported smoking 20 cigarettes or more per day; otherwise it was coded as 0. Moderate smoking was coded as 1 if one reported smoking at least 1 but fewer than 20 cigarettes per day, otherwise as 0. Nonsmokers served as the omitted reference group. Heavier smokers and drinkers are expected to be less likely to engage in both light and heavy leisure physical activity.

Enabling Characteristics

Enabling characteristics are measured by self-reported health status, family/work constraints, and motivational factors. Health status is measured by a global self-reported health status. Additional adjustments for chronic illness were tested but no explanatory power was added to the models.[1] Four dummy variables (*excellent*, *very good*, *good*, and *fair*) were specified, with poor self-reported health serving as the omitted reference group. Workers reporting better health are expected to engage in higher levels of both light and vigorous exercise.

Four variables were specified to reflect potential family/work constraints affecting leisure physical activity: working hours per week, have spouse, children under age of 18 who live at home, and spouse working. Working hours are measured by the reported number of hours worked each week (including hours from a second job). Conflict with work has been found to be a common reason for dropping out of an exercise program (Oldridge, 1982). Working a greater number of

hours leaves less leisure time to potentially exercise and raises the opportunity cost of exercise.

The variable children under age of 18 who live at home was specified as a dummy variable reflecting potential childcare responsibility demands. Childcare responsibility may constrain available leisure time and energy to engage in physical activity. Because such added responsibilities may be also arise when one's spouse works, spouse working was specified as a dummy variable for similar reasons. Because all persons do not have spouses, a dummy variable having spouse was specified, and spouse working was coded as 0 if one's spouse did not work or if one had no spouse. Although the influence of spouse is uncertain, an interactive effect of spouse on exercise is posited, depending on whether the spouse works or not.

The exercise behavior of one's spouse may serve as a motivational factor for one's own participation in physical activity (Oldridge, 1982). The variable spouse exercise level was coded as a single composite ordinal variable constructed from light physical activity and vigorous exercise variables with three categories: high, moderate, and no exercise. It is hypothesized that if the spouse performs regular exercise, the respondent will be more likely to participate in physical activity as well. For those workers without a spouse, the variable was also coded as 0.

Results

Descriptive statistics for white-collar worker and blue-collar workers meeting the sample selection criteria are reported in Table 2. There are more white-collar workers (n = 3,722) than blue-collar workers (n = 2,721) in the overall study sample. T test and chi-square statistics show that with the exception of the variable having a spouse, all differences between the sample means of white-collar workers and blue-collar workers were statistically significant ($p < .01$). White-collar workers were less likely than blue-collar workers to report that their job involved much physical effort but more likely to agree that their job involved a lot of stress. Whereas only 10% of white-collar workers reported that their job involved a lot of physical effort all or almost all the time, nearly 38% of blue-collar workers reported this.

Table 2
Descriptive Analysis for White- and Blue-Collar Workers

Variable	*White-Collar* (n = *3,722*)	*Blue-Collar* (n = *2,721*)	p *Value*
Job characteristics			
Physical requirement (%)			.000
None or almost none of the time	45.67	10.88	
Some of the time	32.18	24.17	
Most of the time	11.97	27.48	
All or almost all the time	10.18	37.50	
A lot of job stress (%)	2.97	2.68	.000
Strongly disagree	2.30	4.97	
Disagree	24.60	37.73	
Agree	46.71	41.92	
Strongly agree	26.39	15.38	
Predisposing characteristics			
Age (years)	54.46	55.13	.000
Education (years)	13.89	10.82	.000
Gender (male)	.46	.68	.000
White (White = 1)	.83	.65	.000
Black (Black = 1)	.10	.22	.000
Health attitudes			
Heavy drinking	.05	.07	.000
Moderate drinking	.66	.52	.000
Heavy smoker	.06	.09	.000
Moderate smoker	.16	.22	.000
Enabling characteristics			
Self-reported health conditions (Yes = 1)			
Excellent	.32	.20	.000
Very good	.35	.28	.000
Good	.25	.35	.000
Fair	.06	.14	.000
Family/work constraints/offset			
Work hours (hours/week)	45.09	44.52	.017
Children younger than 18 at home (Yes = 1)	.20	.23	.020
Have spouse (Yes = 1)	.82	.81	.361
Spouse working (Yes = 1)	.58	.47	.000
Motivation factor			
Spouse exercise level (0-2)	.90	.74	.000
Dependent variables			
Light exercise (1-5)	4.09	3.97	.000
Vigorous exercise (1-5)	2.44	2.13	.000

On the contrary, white-collar workers were more likely than blue-collar workers to agree that their job involved a lot of stress. Twenty-

six percent of white-collar workers strongly agreed that their job involved a lot of stress, compared with 15% of blue-collar workers. In addition, white-collar workers were more likely to be younger, to have more education, to be female, and to be White. Furthermore, they reported being healthier, having healthier lifestyles, and to having working spouses who regularly exercised, relative to blue-collar workers. Finally, comparing the mean values of the light exercise and vigorous exercise dependent variables, respondents more frequently participated in light exercise than vigorous exercise. In comparison with blue-collar workers, white-collar workers were more likely to engage in both vigorous exercise and light physical activity. These differences among white-collar and blue-collar workers are statistically significant but modest and do not control for any potential confounding factors.

Table 3 contains the empirical results for white-collar and blue-collar workers' light physical activity and vigorous exercise multiple regression models. Given that the models are fitted with individual level data and the dependent variables are categorical variables, the adjusted *R*-square measures of model fit are quite reasonable. Because most of the relevant covariates have been specified in the models, the low *R*-squares may also suggest the importance of idiosyncratic factors in leisure exercise behavior. The light physical activity models did not fit as well as those vigorous exercise models. Because many more people engage in light physical activity than vigorous exercise, the predictors of light exercise may not be as distinctive as those for vigorous exercise.

Several sensitivity analyses were conducted to test the robustness of the fitted model. First, backward stepwise regression procedures were used to reduce the number of variables in the models ($p < .10$). The reduced-variable models had only slightly lower adjusted *R*-square, and the removal of insignificant variables resulted in no change in the statistical significance of estimated coefficients that were not significant in the fully specified model.

Job characteristics. The empirical results concerning associations between job characteristics and physical activity level differ for white-collar and blue-collar workers. Job physical requirement is positively associated with greater light physical activity for white-collar

Table 3
Results of Multiple Regression Models on Light and Vigorous Physical Activity for White- and Blue-Collar Workers

	Light Activity		*Vigorous Activity*	
Variable	*White-Collar* (n = *3,722*)	*Blue-Collar* (n = *2,721*)	*White-Collar* (n = *3,722*)	*Blue-Collar* (n = *2,721*)
Job characteristics				
Physical requirement (1-4)	.06***	.01	.01	.05**
Stress level (1-4)	–.03*	.00	.02	.04*
Predisposing characteristics				
Age (years)	.03	.01	–.08***	–.08***
Education (years)	.11***	.06**	.11***	.10***
Gender (male = 1)	.10***	.03	.12***	.11***
White (White = 1)	.05*	.09**	.03	–.02
Black (Black = 1)	.00	.07**	.00	–.04
Health attitude				
Heavy drinking	.01	.00	–.01	–.04*
Moderate drinking	.04*	.01	.07***	.05*
Heavy smoker	–.08***	–.06**	–.09***	–.04*
Moderate smoker	–.04*	–.05*	–.06***	–.05*
Enabling characteristics				
Self-reported health conditions (Yes = 1)				
Excellent	.26***	.20***	.34***	.14**
Very good	.18**	.17**	.23***	.05
Good	.14*	.14*	.14*	.01
Fair	.05	.08	.06	–.04
Family/Work constraints/offset				
Workhours (hours/week)	–.04**	–.02	.01	.03
Any children younger than 18 at home (Yes = 1)	.00	.00	.00	.00
Have spouse (Yes = 1)	–.06**	–.04	–.10***	–.06**
Spouse working (Yes = 1)	–.01	–.02	.01	.02
Motivation factor				
Spouse exercise level (0-2)	.10***	.11***	.16***	.11***
Adjusted *R*-square	.07	.04	.12	.09
F statistics	14.609***	6.296***	27.045***	13.855***

* Significant at .05 level.
** Significant at .01 level.
*** Significant at .001 level.

workers but not for blue-collar workers. On the other hand, only blue-collar workers with higher job physical requirement are more likely to do vigorous exercise. The physical requirements of one's job

are not associated with the level of vigorous exercise reported by white-collar workers.

Job stress also appears to have different effects on white- collar and blue-collar workers' exercise behavior. The results suggest that among white-collar workers, those with more stressful jobs are more likely to engage in regular light physical activity. However, vigorous exercise is not associated with job stress. In contrast, among blue-collar workers, those with higher stress level jobs are more likely to engage in regular vigorous exercise. There is no association between job stress and light physical activity, however.

Demographic characteristics. As expected, having more education is associated with greater levels of both light physical activity and vigorous exercise for white-collar and blue-collar workers. Males of both white-collar and blue-collar occupational status were more likely than females to engage in vigorous exercise. Males, among white-collar workers, however, were more likely to engage in lighter physical activities than males among blue-collar workers. Although age is not associated with light physical activity, younger workers, of either white-collar or blue- collar occupations, were more likely to engage in vigorous exercise than older workers. Some racial differences in exercise behavior were found. Blue-collar workers of both White and Black race were more likely to engage in light physical activities than workers of other races. Among white-collar workers, only Whites were more likely to engage in light physical activities. Race is not associated with the vigorous exercise of white-collar workers.

Health attitude and health status. The empirical findings with regard to health attitudes are generally consistent with expectations. Smoking habits have a strong negative impact on exercise behavior. Among both white-collar and blue-collar workers, heavy and moderate smokers were less likely to engage in both light and vigorous exercise than nonsmokers. Among white-collar workers, it is suggested that moderate drinkers were more likely to engage in both light and vigorous exercise. Among blue-collar workers, drinking behavior was associated only with vigorous exercise. Moderate drinkers were more likely, and heavy drinkers were less likely, to engage in regular

vigorous exercise. Finally, better self-reported health has a very strong positive association with both light and vigorous physical activity for both white-collar and blue-collar worker groups.

Family/work constraints and spouse motivation. Similar to our findings with regard to job stress discussed above, the empirical results suggest that long work hours impede white-collar workers from engaging in regular light physical activity. No association was found for blue-collar workers. The results suggest that the effects on leisure physical activity of having a spouse depend very much on whether one's spouse engages in regular leisure physical activity. Although there is a consistent pattern of negative associations between having a spouse and both light and vigorous exercise among both white-collar workers and blue-collar workers, these negative associations may result from the large positive offset effect of spouse participation in exercise. The results suggest that if the spouse engages in little or no exercise, married workers are less likely to exercise than single workers; however, if the spouse engages in a moderate or high level of exercise, then married workers are more likely to exercise than their single counterparts.

Discussion

The main purpose of the study was to investigate the relationship between work and physical activity through an empirical test of the main alternative theories relating work and attitudes to physical leisure activity in the literature. Our empirical results suggest that there are complexities associated with the nature of work in various occupations that preclude a simple conclusion. In general, the empirical results are most supportive of the generalization theory in the sense that white-collar workers who reported that their jobs involved greater physical effort were more likely to engage in light physical activity, relative to other white-collar workers. Among blue-collar workers, those working in jobs with greatest physical requirements were more likely to do vigorous exercise. The empirical results showing no association between physical job requirements and vigorous exercise

among white-collar workers and no association between participation in light physical activity and physical job requirements among blue-collar workers, respectively, appear to be more supportive of the segmentation theory, which states that there is no relationship between work demands and leisure attitudes. However, these results are still largely consistent with the generalization theory, given the nature of work in various occupations.

The empirical results for blue-collar workers are generally very supportive of the generalization theory. Blue-collar workers with higher physically demanding jobs may perceive greater health benefits from vigorous leisure activities than their peers with less physically demanding jobs. A worker may perceive vigorous exercise as a way to improve or maintain his or her physical strength and flexibility and subsequently a way to maintain ability to do his or her job. Alternatively, these differences may relate to perceived self-efficacy—that is, blue-collar workers with more physically demanding jobs may feel more competent to do vigorous exercise (Desmond et al., 1993).

In contrast to blue-collar workers, our study findings suggest that white-collar workers whose jobs have greater physical requirements, less associated stress, and fewer working hours are more likely to engage in regular light physical activity but not vigorous exercise. Because white-collar jobs are likely to have less demanding physical requirements than blue-collar jobs generally, light physical activity may be seen as sufficient to maintain the physical ability needed to perform one's job. In this sense, these findings are also supportive of the generalization theory. Although the factors of exercise may vary, it is most important to note that both white-collar and blue-collar workers' leisure activity behavior is consistent with the generalization theory.

The other notable aspect of our findings is how job stress is associated with the leisure physical activity of blue-collar and white-collar workers. Whereas the study findings suggest that blue-collar workers in more stressful jobs may be more likely to engage in vigorous exercise, presumably as a means of alleviating stress, this relationship was not found for white-collar workers. Rather, it is suggested that white-collar workers in more stressful jobs are less likely to engage in light physical activities in their leisure time. Given the definition of light

physical activity from the HRS questionnaire—walking, dancing, gardening, golfing, etc.—with the exception of walking, these activities are more likely to be seen as recreational activities. White-collar workers with stressful jobs may not have the spirit to do these kinds of activities. In addition, the light physical activities cited as examples in the HRS questionnaire tend to be time-intensive activities. White-collar workers who work long hours under stressful conditions simply may not have time for recreational activities. Although constraints on time could explain why white-collar workers in stressful jobs may be less inclined to perform time-intensive light recreational activities, it is not clear why vigorous exercise activity is not associated with job stress among white-collar workers. The multidimensional aspects of occupational status and workplace demands may simply have complex effects on people's exercise behavior that are difficult to fully disentangle in a simple cross-sectional analysis.

Job demands have changed during the transition from an industrial to a service economy, especially with the wide use of computers. As our study findings are consistent with the generalization theory, there may be some adverse implications stemming from these changes in economic structure. As physically demanding jobs under the traditional blue-collar definition have decreased, there may be some adverse health consequences associated with decreased exercise by blue-collar workers whose jobs have lower physical demands. Education levels in the workforce have increased. Although people with more education are more likely to exercise than people with less education, the positive effects of education may be offset if the stress level of white-collar jobs is increasing throughout time. The empirical findings of this study suggest that the net effect of these changes in the mix of jobs in a service economy is unclear. Research is needed to investigate further the trend of changing from a manufacturing economy to a service economy and its overall impact on leisure physical activity in society. In addition, generalization and compensation theories should be further tested using multiple aspects of physical activity, such as the length, intensity, and frequency of engaging in physical activity. Longitudinal studies are needed to test further the relationship between people's job characteristics and their leisure physical activity.

NOTE

1. A variable defined as a count of all reported current health conditions was specified in addition to self-reported health status to test for possible interactive effects of comorbid conditions. There was no additional explanatory power in the models containing this summary variable. This finding may be the result of the low prevalence of multiple health conditions in the study sample because about 81% of the respondents reported no current health conditions or only one health condition.

REFERENCES

Ardell, D. (1986). *High level wellness*. Berkeley, CA: Ten Speed Press.

Bennett, S. (1995). Cardiovascular risk factors in Australia: Trends in socioeconomic inequalities. *Journal of Epidemiology and Community Health*, *49*(4), 363-372.

Boey, K. W. (1998). Coping and family relationships in stress resistance: A study of job satisfaction of nurses in Singapore. *International Journal of Nursing Studies*, *35*, 353-361.

Burke, G. L., Savage, P. J., Manolio, T. A., Sprafka, J. M., Wagenknecht, L. E., Sidney, S., Perkins, L. L., Liu, K., & Jacobs, D. R. (1992). Correlates of obesity in young Black and White women: The CARDIA Study. *American Journal of Public Health*, *82*(12), 1621-1625.

Burkhauser, R. V., & Gertler, P. J. (1995). Introduction to special issue on the health and retirement survey/data quality and early results. *The Journal of Human Resources*, *30*(Suppl.), S1-S6.

Caldwell, J. (1996). Exercise in the elderly: An overview. *Activities, Adaptation, and Aging*, *20*(3), 3-8.

Clark, D. O. (1995). Racial and educational differences in physical activity among older adults. *The Gerontologist*, *35*(4), 472-480.

Conrad, K., Riedel, J., & Gibbs, J. (1990). Effect of worksite health promotion programs on employee absenteeism: A comparative analysis. *Journal of American Association of Occupational and Health Nursing*, *38*(12), 573-580.

Crespo, C. J., Keteyian, S. J., Heath, G. W., & Sempos, C. T. (1996). Leisure-time physical activity among U.S. adults. Results from the Third National Health and Nutrition Examination Survey. *Archive Internal Medicine*, *156*(1), 93-98.

Davis, K., Jackson, K., Kronenfeld, J., & Blair, S. (1987). Determinants of participation in worksite health promotion activities. *Health Educational Quarterly*, *14*, 195-205.

Desmond, A. W., Conrad, K. M., Montgomery, A., & Simon, K. A. (1993). Factors associated with male workers' engagement in physical activity: White-collar vs. blue-collar workers. *Journal of American Association of Occupational and Health Nursing*, *41*(2), 73-83.

Duelberg, S. I. (1992). Preventive health behavior among Black and White women in urban and rural areas. *Social Science Medicine*, *34*(2), 191-198.

Emery, C. E., Hauck, E. R., & Blumenthal, J. A. (1992). Exercise adherence of maintenance among older adults: 1-year follow-up study. *Psychology and Aging*, *7*(3), 466-470.

Fasting, K. (1982). A prediction model for participation in sport. *International Review of Sport Sociology*, *17*(3), 29-39.

Featherstone, M. (1987). Leisure, symbolic power, and the life course. *Sociological Review Monograph*, *33*, 113-138.

Folsom, A. R., Cook, T. C., Sprafka, J. M., Burke, G. L., Norsted, S. W., & Jacobs, D. R. (1991). Differences in leisure-time physical activity levels between Blacks and Whites in population-based samples: The Minnesota Heart Survey. *Journal of Behavioral Medicine*, *14*(1): 1-9.

Fontane, P. E. (1996). Exercise, fitness, and feeling well. *American Behavior Scientist*, *39*(3), 288-305.

Ford, E. S., Merritt, R. K., Heath, G. W., Powell, K. E., Washburn, R. A., Kriska, A., & Haile, G. (1991). Physical activity behaviors in lower and higher socioeconomic status populations. *American Journal of Epidemiology*, *133*(12), 1246-1256.

Gordon, C., Gaitz, C. M., & Scott, J. (1976). Leisure and lives: Personal expressivity across the life span. In R. H. Binstock & E. Shanas (Eds.), *Handbook of aging and the social sciences* (pp. 310-341). New York: Van Nostrand Reinhold.

Horgan, P. A. (1987). Health status perceptions affect health-related behaviors. *Journal of Gerontological Nursing*, *13*(12), 30-33.

Kari, F. (1982). A predictor model for participation in sport. *International Review of Sport Sociology*, *17*(3), 29-39.

Kelly, J. R., & Godbey, G. (1992). *The sociology of leisure*. State College, PA: Venture.

Kirkcaldy, B. D., & Cooper, C. L. (1993). The relationship between work stress and leisure style: British and German managers. *Human Relations*, *46*(5), 669-680.

Kuh, D. J., & Cooper, C. (1992). Physical activity at 36 years: Patterns and childhood predictors in a longitudinal study. *Journal of Epidemical Community Health*, *46*(2), 114-119.

Le Marchand, L. E., Wilkens, L. R., Kolonel, L. N., Hankin, J. H., Lyu, L. C. (1997). Associations of sedentary lifestyle, obesity, smoking, alcohol use, and diabetes with the risk of colorectal cancer. *Cancer Research*, *57*(21), 4,787-4,794.

McAuley, E., & Rudolph, D. (1995). Physical activity, aging, and psychological well-being. *Journal of Aging and Physical Activity*, *3*(1), 67-96.

Mills, C. W. (1953). *White collar: The American middle classes*. New York: Oxford University Press.

Mills, K. M., Stewart, A. L., King, A. C., Roitz, K., & Sepsis, P. G. (1996). Factors associated with enrollment of older adults into a physical activity promotion program. *Journal of Aging and Health*, *8*(1), 96-113.

Morgan, K., Dallosso, H., Bassey, H., Ebrahim, S., & Fentem, P. H. (1991). Customary physical activity, psychological well-being and successful aging. *Ageing and Society*, *11*, 399-415.

National Institutes of Health Consensus Conference (1996). Physical activity and cardiovascular health. *JAMA*, *276*(3), 241-245.

Oldridge, N. B. (1982). Compliance and exercise in primary and secondary prevention of coronary heart disease: A review. *Preventive Medicine*, *11*, 56-70.

O'Neill, K., & Reid, G. (1991). Perceived barriers to physical activity by older adults. *Canadian Journal of Public Health*, *82*(6), 392-396.

Ruuskanen, J. M., & Ruoppila, I. (1995). Physical activity and psychological well-being among people aged 65 to 84 years. *Age and Aging*, *24*(4), 292-296.

Salminen, S. (1985). Perceived health and exercise: A cross-lagged panel correlation. *Perceptual and Motor Skills*, *60*(2), 637-638.

Shephard, R. J. (1997). What is the optimal type of physical activity to enhance health? *British Journal of Sports Medicine*, *31*(4), 277-284.

Sloan, P., & Gruman, J. C. (1988). Participation in workplace health promotion programs: The contribution of health and organizational factors. *Health Education Quarterly*, *15*, 269-288.

Sutherland, V. J., & Cooper, C. L. (1990). Exercise and stress management: Fit employees, healthy organizations. *International Journal of Sport Psychology*, *21*, 218-236.

U.S. Department of Commerce. (1980). *Standard occupational classification manual*. Washington, DC: Office of Federal Statistical Policy and Standards.

U.S. Department of Health and Human Services. (1996). *Physical Activity and Health: A Report of the Surgeon General Executive Summary.* Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

Washburn, R. A., Kline, G., Lackland, D. T., Wheeler, F. C. (1992). Leisure time physical activity: Are there Black/White differences? *Preventive Medicine*, *21*(1), 127-135.

Wilson, R. L. (1991). *Physical activity, absenteeism, stress, and attitude toward work*. Unpublished doctoral dissertation, University of South Carolina, Columbia.

Wolinsky, F. D., Stump, T. E., & Clark, D. O. (1995). Antecedents and consequences of physical activity and exercise among older adults. *The Gerontologist*, *35*(4), 451-462.