WORK AND HEALTH: INVESTIGATING THE EFFECTS OF WORKLOAD AND

EXHAUSTION ON NUTRITION AND PHYSICAL ACTIVITY BEHAVIORS

by

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(Under the Direction of Mark Wilson)

ABSTRACT

Obesity is a paramount problem of the 21st century. Among working adults, nearly 70% are overweight or obese. High rates of obesity among working adults have detrimental effects on health related quality of life and organizational effectiveness. Current weight loss programs offered in worksite settings use individual strategies to improve nutrition and physical activity behaviors supported by modifications to the physical and social worksite environment to increase access to and support for healthy eating and physical activity. Such approaches have had significant but small effects on weight loss. The effects of workload on nutrition and physical activity has received little attention and has not been investigated in the context of the Job Demands-Resources model. The purpose of this dissertation was to investigate the role of workload and exhaustion on nutrition and physical activity behaviors using the Job Demands-Resources model. Two studies were conducted to examine the relationships between workload, exhaustion, nutrition, and physical activity behaviors. Participants, recruited from Amazon Mechanical Turk, completed three surveys over a four week period. The first study examined the separate, cross-sectional relationships of workload and burnout on

eating behaviors (cognitive restraint, emotional eating, uncontrolled eating), percent of calories from fat, and physical activity using data obtained in the first survey. The second study tested a mediation model where workload, exhaustion, and the nutrition and physical activity behaviors were temporally separated by a two-week period. Structural models and path coefficients were estimated using the two-step approach to structural equation modeling. In the first study, high workload and exhaustion were both related to more emotional and uncontrolled eating and a higher intake of fat. Additionally, exhaustion was related to lower levels of physical activity. In the second study, significant indirect relationships were observed for workload through exhaustion on emotional eating, uncontrolled eating, percent of calories from fat, and physical activity. There was a small but significant indirect relationship between workload and cognitive restraint for females only. Findings from these studies provide evidence that strategies addressing the effects of workload and exhaustion on health behaviors should be incorporated in worksite weight loss programs.

INDEX WORDS: Obesity, Worksite, Workload, Exhaustion, Nutrition, Physical activity, Job demands-resources model, Mediation, Structural equation modeling

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CHAPTER 1

INTRODUCTION

Obesity and work

The United States is in the midst of an obesity epidemic with more than two-thirds of adults identified as overweight or obese and at increased risk for mortality and comorbid conditions including type 2 diabetes and cardiovascular disease (NHLBI, 2013). Nearly 60% of adults in the U.S. work and approximately 69% of working adults are overweight or obese (BLS, 2011; Ogden, Carroll, Kit, & Flegal, 2014). In addition to the increased health risks, obese adults have more work limitations than normal weight employees and cost U.S. businesses more than $73 billion annually in medical costs and lost productivity (Finkelstein, DiBonaventura, Burgess, & Hale, 2010; Hertz, Unger, McDonald, Lustik, & Biddulph-Krentar, 2004).

Weight management and the worksite

Weight loss and management is achieved by creating a calorie deficit through diet and increased physical activity (NHLBI, 2013). In 2009, the U.S. Task Force for Community Preventive Services recommended nutrition and physical activity programs for weight loss in the worksite setting – a recommendation based on a consistent but relatively small effect size of ~2.8 pounds (Anderson et al., 2009). Employers are increasingly offering weight management programs and the worksite serves as an important setting for reaching overweight and obese adults (Gabel et al., 2009). Despite the increasingly common delivery of such programs in the worksite, there is little

evidence that strategies targeting work factors have been incorporated in weight

management programs. This is surprising given that most adults spend the majority of

their waking hours at work, consume one or more meals while at work, and may have

opportunities for physical activity during their work time.

Job demands, burnout, nutrition, and physical activity

There has been a considerable amount of literature on how work factors affect

employee performance; however, there is very little research on how work factors affect

health, particularly nutrition and physical activity behaviors. The studies that have been

conducted are predominantly samples with workers outside of the U.S., cross-sectional in

design and guided by Karesek's Job-Strain Model (Karasek, 1979). Karesek's Job-Strain

model is based on the notion that job strain is the result of a combination of high job

demands and low job control. Of the three studies conducted with U.S. samples, one

focused on a particular occupation – nursing – and the other focused only on working

mothers limiting generalizability of the findings to the larger working population (Chin,

Nam, & Lee, 2016; Johnson & Allen, 2012). Additionally, the authors of these two

studies reported conflicting results for the relationship between job demands and physical

activity. In the study of nurses in California, more nurses who reported high job demands

also reported being physically active (Chin et al., 2016). In contrast, working mothers

who reported strain- and time-based job demands were less active (Johnson & Allen,

2012). A third study was conducted in the U.S. with employees from 32 worksites in

Minnesota and captured a more diverse sample (Hellerstedt & Jeffery, 1997). In this

study, men who had high job demands consumed more calories from fat; however, this

relationship was not observed in women (Hellerstedt & Jeffery, 1997). Additionally, there was no relationship between job demands and physical activity in this sample.

A larger body of literature comes from international studies that exclusively used cross-sectional designs. While these studies contribute to our knowledge base, there is evidence that work, and particularly work demands (hours worked), differs between countries such that U.S. workers work more hours than workers in other countries (oecd.stat). Like the studies in the U.S., some of the findings from international studies are also conflicting and many of the studies report results that differ by sex as did the U.S. study of employees in Minnesota. For example, Dutch women, but not men, who had lower job demands also had lower intake of fruits and vegetables (Van Loon, Tijhuis, Surtees, & Ormel, 2000). Lallukka et al. (2004) used a broader definition of a healthy diet and concluded that women with fewer demands, more control, and mentally strenuous work had a healthier diet based on the Finnish dietary recommendations (fruits, vegetables, whole grains, fish, healthy oils). Some of the discrepancies between these studies could be due to the use of different constructs for diet (overall healthy diet, fruit and vegetable intake) and physical activity (exercise, physical inactivity). Additionally, the guiding theory in the majority of these studies is Karesek's job-strain model, which may not sufficiently represent the relationship between work factors and health behaviors.

A consequence of chronic high job demands is the development of burnout (exhaustion). Our knowledge of the effects of burnout on nutrition and physical activity behaviors is relatively small and restricted to studies either outside the U.S. or in a specific occupation. For example, burnout has been associated with increased fast food

consumption and decreased physical activity in medical professionals in Mediterranean countries (Alexandrova-Karamanova et al., 2016). Burnout has also been associated with negative eating behaviors, high levels of emotional eating and uncontrolled eating, in Finnish women (Nevanperä et al., 2012). Additionally, burnout has also been associated with low levels of physical activity in workers in Finland (Ahola et al., 2012). The evidence for relationships between burnout and physical activity behaviors, in particular, comes from cross-sectional studies that do not allow us to determine whether burnout leads to physical inactivity or whether physical inactivity contributes to burnout. Indeed, there is evidence that the latter is true. That is that physical inactivity predicts the development of burnout (Carson, Baumgartner, Matthews, & Tsouloupas, 2010; Olson, Odo, Duran, Pereira, & Mandel, 2014).

The proposed research seeks to expand and clarify our knowledge on the cross-sectional relationships between both job demands and burnout and nutrition and physical activity behaviors. Specifically, the proposed research will be conducted with a representative sample of U.S. workers increasing the generalizability of the findings to the U.S. working population. I propose two nutrition outcomes to capture both how and what people eat – eating behaviors and fat intake. Previous studies on job demands have not examined eating behaviors as an outcome and previous studies on burnout have not included calories from fat as an outcome. Further, this research will investigate these relationships in a mediated model guided by the Job-Demands and Resources model (JD-R). Given the discrepancies in the literature on effects that differ by sex, I will include a research question to explore differences in the hypothesized relationships by sex.

Job Demands-Resources model (JD-R)

The JD-R provides a useful framework for examining the relationship between work, nutrition and physical activity. The JD-R model extends Karasek's Job-Strain model to account for both the negative and positive aspects of a job, the interaction of job demands and job resources, and the mediating role of burnout on impaired health behaviors (Bakker & Demerouti, 2007). Job demands are physical, social or organizational features of the job or occupation that require effort and energy from an employee and, therefore, have physiological and psychological costs. Additionally the model posits that chronic job demands deplete an employee's mental and physical resources and lead to exhaustion and health problems (Bakker & Demerouti, 2007). Previous studies using the JD-R model have predominantly focused on interpersonal, attitudinal, and organizational outcomes (Demerouti & Bakker, 2011). The present research is guided by the proposed health impairment process of the JD-R model and expands the model beyond organizational outcomes to key behaviors for weight loss - nutrition and physical activity.

Purpose of the study

Given the high incidence of overweight and obesity among working adults, the negative impact of obesity on both organizational and individual outcomes, and the small effects of current weight loss programs in worksite settings, there is a critical need to understand how work affects nutrition and physical activity behaviors.

The *long-term goal* of this project is to understand how job demands and exhaustion are related to nutrition and physical activity behaviors in a diverse, U.S. sample of working adults. This project is divided into two studies using data from three

administrations of the same survey instrument. The first study will use data obtained in the first administration of the survey (Time 1) to investigate cross-sectional relationships between job demands and exhaustion, and nutrition and physical activity behaviors. Additionally, relationships will be modeled separately for males and females to determine if results differ by sex. The second study uses the JD-R framework to test a moderated mediation model of job demands and nutrition and physical activity behaviors mediated through exhaustion (burnout). As in Study 1, we will explore whether the relationships differ by sex.

These studies contribute to the literature in several ways. First, data for the studies will be obtained from a diverse sample of working adults in the U.S., increasing the generalizability to a variety of U.S. workers. Second, these studies examine both cross-sectional relationships and time-separated indirect effects with a temporal sequencing between the predictor, mediator, and the outcomes. Third, in both studies nutrition is conceptualized to include both what people eat (calories from fat) and how people eat (eating behaviors). Finally, data will be analyzed using structural equation modeling to account for measurement error and simultaneously estimate the parameters for eating behaviors, calories from fat, and physical activity.

It is expected that knowledge gained from these studies will further our understanding of how work factors affect nutrition and physical activity behaviors – critical behaviors in weight loss and management. This knowledge is expected to inform strategies that target work factors (decreasing demands, increasing resources), which can be tested in future studies for their potential to increase the effectiveness of weight loss

programs in worksites and, more broadly, working adults. Such strategies are expected to improve individual health outcomes, reduce productivity loss and lower health care costs.

Specific aims

The study aims will be tested in two studies using a survey administered at three time points over 4 weeks. Study 1 will use data collected during the first administration only (Time 1) to test the cross-sectional relationships hypothesized in Aims 1-2. Study 2 will use data collected in all three administrations (Time 1, 2, and 3) to test a mediation model with temporal sequencing between the predictor variables, mediator, and the outcomes. The hypothesized relationships tested in Study 2 are described in Aim 3 below.

Aim 1 – Examine the cross-sectional relationship between job demands and nutrition and physical activity (Figure 1.1).

H1: Job demands will be have a significant negative relationship with cognitive restraint and a significant positive relationship with uncontrolled eating and emotional eating.

H2: Job demands will have a significant positive relationship with percent of calories from fat.

H3: Job demands will have a significant negative relationship with moderate and vigorous physical activity.

Aim 2 – Examine the cross-sectional relationship between exhaustion (burnout) and nutrition and physical activity (Figure 1.2).

H4: Exhaustion will be negatively related to cognitive restraint and positively related to uncontrolled eating and emotional eating.

H5: Exhaustion will be positively related to percent of calories from fat.

H6: Exhaustion will be negatively related to moderate and vigorous physical activity.

Research Question 1: Are effects of job demands and exhaustion on nutrition and physical activity moderated by sex?

Aim 3 – Investigate whether there is an indirect effect between job demands and health behaviors through exhaustion (Figure 1.3).

H7: There will be an indirect effect between job demands and cognitive restraint, uncontrolled eating, and emotional eating through exhaustion.

H8: There will be an indirect effect between job demands and percent of calories from fat through exhaustion.

H9: There will be an indirect effect between job demands and physical activity through exhaustion.

Research Question 2: Are the indirect effects of job demands on nutrition and physical activity moderated by sex?
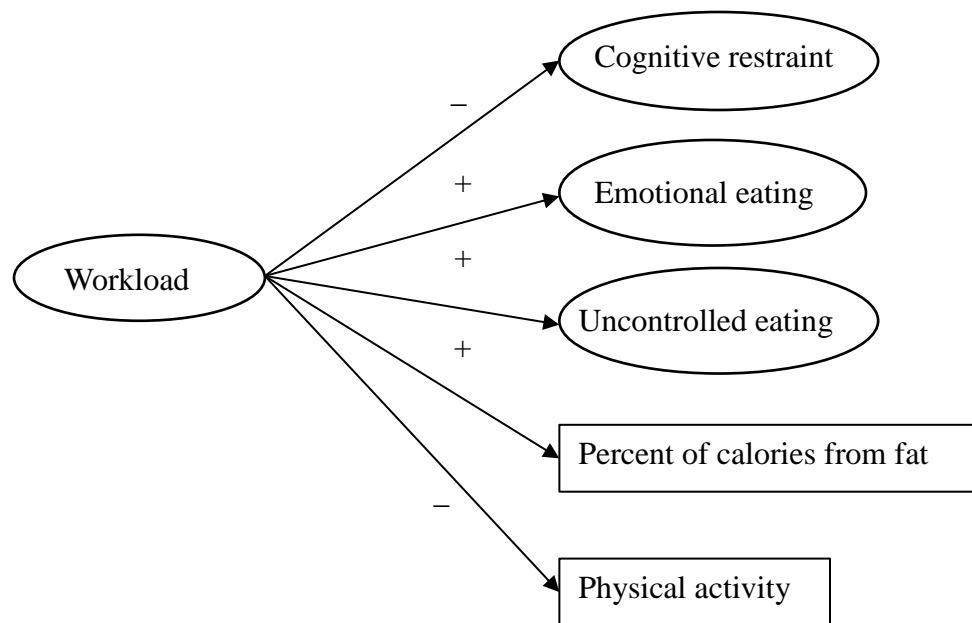
Figure 1.1. Hypothesized cross-sectional associations between job demands and health behaviors.
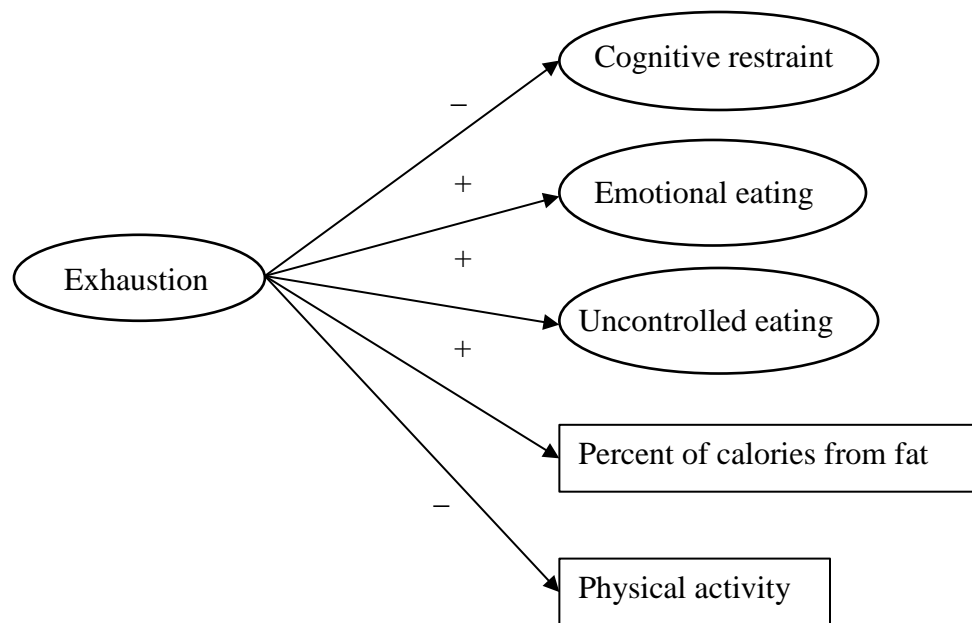
Figure 1.2. Hypothesized cross-sectional associations between exhaustion and health behaviors.

Time 1   *Time 2*   *Time 3*

Cognitive restraint

Emotional eating

Uncontrolled eating

Workload → Exhaustion

−
+
+
+
−

Percent of calories from fat

Physical activity
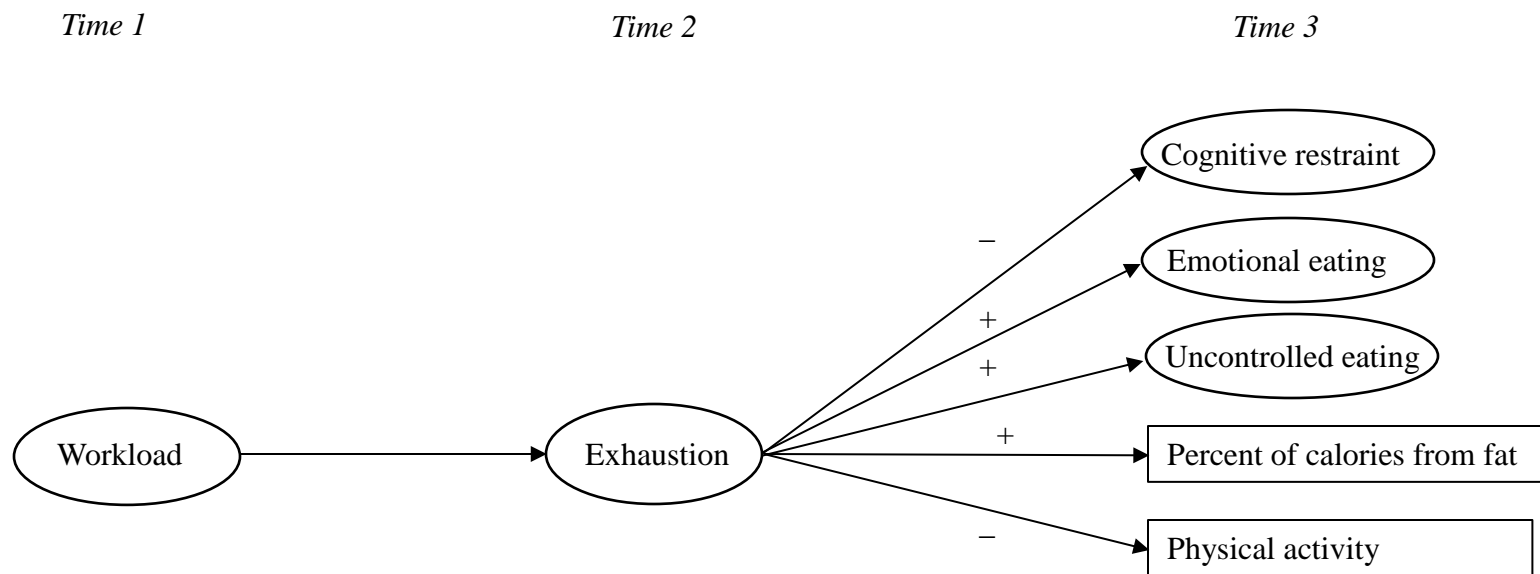
Figure 1.3. Time-separated mediation model testing indirect effects of workload on health behaviors through exhaustion.

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CHAPTER 2

LITERATURE REVIEW

Obesity

In the United States, 71% of adults are either overweight or obese (NAS, 2016).

More than 82 million Americans are obese – an increase of about 7% since the year 2000

(NAS, 2016). Obese individuals are at increased risk for mortality and co-morbid

conditions including hypertension, dyslipidemia, type 2 diabetes, coronary heart disease,

stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and some

cancers (NHLBI, 2013). In 2008 dollars, medical care costs for obesity were estimated to

be $147 billion including physician visits, prescription drugs, and outpatient and inpatient

hospitalizations (Finkelstein et al., 2010). In 2000, the National Heart Lung and Blood

Institute (NHLBI) established classifications for overweight and obesity based on a body

mass index of $25 - 29.9$ kg/m^2 and >30 kg/m^2, respectively (NHLBI, 2000).

Obesity and work

Nearly 60% of the U.S. population work and spend on average 8.8 hours at work

(BLS, 2011). Approximately 69% of working adults are overweight or obese (Ogden et

al., 2014) and at risk for co-morbid conditions including type 2 diabetes and

cardiovascular disease (NHLBI, 2013). In addition to the increased risk for multiple

chronic conditions, obese employees have more work limitations and lower productivity

compared to normal weight employees (Hertz et al., 2004). Recent estimates suggest that

obesity-related conditions cost U.S. businesses $73 billion annually from increased

medical expenditures and lost productivity from both absenteeism and presenteeism (Finkelstein et al., 2010).

Weight management

Weight management and weight loss are complex and multifactorial with genetic, individual, behavioral, and environmental factors influencing body weight outcomes. Nonetheless, the benefits of weight loss are well-established and include reduced risk of diabetes, improved blood pressure, and improved cholesterol/lipid profile (Jensen et al., 2014; Knowler et al., 2002; NHLBI, 2013). While recognizing the complexity of overweight and obesity, NHLBI noted that effective weight loss and weight loss maintenance results from long-term changes in nutrition and physical activity behaviors (NHLBI, 2013). In 2000, NHLBI recommended weight loss therapy for overweight and obese individuals that included a combination of reduced calorie intake, increased physical activity, and behavioral therapy to increase compliance with the diet and physical activity recommendations (NHLBI, 2000).

In 2013, the original recommendations were updated in the American Heart Association/American College of Cardiology/The Obesity Society (AHA/ACC/TOC) Guidelines for the Management of Overweight and Obesity in Adults (Jensen et al., 2014). The AHA/ACC/TOC concluded that an energy deficit was needed to achieve weight loss and that a variety of diet strategies could be used to effectively achieve that deficit including a low-fat diet. Additionally, the AHA/ACC/TOC reaffirmed the previous NHLBI recommendation indicating that there is a high level of evidence for the effectiveness of a combination of a reduced calorie diet, increased physical activity, and behavioral therapy for the management of overweight and obesity (Jensen et al., 2014;

NHLBI, 2013). A clinical trial of the Diabetes Prevention Program lifestyle intervention successfully demonstrated that a combination of a low-fat diet, moderate levels of physical activity, and behavioral strategies could we be used to achieve weight loss (Knowler et al., 2002; The Diabetes Prevention Program Research Group, 2002).

In addition to what people eat, how people eat is also important for weight management. The Three-Factor Eating Questionnaire (TFEQ) was developed to measure three eating factors purported to be important for weight management – cognitive restraint, disinhibition (uncontrolled eating) and hunger (Stunkard & Messick, 1985). Cognitive restraint is the conscious control of food intake to manage weight (i.e. prevent gain or achieve loss). For example, eating smaller portions and avoiding foods thought to promote weight gain. Disinhibition or uncontrolled eating is in the inability to control food intake in certain situations even when not hungry. For instance, eating when others are eating even if not hungry, eating due to negative or positive feelings, or the inability to resist eating when you see or smell food even if not hungry. Finally, hunger is our susceptibility to feelings of hunger and the likelihood that we consume foods in response to our feelings of hunger. In this case, feeling so hungry that one eats all the time.

Of the three factors, disinhibition, has the strongest associations with increased body weight and body mass index (Bryant, King, & Blundell, 2008). In addition to the associations with overweight and obesity, disinhibition is associated with poor food choices and is a predictor of weight regain after weight loss, regardless of dietary approach (Bryant et al., 2008). In a weight loss program of obese women, baseline restraint scores were positively associated with lower body weight and higher disinhibition scores were associated with more binge eating (Foster et al., 1998). After

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the weight loss intervention, women who lost weight had increased restraint scores and decreased disinhibition and hunger scores suggesting that these eating factors are modifiable by behavioral therapy (Foster et al., 1998). In a study of working adults, disinhibition and hunger were associated with higher BMI (French, Mitchell, Finlayson, Blundell, & Jeffery, 2014). Indeed, the behavioral strategies used in weight loss programs, such as DPP, often target eating factors to increase cognitive restraint, decrease disinhibition or uncontrolled eating, and to recognize and respond appropriately to feelings of hunger.

Worksite interventions for weight management

In 2009, the U.S. Task Force for Community Preventive Services published recommendations for nutrition and physical activity interventions for weight management at the worksite (Anderson et al., 2009). Anderson and colleagues (2009) concluded that worksite programs that included nutrition and/or physical activity strategies produced a consistent but small weight loss of ~2.8 pounds. The Task Force recommendation is consistent with NHLBI recommendations for nutrition, physical activity, and behavioral interventions (NHLBI, 2000; NHLBI, 2013). Around the same time as the recommendation was issued, Gabel et al. (2009) reported that both employers and employees believe that weight management programs offered at the worksite are effective and appropriate. Additionally, Gabel and colleagues (2009) reported that employers are increasingly improving the availability of healthy foods in the vending machines and cafeterias, offering discounted or free gym memberships, posting nutritional information in cafeterias, offering health coaching, and classes on nutrition. More recently, the lifestyle intervention of the Diabetes Prevention Program has been

translated to worksites for weight management (Wilson et al., 2016; Wilson, Dejoy, Vandenberg, Padilla, & Davis, 2016).

Worksite weight loss programs are capitalizing on the worksite setting as a way to reach a large population of adults and the eagerness of employers to find a way to control health care costs associated with rising rates of obesity among their workforce. Such programs have taken the strategies used in other settings and recommended by both NHLBI and the Community Guide and made them available at the worksite. Typically, the effects of such weight loss programs offered in the worksite are lower than the effects of the same programs offered in clinical settings. One possible explanation for the reduced effect seen in the worksite setting is that work factors affect the nutrition and physical activity behaviors needed for effective weight loss. Currently, there is limited evidence in the scientific literature about how work factors affect nutrition and physical activity behaviors. Armed with such information, worksite programs could include strategies to address work factors that may increase the effectiveness of weight loss programs offered in the work setting.

Work, nutrition, and physical activity

The literature on work factors and nutrition and physical behaviors has several themes. First, most of the research is conducted outside of the U.S. Second, the studies are predominantly cross-sectional and informed by the Karesek's Job-Strain Model (1979). The Job-Strain model purports that work demands and job control interact and jobs can be classified according to this interaction into four types: passive (low demands, low control), low strain (low demands, high control), high strain (high demands, low control), and active (high demands, high control) jobs. Finally, several studies use one-

item measures for diet or physical activity or measured intentions rather than behavior. Table 1 provides an overview of this literature.

Because much of the current research is conducted outside of the U.S., particularly in European countries, there is a question of whether the results can be generalized to the U.S. workforce. While there are a number of similarities between the U.S. and other countries, there is also evidence that work differs between countries. In particular, data on average hours worked per typical week reveal that U.S. workers work more hours in a typical week compared to workers in other countries. Americans work six, four, and two more hours than workers in Denmark, Germany, Finland and the UK, respectively (oecd.stat).

As for studies in the U.S., two studies investigated the relationship between work factors and physical activity in specific populations (nurses and employed mothers) limiting the generalizability of these findings to other workers (Chin et al., 2016; Johnson & Allen, 2012). Chin et al. (2016) found that a higher proportion of nurses who reported high job demands were physically active while nurses who reported low job demands were not. Additionally, nurses who reported passive jobs were the least likely to be physically active. In contrast, Johnson & Allen (2012) reported a significant negative relationship between both strain- and time-based job demands and physical activity in working mothers. In a more representative sample, Hellerstedt & Jeffery (1997) reported differences by sex for the relationship between work factors and nutrition using data from the Healthy Worker project, which includes employees from 32 worksites in Minnesota who were participating in a weight loss study. Specifically, men who reported the highest job demands consumed more calories from fat compared to men with the lowest job

demands; however, there was no relationship between job demands and calories from fat for women. Additionally, men who had low strain jobs (low demands, high control) consumed fewer calories from high-fat foods compared to those with high-strain and active jobs. For exercise, men and women who reported the lowest job control exercised less compared to all other men and women, respectively. Men with passive jobs reported less exercise while women in active jobs exercised more than women in other groups. These studies suggest a relationship between job demands, nutrition, and physical activity; however, the direction of this relationship for both men and women in a variety of occupations needs to be clarified.

Notwithstanding, the evidence from studies in other countries contributes to our knowledge on these relationships. Three studies were not cross-sectional and are described first. One was a large meta-analysis of 14 European cohort studies using the Job-Strain model (Fransson et al., 2012). In this meta-analysis, data from ten cross-sectional studies suggests that participants who had high strain or passive jobs were more likely to be physically inactive during leisure time when compared to participants in low-strain jobs. In six prospective studies, participants who were physically active at baseline and who reported high-strain or passive jobs had increased odds of becoming physically inactive at follow-up. Second, a daily diary study of employees in Northern England reported differences by sex (Jones, O'Connor, Conner, McMillan, & Ferguson, 2007). For women, long work hours were associated with increased intake of high-fat and high sugar snacks and reduced likelihood of exercise. In contrast, there was no relationship between job factors and diet or exercise for men; however, high job demands among women was associated with lower likelihood of exercise. Finally, in a longitudinal study

of employees in the UK, employees who had low job demands had increased perceived behavioral control over exercise. Participants with lower job demands, lower job control, and those in passive jobs had increased intention to consume sweets and snack food; however, participants with high levels of job control and low strain jobs consumed more sweets and snack foods.

Cross-sectional studies in countries outside the U.S. have provided mixed results but all report relationships that differ by sex. In a study of Dutch employees, Van Loon et al., (2000) reported that in women, but not men, a higher proportion of participants who reported low job demands or low job control reported lower intake of fruits and vegetables. In contrast, Lallukka et al. (2004) reported that, for women, low demands and high control and mentally strenuous work were associated with a healthier diet. Women who were more satisfied with their work-home life and did physically strenuous work engaged in more physical activity and those who reported more work fatigue engaged in less activity. In men, no working conditions were associated with a healthy diet or physical activity. Similarly, Kouvonen and colleagues (Kouvonen et al., 2005) reported differences by sex in a sample of Finnish hospital personnel. Such that, women who had passive jobs and high strain jobs had lower physical activity when compared to women who had low strain jobs. For men, those who had active jobs, passive jobs, and high strain jobs had lower physical activity than those in low strain jobs. For both men and women there was no relationship between job demands and physical activity. Nomura & Nakao (2010) conducted a study of male, white-collar workers in Japan and found that workers who reported a healthy diet and exercise also reported a higher degree of job control, lower job demands and strain.

One study of employed adults in Malaysia and the UK looked at intentions rather than behavior and found that higher job demands were associated with lower intentions to consume a low-fat diet (Shukri, Jones, & Conner, 2016). Finally, several of the studies reviewed above used one-item measures for physical activity (Johnson & Allen, 2012; Payne, Jones, & Harris, 2005) or for both diet and physical activity (Nomura & Nakao, 2010). While a single-item measure is easier to use in a survey, it is unlikely that a single item could adequately and reliably capture a complex behavior like physical activity or nutrition.

In summary, most of what we know about work factors and nutrition and physical activity behaviors comes from cross-sectional studies and samples outside of the U.S. or from specific populations within the U.S. This raises the question of whether these findings apply to workers in the U.S. and in a variety of occupations. Further, the findings from studies conflict with one another. The conflict could be due to the different ways in which diet or exercise were measured. Nutrition, in particular, is a complex behavior that requires a series of decisions to be made by the person daily. Some of the studies measured one aspect of diet like fruits and vegetables while others measured fat or relied on a one-item assessment of diet by the participant. None of the studies identified looked at relationships between job demands and eating factors like cognitive restraint, uncontrolled eating, or emotional eating. Like nutrition, physical activity was measured by various instruments in this study including one-item measures. Overall, there is a suggestion that reported relationships differ by sex. Research is needed in a representative sample of U.S. workers using valid and reliable measures of nutrition and

physical activity with a sufficient sample size to explore differences in relationships by sex.

Burnout, nutrition, and physical activity

Burnout is a consequence of chronic high job demands that lead to a state of exhaustion (Maslach & Jackson, 1981). Compared to work demands, there is a smaller body of literature examining the effects of burnout on nutrition and physical activity behaviors; however, like the data on work demands studies are conducted in countries other than the U.S. or focus on a specific occupation. In a cross-sectional study of medical professionals in multiple Mediterranean countries, burnout was found to be associated with increased fast food consumption and decreased activity (Alexandrova-Karamanova et al., 2016). In a longitudinal study of women in Finland, emotional and uncontrolled eating, as measured by the 3-Factor Eating Questionnaire, were found to be higher among those with burnout at baseline and 12 months (Nevanperä et al., 2012). In a large population-based study in Finland, burnout was related to low physical activity levels (Ahola et al., 2012).

Unfortunately, these cross-sectional relationships cannot tell us whether the burnout results in low physical activity or if low physical activity leads to burnout. A number of studies have focused on physical inactivity as a predictor of burnout. In fact, several studies in the U.S. with specific populations have shown that physical activity predicts burnout. For example, in a cross-sectional study of childcare teachers, workplace physical activity and leisure-time physical activity predicted exhaustion and had superior fit to a model where the exhaustion was used to predict physical activity (Carson et al., 2010). In a different study, internal medicine residents who met physical activity

guidelines were less likely to report burnout than residents who did not meet physical

activity guidelines (Olson et al., 2014). Overall, there seems to be a relationship between

burnout and eating behaviors and physical activity. However, our knowledge of how

burnout is related to nutrition and physical activity is relatively limited by the cross-

sectional design of studies, samples drawn from countries other than the U.S. or from a

specific occupation, and the focus on one aspect of the diet such as fast food

consumption.

Job Demands-Resources model

The Job Demands and Resources Model (JD-R) is a useful model for

investigating the relationship between work and health behaviors important to weight loss

and offers some advantages over Karesek's Job Strain model. According to the Job

Demands-Resources model, employees in any occupation are exposed to job factors

which can be classified as either job demands or resources (Bakker & Demerouti, 2007).

Job demands are physical, social or organizational features of the job or occupation that

require effort and energy from an employee (Bakker & Demerouti, 2007). Job resources

are features of the job or occupation that help an employee achieve work goals, reduce

job demands or the costs associated with the demands, or stimulate personal growth and

development. This model accounts for both the negative and positive aspects of a job, the

separate and main effects of both job demands and job resources, and the interaction of

job demands and job resources (Bakker & Demerouti, 2007).

In addition to the specification of job demands and job resources, JD-R is a dual-

process model (Bakker & Demerouti, 2007). The first process of the model is the health

impairment process. In this process, chronic job demands deplete an employee's mental

and physical resources and lead to exhaustion and health problems. Exhaustion and health problems are proposed to occur through increased activation of the autonomic and endocrine processes or increased effort to control the demands. The second process in the JD-R model is a motivational process where job resources are proposed to have motivational potential and lead to improved organizational outcomes. In the absence of adequate resources, withdrawal or disengagement occur.

The JD-R model was later updated to specify burnout as a mediator of the relationship between job demands and negative organizational outcomes and engagement as the mediator of the relationship between job resources and performance (Schaufeli & Taris, 2014). The revised JD-R model is shown in Figure 2.1. Research using the JD-R model has confirmed these relationships – that high job demands are associated with exhaustion and absenteeism and inadequate resources are associated with disengagement (Bakker, Demerouti, & Schaufeli, 2003; Bakker, Demerouti, & Verbeke, 2004; Bakker, Demerouti, & Euwema, 2005; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Hansen, Sverke, & Naswall, 2009; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007).

As specified in the JD-R model, chronic high job demands eventually lead to exhaustion and a depletion of energy (Demerouti et al., 2001). In the early stages of elevated job demands, strategies are typically put in place to try to reduce or cope with the stress of high job demands and can result in fatigue and lead to risky choices (Demerouti et al., 2001). Burnout was initially described by Maslach, Schaufeeli, & Leiter (Maslach, Schaufeli, & Leiter, 2001) to have three dimensions – exhaustion (receives the most attention), cynicism, and professional efficacy. Burnout and,

particularly the exhaustion dimension, has been linked to job performance including absenteeism, turnover intentions, turnover, and job satisfaction (Bakker et al., 2004; Bakker, Van Emmerik, & Van Riet, 2008; Maslach et al., 2001). Job demands are important predictors of burnout at work (Bakker et al., 2003; Bakker & Demerouti, 2007b).

Most of the early burnout studies were conducted in occupations of "people work," such as teachers and healthcare workers, using the Maslach Burnout Inventory (MBI; (Demerouti et al., 2001). Criticisms of this approach are that workers in occupations that do not involve people work or service may also experience burnout (Demerouti et al., 2001). Further, the psychometric structure of the MBI instrument has been criticized for having exhaustion and cynicism negatively worded and the professional efficacy dimension worded positively (Demerouti et al., 2001). In response to such criticisms, an alternate measure was developed - the Oldenburg Burnout Inventory (OLBI). The OLBI used good psychometric practices of including both positive and negative worded items and has been validated among a variety of occupations (Demerouti & Bakker, 2008). In contrast to the 3-factor burnout measure of the MBI, the OLBI measure two dimensions: exhaustion and disengagement from work (Demerouti et al., 2001). Exhaustion was broadened from the original definition of only affective strain to include physical and cognitive strain and disengagement refers to a person distancing themselves from their work and the development of negative attitudes toward work (Demerouti et al., 2001).

Previous studies using the JD-R model have predominantly focused on interpersonal, attitudinal, and organizational outcomes (Demerouti & Bakker, 2011). The

evidence linking the JD-R model with objective health indicators has been relatively

limited (Demerouti & Bakker, 2011). The current study guided by the health impairment

process of the JD-R model proposes that high job demands lead to a depletion of mental

and physical energy resulting in exhaustion/burnout, which compromises the ability to

engage in healthy eating behaviors, make good food choices, and be physically active to

manage body weight (Figure 2.2).

In summary, a high incidence of overweight and obesity affects working adults

and the organizations they work for and have very real costs both in health quality of life

for the individual and organizational effectiveness for businesses. The evidence is strong

that a calorie deficit through nutrition strategies, including a low-fat diet, and increased

physical activity along with behavioral therapy is effective for weight loss. There is a

small and somewhat conflicting body of literature on how work affects nutrition and

physical activity behaviors. Most studies have found negative relationships between job

factors and nutrition and physical activity behaviors but a few have found that high job

demands were associated with improved nutrition - more fruit and vegetable intake - and

physical activity. The studies conducted thus far have been largely cross-sectional and

focused on one aspect of diet such as fruits and vegetables or fast food, in particular.

Additionally, the study samples have largely been outside of the U.S. or focused on a

particular occupation. Given the differences in the hours worked between countries, there

is reason to believe that the data from international studies cannot be used to draw

conclusions about U.S. workers. In this project, I propose two studies. The first is a

cross-sectional investigation that broadens the previous knowledge base to include a

more representative sample of U.S. workers and to include eating behaviors as a

dependent variable, which has not been included in previous studies with job demands. Calories from fat will also be included as a dependent variable – the relationship of this variable with burnout has not been investigated previously. Finally, I will explore the potential differences in observed relationships by sex. The second study will employ a novel mediation model based on the JD-R framework to examine indirect relationships between job demands, exhaustion, and nutrition and physical activity. Again, potential differences in observed relationships between sexes will be explored. Understanding such relationships are critical to increasing the effectiveness of weight loss programs in the worksite setting and improving weight management in working adults more broadly.

Table 2.1. Summary of studies investigating the relationship between work factors and nutrition and physical activity behaviors.

Author	Population	Design	IV	DV	Results
Van Loon et al., 2000	Dutch employees	Cross-sectional	Job demands, control, support	Low intake of fruit and vegetables (FFQ) – dichotomized by median Lack of physical activity (Baecke) – three categorized as high, medium and low	For women, a higher proportion of participants who reported low job demands or low job control reported lower intake of fruits and vegetables For men, a higher proportion of those with low job support reported low physical activity as compared to men who reported high job support
Lallukka et al., 2004	Finnish employees	Cross-sectional	Job demands, job control, physically and mentally strenuous work, work fatigue, working overtime, satisfaction with work-home interface	Dietary habits measured using 22-item FFQ and classified as healthy according to Finnish dietary recommendations Leisure-time physical activity	In women, low demands and high control were associated with a healthier diet. Also, more mentally strenuous work was associated with a healthier diet. Women who were more satisfied with their work-home life and did physically strenuous work engaged in more physical activity and those who reported more work fatigue reported less activity In men, no working conditions were associated with a healthy diet or physical activity.
Payne et al., 2005	UK employees	Two-time points – baseline and 1 week later	Job demands and control	Intention to exercise Intention to eat healthily	Low job demands were associated with increase perceived behavioral control over exercise Participants with lower levels of job demands, lower levels of job control,

Author	Population	Design	IV	DV	Results
				Exercise (1-item assessment) Healthy eating behavior (FFQ) activity	and those in low job demand/low job control positions intended to consume more sweets and snacks People with low levels of job demands, people with high levels of job control, and people with jobs that had both low levels of demand with high control were more likely to realize their intention to eat junk food
Nomura & Nakao, 2010	Japanese male, white-collar workers	Cross-sectional	Job stress	Healthy behaviors of diet and exercise (1-item assessment)	Healthy behaviors were associated with lower job demands and higher job control
Shukri et al., 2016	UK and Malaysian employees	Cross-sectional	Job demands Job resources Work-family conflict	Intention, attitude, and norms for fruit and vegetable intake	Job demands, job resources, and work-family conflict did not predict intention to consume fruits and vegetables Higher job demands were associated with lower low-fat diet intention with women being more likely than men to intend to eat a low-fat diet. This relationship was partially mediated by self-efficacy and attitude
Jones et al., 2007	Northern England employees	Diary study	Job demands Job control Social support	Daily snack consumption Daily exercise	For women, long work hours was associated with increased intake of high-fat and high sugar snacks and reduced likelihood of exercise For men, no relationship between job factors and diet or exercise For men, high job demands was associated with lower likelihood of exercise

Author	Population	Design	IV	DV	Results
Hellerstedt & Jeffery, 1997	U.S. workers	Cross-sectional	Job demands Job control	Exercise Dietary fat intake (FFQ)	Men with the highest demands consumed more calories from fat Men with the lowest job control exercised less than men in other categories Women with the lowest job control reported less exercise Men with passive jobs (low demand, low control) reported less exercise than other men Men with low strain jobs (low demand, high control) reported fewer calories from high-fat foods compared to those with high-strain and active jobs Women in active jobs exercised more than women in other groups
Fransson et al., 2012	14 European cohort studies	Systematic review and meta-analysis	Job demands Job control	Physical inactivity (no or very little moderate or vigorous leisure-time physical activity	Cross-sectional studies – participants who had high-strain or passive jobs were more likely to be physical inactive during leisure time compared with low-strain jobs (10 studies) Prospective – For participants who were physically active at baseline, there was increased odds of becoming physically inactive at follow-up among those who at baseline had high-strain or passive jobs compared with those who had low-strain jobs (6 studies)
Kouvonen et al., 2005	Finnish employees	Cross-sectional	Job demands Job control	Physical activity	Women with passive jobs and high strain jobs had lower physical activity compared to low job strain. Women with low job control had lower physical

Author	Population	Design	IV	DV	Results
					activity compared to those with high job control
					Men with active jobs, passive jobs, high strain jobs had lower physical activity compared to those in low strain jobs
					Men with low job control had lower physical activity compared to those with high job control.
					No relationship between job demands and physical activity
Chin et al., 2016	California nurses	Cross-sectional	Physical workload Job demands Job control	Leisure-time activity (BRFSS)	A higher proportion of nurses with high job demands reported physical activity compared to those with low job demands
					Nurses who reported passive jobs had the lowest prevalence of physical activity
Johnson & Allen, 2012	Working mothers in the U.S.	Two time points	Job demands	Physical activity (single item)	There was a significant negative relationship between both strain and time-based job demands and physical activity
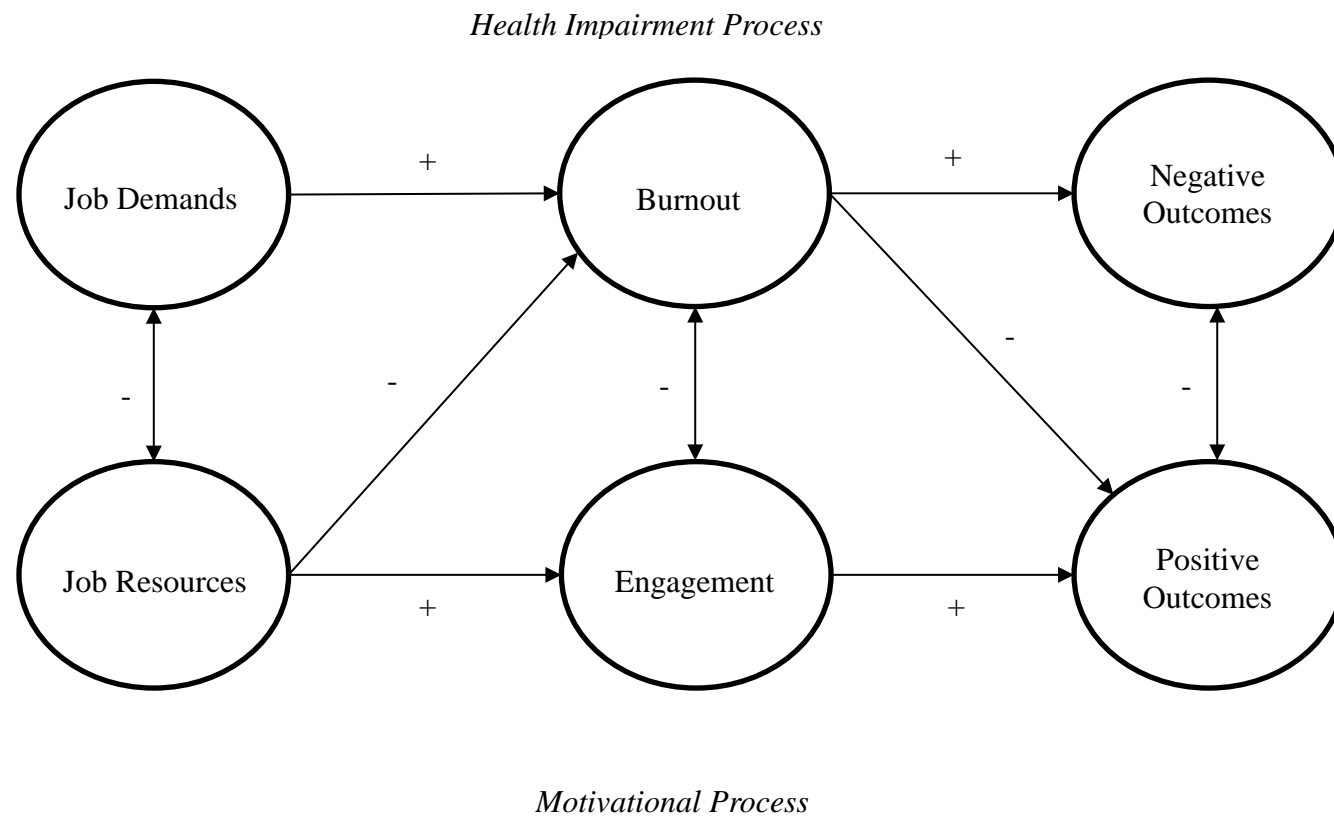
Figure 2.1. Job Demands-Resources model.
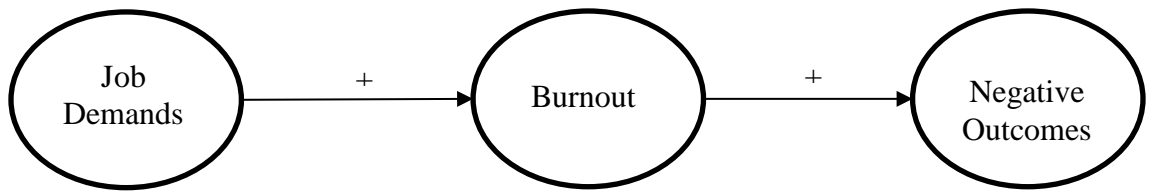
Figure 2.2. Health impairment process of the JD-R model guiding study aims.

CHAPTER 3

WORKLOAD, EXHAUSTION, AND NUTRITION AND PHYSICAL ACTIVITY

BEHAVIORS: A CROSS-SECTIONAL EXAMINATION[1]

[1]Padilla, H.M., Wilson, M.G., Vandenberg, R.J., Davis, M., & Clark, M. To be submitted to *Journal of Health Psychology.*

Abstract

The purpose of this study was to evaluate the relationship between workload, exhaustion, and key health behaviors for weight loss – nutrition and physical activity. Structural equation modeling was used to estimate the path coefficients in a sample of 953 employed adults. The results show that workload and exhaustion were positively related to emotional eating, uncontrolled eating, and percent of calories from fat. Additionally, exhaustion was negatively related to physical activity levels. Work factors should be considered in weight management interventions for working adults.

Keywords: workload, exhaustion, nutrition, physical activity, weight management

Introduction

More than two-thirds of working adults are overweight or obese and at increased risk for mortality and comorbid conditions including type 2 diabetes and cardiovascular disease (Ogden, Ogden, Carroll, Kit, & Flegal, 2014; NHLBI, 2013). In addition to the increased health risks, obese adults have more work limitations than normal weight employees and cost U.S. businesses more than $73 billion annually in medical costs and lost productivity (Finkelstein, DiBonaventura, Burgess, & Hale, 2010; Hertz, Unger, McDonald, Lustik, & Biddulph-Krentar, 2004).

Weight loss and management is achieved by creating a calorie deficit through long-term changes in nutrition and physical activity behaviors (NHLBI, 2013). While many diet strategies have been used effectively to achieve a calorie deficit, a reduction in fat is commonly used as fat is the most calorie-dense macronutrient and reduction of fat has been demonstrated to be effective for weight loss in large clinical trials (Jensen et al., 2014; NHLBI, 2013; Knowler et al., 2002; The Diabetes Prevention Program Research Group, 2002). In addition to what people eat, three eating factors have also been purported to be important for weight management – cognitive restraint, uncontrolled eating, and emotional eating (Stunkard & Messick, 1985). Cognitive restraint is the conscious control of food intake to manage weight (i.e. prevent gain or achieve loss). For example, eating smaller portions and avoiding foods thought to promote weight gain. Uncontrolled eating is in the inability to control food intake in certain situations even when not hungry. For instance, eating when others are eating or the inability to resist eating when you see or smell food even when not hungry. Finally, emotional eating is eating in response to things other than hunger.

Many worksites are increasingly offering weight management programs in the worksite that are modeled after community and clinical programs that provide individual strategies for reducing caloric intake and increasing physical activity that are supported by behavioral strategies that frequently target eating behaviors. Other strategies have been tested in worksites to increase physical and social environmental support (increasing healthy foods in vending and cafeteria, installing walking trails, increasing coworker and supervisor support) for weight management. Such studies have achieved small but significant levels of weight loss of ~ 2.8 pounds (Anderson et al., 2009). Despite the increasingly common delivery of such programs in the worksite, there is little evidence that strategies targeting work factors have been incorporated in weight management programs.

The health impairment process of the Job Demands-Resources (JD-R) model provides a conceptual framework for investigating the role of work factors on health behaviors important for weight management. In the health impairment process, job demands, the physical, social, or organizational features of a job, deplete mental and physical resources of employees and result in health problems (Bakker & Demerouti, 2007). Of particular interest in this study, is workload as a job demand. Workload is a common work stressor across a variety of occupations (Bowling & Kirkendall, 2012). Workload captures the time demands and pressure of work along with the amount and difficulty of the work (Bowling & Kirkendall, 2012). Workload, in and of itself, may affect health behaviors by directly depleting physical or mental energy or by reducing the time that an individual can devote to engaging in healthy behaviors (Bowling & Kirkendall, 2012). In previous studies, workload has been positively associated with

mental health conditions such as anxiety and depression as well as physical symptoms such as headache and stomachache (Spector & Jex, 1998). The effects of workload on health behaviors have not been investigated independently of the job demands-control framework that includes measures of a variety of job demands and the intersection of job control (van Loon et al., 2000, Lallukka et al., 2004, Jones et al., 2007, Hellerstedt & Jeffery, 1997, Fransson et al., 2012, Kouyonen et al., 2005, Chin et al., 2016). In the current study, we focus on workload rather than overall job demands and estimate the effects of workload on nutrition and physical activity behaviors critical to weight loss in a structural equation model that allows simultaneous estimation of these relationships. We propose that high workload will be associated with negative eating behaviors, higher intake of fat, and lower levels of physical activity. Previous studies on the relationship of job strain (high job demands-low control) and health behaviors have reported inconsistent results for men and women, therefore, we include a research question to determine if the proposed relationships are moderated by sex.

Hypothesis 1: Workload will be have a significant negative relationship with cognitive restraint and a significant positive relationship with uncontrolled eating and emotional eating.

Hypothesis 2: Workload will have a significant positive relationship with percent of calories from fat.

Hypothesis 3: Workload will have a significant negative relationship with moderate and vigorous physical activity.

Research Question 1: Are effects of workload on nutrition and physical activity moderated by sex?

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According to the JD-R model, chronic high job demands eventually lead to burnout (Demerouti et al., 2001). Burnout was initially described by Maslach, Schaufeeli, & Leiter (2001) to have three dimensions – exhaustion (receives the most attention), cynicism, and professional efficacy. Exhaustion is the component of burnout that reflects the depletion of an employee's emotional and physical resources. Burnout and, particularly the exhaustion dimension, have been linked to job performance including absenteeism, turnover intentions, turnover, lower productivity, and job satisfaction (Bakker et al., 2004; Bakker, Van Emmerik, & Van Riet, 2008; Maslach et al., 2001). Exhaustion is the construct of interest in the present study due to its proposed effects on emotional and physical resources that may be needed to engage in healthy behaviors. There is existing evidence that burnout in medical professionals is associated with increased consumption of fast food and decreased activity (Alexandrova-Karamanova et al., 2016). Additionally, in Finnish women emotional and uncontrolled eating was higher in those who reported burnout. Based on this evidence, we propose that exhaustion will be associated with negative eating behaviors, higher intake of fat, and low levels of physical activity. Additionally, we will explore whether these relationships differ by sex.

Hypothesis 4: Exhaustion will be negatively related to cognitive restraint and positively related to uncontrolled eating and emotional eating.

Hypothesis 5: Exhaustion will be positively related to percent of calories from fat.

Hypothesis 6: Exhaustion will be negatively related to moderate and vigorous physical activity.

Research Question 2: Are effects of exhaustion on nutrition and physical activity moderated by sex?

Methods

Participants and procedure

Participants were recruited from Amazon Mechanical Turk
(https://www.mturk.com) using two separate Human Intelligence Tasks (HITs) – one for
males and one for females to ensure that sufficient responses were obtained from both
sexes. Amazon Mechanical Turk (Mturk) is a crowdsourcing online labor market that
connects workers with tasks. Mturk workers must be over 18 years of age. Mturk
qualifications were selected that required participants to reside in the United States and
be employed full-time (35 hours or more per week). Data were collected using a cross-
sectional survey from 1,000 participants who responded to the Mturk HITs (500 women
and 500 men). Participants were paid $2 for completing the survey. All procedures were
approved by the University of Georgia's Institutional Review Board. A total of 47
participants were removed from the data due to failing the attention-check items (n=4, see
below) or not working more than 35 hours per week (n=43). The remaining sample of
953 participants were included in the analysis.

Measures.

Workload. Workload was measured using the eight-item scale validated by (Van
Veldhoven & Meijman, 1994). Responses were on a 4-point Likert scale of 1 = never, 4 =
always. Example items are "Do you have to work fast?" and "Do you have too much
work to do?" The Cronbach alpha of the scale was previously reported to be 0.79
(Janssen, 2001). In the current study, the Cronbach alpha coefficient was .79 and the
composite reliability index was .80.

Exhaustion. Exhaustion was measured by the Oldenburg Burnout Inventory (Halbesleben & Demerouti, 2005). The exhaustion dimension of the OLBI is seven items, three positively worded and four negatively worded. Example items are "After work, I usually feel wornout and weary" and "After work, I usually feel totally fit for my leisure activities." The response scale is 1 – 4 where 1 = totally disagree and 4 = totally agree. The OLBI English translation has demonstrated adequate reliability (α=.74-.87). In the current study, the Cronbach alpha coefficient and the composite reliability index were both .87.

Eating behaviors. Eating behaviors were measured using the 21-item Three Factor Eating Questionnaire (TFEQ-R21). The TFEQ-R21 measures cognitive restraint, uncontrolled eating, and emotional eating. The psychometric properties and reliabilities have been demonstrated in obese and normal weight participants in the U.S. and Canada (Cappelleri et al., 2009). Previously reported alphas were .70-.78, .84-.89, and .92-.94 for cognitive restraint, uncontrolled eating, and emotional eating, respectively. In the current study, the Cronbach alpha coefficients were .84, .87, and .94 for the cognitive restraint, uncontrolled eating, and emotional eating scales, respectively. Similarly, the composite reliability indices were .84, .87, and .94.

Percent calories from fat. Percent of calories from fat was estimated using the 17-item Fat Screener developed by the National Cancer Institute Risk Monitoring and Methods Branch (Thompson et al., 2007). Participants were asked about the frequency of intake of foods such as mayonnaise, cheese, bacon that have been shown to be important predictors of percentage of energy from fat (Williams et al., 2008).

Physical activity. Leisure time physical activity was estimated using the 4-item Godin

Leisure Time Exercise Questionnaire (Godin & Shephard, 1997). Participants were asked

how many times in a week that they normally engage in strenuous, moderate, and light

activity for at least 15 minutes. A modified leisure-time physical activity score was

calculated to represent moderate and vigorous physical activity.

Sociodemographics. Demographic data included sex, race, ethnicity, age, marital status,

income, education, and number of children under 18 living in their household were

captured on the survey. Additional questions asked about hours worked outside of

MTurk, hours worked on MTurk, job title, years of employment at current job, and

whether they supervise other employees.

Attention-checking item. The following statement was included on all surveys: "The

answer to this item should be Neutral so we know to keep your data." Response options

will be a 1 to 5 scale were 1=Strongly disagree to 5=Strongly agree, with the correct

answer being 3=Neutral. Respondents who failed to correctly answer the attention-

checking item were removed from the data analysis.

Statistical analysis.

A two-step procedure for structural equation modeling was used to test the

underlying factor structure and the hypothesized relationships between variables

(Anderson and Gerbing, 1988). In the first step, two separate measurement models were

specified. Model 1 included the following variables: workload, cognitive restraint,

uncontrolled eating, and emotional eating. Model 2 contained the following variables:

exhaustion, cognitive restraint, uncontrolled eating, and emotional eating. To evaluate

model fit, the following fit indices were used: χ^2 goodness-of-fit, the standardized root

mean square residual (SRMR), root mean square error of approximation (RMSEA), and comparative fit index (CFI). The model was considered to have good fit when the χ^2 was not significant, SRMR <.09, RMSEA <.06, and CFI >.90 (Hu & Bentler, 1999). The Bayesian information criterion (BIC) and the Akaike information criterion (AIC) are provided for each measurement model for a comparison to the hypothesized models. In the second step, the path models for Model 1 and Model 2 were specified and parameters were estimated using Maximum Likelihood. The physical activity data were skewed right thus a Tobit model was used to censor the physical activity variable to account for the skewness. The use of the Tobit model does not provide traditional fit statistics ($\chi2$ goodness-of-fit, SRMR, RMSEA) but rather provides BIC and AIC. All hypothesized models were ran for the full sample. Differences in path coefficients between males and females were tested using the MODEL CONSTRAINT command. All analysis were ran in M*Plus* statistical package (version 8.0).

Results

The study sample included 473 females (49.7%) and 478 males (50.3%) with a mean age of 36.1 years (range 19 – 71). Participants worked, on average, 41.9 hours per week outside of Mturk and 10.8 hours weekly on Mturk. Participants were predominantly White (84.7%) and non-Hispanic (94.6%). Participants in the study represented a variety of job categories across varying levels of income. Table 3.1 shows the sociodemographic variables for the overall sample and by sex. Table 3.2 provides the means, standard deviations of the variables and the estimated latent variable correlation matrix for Model 1. Workload was significantly positively correlated with emotional eating, uncontrolled eating, and percent of calories from fat. Table 3.3 provides the means, standard

deviations of the variables and the estimated latent variable correlation matrix for Model

2. Exhaustion was significantly positively correlated with emotional eating, uncontrolled

eating, and percent of calories from fat. Additionally, exhaustion was significantly

negatively correlated with physical activity.

Model fit

To evaluate the fit of the measurement model, confirmatory factor analysis was

conducted for each model. Model 1 contained the four latent constructs - workload,

cognitive restraint, uncontrolled eating, and emotional eating. The measurement model

had poor absolute fit of the data $\chi^2 = 930.25$ (p<.001) due to the large sample size but

acceptable fit per relative fit indices of the SRMR (.04), RMSEA (.05), and CFI (.94).

The AIC was 45922.15 and the BIC was 46301.20. Model 2 contained the four latent

constructs – exhaustion, cognitive restraint, uncontrolled eating, and emotional eating.

Similar to the first measurement model, this model had poor absolute fit of the data $\chi^2 =$

1219.53 (p<.001) due to the large sample size but acceptable fit per relative fit indices of

the SRMR (.04), RMSEA (.06), and CFI (.93). The AIC was 47634.31 and the BIC was

48027.94.

Test of Hypothesis 1-3 – Workload

The AIC and BIC values for the hypothesized model were 59774.26 and

60167.89, respectively. Table 3.4 shows the unstandardized and standardized path

coefficients. The hypothesized relationships between workload and eating factors (H1)

was partially confirmed. Workload was positively related to emotional eating (β=.21,

p<.001) and uncontrolled eating (β=.24, p<.001) but was not significantly related to

cognitive restraint. Similarly, workload was positively related to percent of calories from

fat (β=.10, p=.007) supporting Hypothesis 2. Workload was not significantly related to physical activity, therefore, Hypothesis 3 was not supported. Models were ran grouped by sex using MODEL CONSTRAINT to test for significant differences between the path coefficients for males and females. No significant differences between males and females were found.

Test of Hypothesis 4-6 – Exhaustion

The AIC and BIC values for the hypothesized model were 61367.79 and 61776.00, respectively. The relationships between exhaustion and eating factors (H4) was partially confirmed (Table 3.5). Exhaustion was positively related to emotional eating (β=.42, p<.001) and uncontrolled eating (β=.45, p<.001) but was not significantly related to cognitive restraint. Similarly, exhaustion was positively related to percent of calories from fat (β=.12, p=.001) supporting Hypothesis 5. Exhaustion was negatively associated with physical activity (β=.13, p=.001) supporting Hypothesis 6. Models were ran grouped by sex using MODEL CONSTRAINT to test for significant differences between the path coefficients for males and females. No significant differences between males and females were found.

Discussion

Our findings suggest that both workload and exhaustion are related to percent of calories consumed from fat, emotional eating, and uncontrolled eating. Workload was related to higher intake of calories from fat, uncontrolled eating and emotional eating. However, workload were not related to cognitive restraint or moderate/vigorous physical activity. Similarly, exhaustion was related to higher intake of calories from fat, uncontrolled eating, and emotional eating. In addition, exhaustion is negatively related to

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moderate/vigorous physical activity but, similar to the relationships with workload, exhaustion was not related to cognitive restraint. These finding indicate an important relationship between work factors and behaviors critical for weight management. In Model 1 (workload), the model explained 4% of the variance in emotional eating, 6% of the variance in uncontrolled eating, and 1% of the variance in percent of calories from fat. In Model 2 (exhaustion), the model explained 18% of the variance in emotional eating, 21% of the variance in uncontrolled eating, 2% of the variance in percent of calories from fat, and 2% of the variance in physical activity.

Our results are consistent with a previous study conducted by Hellerstedt and Jeffrey (1997) that found that men who had high job demands consumed more calories from fat but no relationship between job demands and physical activity. This study looked at job demands rather than workload specifically, did not investigate the relationship of exhaustion and health behaviors, and only included fat intake and physical activity (not eating behaviors) as an outcomes. Nevanperä and colleagues (2012) previously reported that burnout was associated with high levels of emotional eating and uncontrolled eating in Finnish women, which is consistent with our current study. In a separate study, Ahola and colleagues (2012) reported associations between burnout and low levels of physical activity in Finnish workers. Our study did not find significant differences in path estimates for males and females suggesting that the effects observed for both workload and exhaustion are not moderated by sex. This differs from the reported findings of job demands and health behaviors for males and females reported by Hellerstedt and Jeffery (1997) where men but not women with the highest job demands consumed more calories from fat. These findings are not directly comparable because

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Hellerstedt and Jeffery used job demands as the independent variable rather than workload.

Given the relationship between workload and nutrition behaviors and the relationship of exhaustion and both nutrition and physical activity behaviors, it is important to consider work factors in the context of weight loss interventions. Weight loss interventions offered in worksite settings and, more broadly to employed adults, may have limited effectiveness in the absence of strategies that identify and address high workload and exhaustion. Studies examining the effects of workload and exhaustion on organization and employee performance outcomes provide some guidance for intervention strategies at both the individual and organization level. With regard to workload, Bowling and Kirkendell (2012) point out that excessive workload can often be mitigated by training or job redesign and is not an inherent factor of most occupations. Individual approaches for reducing exhaustion have been relatively limited but a few do show positive effects (Maslach, Schaufeli, & Leiter, 2001). Management level strategies that increase perceptions of fairness and equity in the workplace have shown promise at reducing exhaustion (Maslach, Schaufeli, & Leiter, 2001)

While it may not always be possible to redesign jobs or to change the job such that workload is reduced, increasing resources that buffer the effects of job demands should be explored as an alternative strategy. In previous research, autonomy, social support from colleagues, high-quality relationship with the supervisor and performance feedback were all found to buffer the effects of job resources on exhaustion (Bakker, Demerouti, Euwema, 2005). Future research should investigate whether these resources also buffer the effect of workload on nutrition and physical activity behaviors.

One limitation of our study is that it is cross-sectional and does not allow us to examine the causal paths between workload, exhaustion, and health behaviors. Additionally, all our measures were collected at the same time using the same instrument and as such may be subject to common method variance resulting in inflated relationships. In this study, we focus on workload specifically. From this research, we do not know if other job demands such as emotional demands or work-home interference are related to nutrition and physical activity behaviors. Future research should determine whether other job demands demonstrate the same relationship with nutrition and physical activity behaviors as those observed with workload.

In summary, results from this study provide evidence of a relationship between workload, burnout and health behaviors critical to weight loss. Worksite weight loss programs and weight management programs offered to working adults should incorporate ways to assess workload and exhaustion and address high workload or exhaustion through behavioral therapy. Additional research is needed to develop strategies that minimize the effects of workload and exhaustion on eating behaviors and physical activity.

Table 3.1. Sociodemographic variables for the overall sample and by sex.

	Overall (n=953)	Males (n=478)	Females (n=473)
Mean age (yrs)	36.1 ± 9.7	35.6 ± 9.4	36.7 ± 10.0
Weekly hours worked outside of MTurk	41.9 ± 5.1	42.3 ± 5.4	41.6 ± 5.4
Weekly hours worked on MTurk	10.8 ± 9.0	10.5 ± 8.6	11.18 ± 9.5
Ethnicity			
Hispanic	48 (5.1%)	26 (5.4%)	22 (4.7%)
Non-Hispanic	902 (94.9%)	452 (94.6%)	448 (95.3%)
Race			
White	807 (85.1%)	400 (84.4%)	406 (86.0%)
Black/African American	72 (7.6%)	29 (6.1%)	43 (9.1%)
Asian	61 (6.4%)	38 (8.0%)	22 (4.7%)
American Indian or Alaska Native	4 (0.4%)	3 (0.6%)	1 (0.2%)
Native Hawaiian or other Pacific Islander	4 (0.4%)	4 (0.8%)	0 (0.0%)
Education			
Some high school	2 (0.2%)	2 (0.4%)	0 (0.0%)
High school graduate or GED or less	65 (6.8%)	34 (7.1%)	31 (6.6%)
Some college or technical/vocational training	190 (20.0%)	9 (19.7%)	96 (20.3%)
Associate degree	132 (13.9%)	54 (11.3%)	78 (16.5%)
Bachelor degree	379 (39.9%)	200 (41.9%)	178 (37.7%)
Postgraduate work	51 (5.4%)	29 (6.1%)	22 (4.7%)
Postgraduate degree	131 (13.8%)	64 (13.4%)	67 (14.2%)
Income			
$0-$20,000	71 (7.5%)	34 (7.1%)	37 (7.8%)
$20,001-40,000	296 (31.1%)	126 (26.4%)	170 (35.9%)
$40,001-60,000	295 (31.0%)	143 (29.9%)	151 (31.9%)
$60,001-80,000	178 (18.7%)	103 (21.5%)	75 (15.9%)
$80,001 or more	113 (11.9%)	72 (15.1%)	40 (8.5%)
Marital status			
Single	330 (34.6%)	176 (37.1%)	154 (32.6%)
Divorce/separated/widowed	77 (8.1%)	25 (5.3%)	52 (11.0%)
Married/living with a partner	542 (56.9%)	274 (57.3%)	266 (56.4%)
Number of children under 18 in household			
None	533 (55.9%)	286 (59.8%)	246 (52.0%)
1 child	180 (18.9%)	83 (17.4%)	97 (20.5%)
2 children	147 (15.4%)	68 (14.2%)	78 (16.5%)
3 children	72 (7.6%)	34 (7.1%)	38 (8.0%)

	Overall (n=953)	Males (n=478)	Females (n=473)
4 children	18 (1.9%)	6 (1.3%)	12 (2.5%)
5 or more children	3 (0.3%)	1 (0.2%)	2 (0.4%)
Job Category			
Executive, administrator, or senior manager	52 (5.5%)	28 (5.9%)	24 (5.1%)
Professional	305 (32.2%)	167 (35.0%)	137 (29.2%)
Technical support	148 (15.6%)	101 (21.2%)	46 (9.8%)
Sales	104 (11.0%)	63 (13.2%)	41 (8.7%)
Clerical and administrative support	198 (20.9%)	41 (8.6%)	157 (33.5%)
Service occupation	79 (8.3%)	29 (6.1%)	50 (10.7%)
Precision production and crafts worker	20 (2.1%)	14 (2.9%)	6 (1.3%)
Operator or laborer	42 (4.4%)	34 (7.1%)	8 (1.7%)
Number of years employed in current position			
Less than 1 year	90 (9.5%)	44 (9.2%)	46 (9.7%)
1 year	86 (9.0%)	43 (9.0%)	42 (8.9%)
2 years	132 (13.9%)	66 (13.8%)	66 (14.0%)
3 years	137 (14.4%)	68 (14.2%)	69 (14.6%)
4 years	96 (10.1%)	53 (11.1%)	43 (9.1%)
5 years	82 (8.6%)	44 (9.2%)	38 (8.1%)
6 years	53 (5.6%)	29 (6.1%)	24 (5.1%)
7 years	46 (4.8%)	20 (4.2%)	26 (5.5%)
8 years	24 (2.5%)	15 (3.1%)	9 (1.9%)
9 years	24 (2.5%)	8 (1.7%)	16 (3.4%)
10 or more years	182 (19.1%)	88 (18.4%)	93 (19.7%)
Supervise other employees			
Yes	369 (39.3%)	198 (41.4%)	171 (36.2%)
No	571 (59.9%)	277 (57.9%)	292 (61.7%)

Table 3.2. Means, standard deviations, and estimated correlation matrix for latent variables in Model 1.

Variable	Mean[1]	SD	1	2	3	4	5	6
1. Workload	2.56	.46	1					
2. Cognitive restraint	2.32	.54	.022	1				
3. Emotional eating	2.14	.82	.209**	.005	1			
4. Uncontrolled eating	2.01	.57	.243**	.005	.051*	1		
5. % calories from fat	32.85	3.98	.105*	.002	.022*	.026*	1	
6. Physical activity	35.93	22.65	.036	.001	.008	.009	.004	1

SD = standard deviation

*p<.05, **p<.001

[1]MPlus does not provide means of latent variables for cross-sectional data. Means and SD were computed using raw data in SPSS 24.

Table 3.3. Means, standard deviations, and estimated correlation matrix for latent variables in Model 2.

Variable	Mean[1]	SD	1	2	3	4	5	6
1. Exhaustion	2.43	.54	1					
2. Cognitive restraint	2.32	.80	.009	1				
3. Emotional eating	2.14	.82	.425**	.004	1			
4. Uncontrolled eating	2.01	.57	.455**	.004	.193**	1		
5. % calories from fat	32.85	3.98	.121*	.001	.051*	.055*	1	
6. Physical activity	35.93	22.65	-.131*	-.001	-.056*	-.059*	-.016*	1

SD = standard deviation

*p<.05, **p<.001

[1]MPlus does not provide means of latent variables for cross-sectional data. Means and SD were computed using raw data in SPSS 24.

Table 3.4. Path coefficients for structural equation models testing relationships of Model 1 for the full sample and by sex.

	Full sample			Male			Female		
	Unstd	SE	Std	Unstd	SE	Std	Unstd	SE	Std
Workload → Cognitive restraint	.042	.077	.022	.106	.103	.057	-.050	.123	.-.026
Workload → Emotional eating	.458**	.115	.209**	.508**	.135	.235**	.363*	.169	.170*
Workload → Uncontrolled eating	.493**	.112	.243**	.554**	.137	.272**	.418*	.163	.208*
Workload → % of calories from fat	1.187*	.471	.105*	.518	.528	.046	1.801*	.797	.160*
Workload → Physical activity	2.621	2.838	.036	.745	4.113	.010	5.634	3.766	.078

Unstd: unstandardized coefficient
Std: standardized coefficient
SE: standardized error
**p<.001, *p<.05

Table 3.5. Path coefficients for structural equation models testing relationships of Model 2 for the full sample and by sex.

	Full sample			Male			Female		
	Unstd	SE	Std	Unstd	SE	Std	Unstd	SE	Std
Exhaustion → Cognitive restraint	.013	.060	.009	.128	.082	.086	-.157	.090	-.105
Exhaustion → Emotional eating	.733**	.079	.425**	.672**	.101	.398**	.708**	.107	.416**
Exhaustion → Uncontrolled eating	.730**	.076	.455**	.717**	.101	.447**	.714**	.104	.445**
Exhaustion → % of calories from fat	1.064*	.330	.121*	.615	.423	.070	1.257*	.508	.142*
Exhaustion → Physical activity	-7.460*	2.291	-.131*	-8.913*	3.603	-.155*	-4.195	2.748	-.074

Unstd: unstandardized coefficient
Std: standardized coefficient
SE: standardized error
**p<.001, *p<.05

CHAPTER 4

WORKLOAD INDIRECTLY AFFECTS NUTRITION AND PHYSICAL ACTIVITY

THROUGH BURNOUT[1]

Abstract

Background More than two-thirds of working adults are overweight or obese. Worksite

weight management programs have largely focused on individual behavior change

complemented by increased access to and support for healthy behaviors at the worksite.

Purpose The purpose of this study was to investigate whether workload was related to

nutrition and physical activity behaviors through a path mediated by exhaustion. We also

examined whether observed relationships differed by sex.

Methods Participants (n=953) were recruited from Amazon Mechanical Turk to complete

three surveys over four weeks assessing workload, exhaustion, cognitive restraint,

emotional eating, uncontrolled eating, percent of calories from fat, and physical activity.

Structural equation modeling was used to estimate path coefficients and compare paths

for males and females.

Results High workload had indirect positive effects on emotional eating, uncontrolled

eating, and percent of calories from fat that were mediated through exhaustion. High

workload was also indirectly associated with less physical activity through exhaustion.

There were no differences in these relationships for males and females. Workload had a

negative indirect relationship with cognitive restraint for females only.

Conclusions These results indicate a need to consider work demands in weight

management programs offered to working adults. High workload through exhaustion was

associated with negative eating behaviors, higher intake of fat and less physical activity.

Intervention strategies to reduce workload and exhaustion need to be included in worksite

weight management programs.

Keywords: workload, exhaustion, nutrition, physical activity, weight management

Introduction

More than 123 million adults work full-time and spend, on average, more than 8 hours per day at work (BLS, 2011). Approximately 69% of working adults are overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014). Obese employees are at risk for comorbid conditions and cost U.S. businesses more in medical costs and lost productivity compared to healthy weight employees (Finkelstein, DiBonaventura, Burgess, & Hale, 2010; Hertz, Unger, McDonald, Lustik, & Biddulph-Krentar, 2004). The worksite is an important setting for promoting weight management.

The U.S. Task Force for Community Preventive Services recommends worksite nutrition and physical activity programs based on a consistent but relatively small weight loss of ~2.8 pounds (Anderson et al., 2009). Specifically, The Community Guide recommends information/education, activities and social factors that affect behavior change, and physical and organizational changes that make healthy choices easy (www.thecommunityguide.org). This recommendation is consistent with National Heart Lung and Blood Institute recommendations for a combination of reduced caloric intake, increased physical activity, and behavioral therapy for weight loss (NHLBI, 2013). Worksite programs have largely focused on individual behavior change strategies that have been complemented with changes to the social and physical environment to encourage healthy behaviors (Wilson, DeJoy, et al., 2016; Wilson, DeJoy, Vandenberg, Padilla, & Davis, 2016; Goetzel et al., 2010; French et al., 2010; Lemon et al., 2010). Environmental interventions have primarily focused on increasing access to healthy foods and physical activity and increasing coworker and supervisor support for weight management through changes in foods available in vending machines and cafeterias,

installation of exercise equipment and walking paths, competitions, and increased health messaging (Goetzel et al., 2010; French et al., 2010; Lemon et al., 2010). Quintiliani and colleagues (2010) acknowledge that organizational factors such as work stress and work schedule affect food choices and obesity risks; however, limited attention has been given to understanding the relationship of these factors. The limited research in this area has been predominantly cross-sectional and based on Karesek's Job-Strain model (1979). The Job-Strain model purports that job strain results from a combination of high job demands and low job control resulting in symptoms of psychological stress (Karesek, 1979). Results from these studies have offered some support for the relationship of healthy behaviors and work factors and have suggested that the relationships may differ for males and females (Hellerstedt & Jeffery, 1997; Fransson et al., 2012; Van Loon et al., 2000; Lallukka et al., 2004; Kouvonen et al., 2005).

The Job Demands-Resources Model (JD-R) is an extension of Karasek's Job-Strain model recognizing that in addition to the interactive effects of job demands and control that both job demands and job resources may have important and separate main effects (Bakker & Demerouti, 2007). In the JD-R model, job demands are physical, social or organizational features of the job or occupation that require effort and energy from an employee (Bakker & Demerouti, 2007). Job resources are features of the job or occupation that help an employee achieve work goals, reduce job demands or the costs associated with the demands, or stimulate personal growth and development. The main effects of job demands are proposed to occur through a health impairment process in which chronic job demands deplete an employee's mental and physical resources and lead to exhaustion and health problems. A second process, a motivational process, occurs

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when job resources lead to motivation and positive outcomes. In later updates to the model, exhaustion was included as the mediator of the relationship between job demands and negative outcomes and engagement was proposed as the mediator of the relationship between job resources and positive outcomes (Schaufeli & Taris, 2014). To date, this model has been predominantly used to predict interpersonal, attitudinal, and organizational outcomes (Demerouti & Bakker, 2011). There are few studies linking the model with objective health indicators (Demerouti & Bakker, 2011).

The current study is guided by the health impairment process of the JD-R model that proposes that high job demands lead to a depletion of mental and physical energy resulting in exhaustion that leads to negative outcomes. Specifically, it is expected that high job demands lead to a state of exhaustion and, due to inadequate mental and physical energy to make good food and activity choices, lead to poor nutrition and physical activity behaviors.

The job demand of interest in this study is workload because it is common across multiple occupations and consumes time and resources that may be required for engaging in healthy eating behaviors and physical activity (Bowling, Alarcon, Bragg, & Hartman, 2015). Previous research in this area has not investigated the indirect relationship of workload on nutrition and physical activity behaviors mediated through exhaustion. The outcomes of interest in this study are both nutrition and physical activity behaviors as the combined effect of these behaviors is the crux of weight loss strategies (NHLBI, 2013). The nutrition outcomes of interest in this study reflect both the way that people eat and the macronutrient content of the diet (percent of calories from fat). Cognitive restraint (the conscious control of food), uncontrolled eating, and emotional eating have been

shown to be related to body weight and are often the target of behavioral strategies for weight management (Stunkard & Messick, 1985; Bryant, King, & Blundell, 2008; Foster et al., 1998; French, Mitchell, Finlayson, Blundell, & Jeffery, 2014). This is the first study to examine this indirect relationship for eating and physical behaviors. The purpose of this paper is to describe the indirect relationship between workload and health behaviors through exhaustion. We predict:

> H1: There will be an indirect effect of workload on eating behaviors (cognitive restraint, uncontrolled eating, and emotional eating) through exhaustion.

> H2: There will be an indirect effect of workload on the percent of calories from fat through exhaustion.

> H3: There will be an indirect effect of workload on physical activity through exhaustion.

Additionally, based on prior research using Karasek's Job-Strain model where effects were inconsistent between males and females, we pose a research question to examine the relationships by sex.

> RQ: Do the indirect effects of workload on nutrition and physical activity behaviors differ for men and women?

Methods

Participants and procedure

Separate Human Intelligence Tasks (HITs) for males and females were posted on Amazon Mechanical Turk (https://www.mturk.com), a crowdsourcing online labor market that connects workers with tasks. Inclusion criteria were over 18 years of age, U.S. resident, and full-time employment (more than 30 hours per week). One-thousand

participants responded to the Mturk HITs (500 women and 500 men). Three surveys were administered with a two-week interval between each survey. Participants were paid $2 for completing the first survey, $3 for completing the second survey, and $3 for completing the final survey. All procedures were approved by the University of Georgia's Institutional Review Board. Participants who failed the attention-check item (n-4, see below) and who did not meet inclusion criteria (n=43) were removed from the sample (n=47) resulting in 953 participants for analysis.

Measures

Workload. Workload was measured at Time 1 using the eight-item scale validated by (Van Veldhoven & Meijman, 1994). Responses were on a 4-point Likert scale of 1 = never, 4 = always. Example items are "Do you have to work fast?" and "Do you have too much work to do?" The Cronbach alpha of the scale was previously reported to be 0.79 (Janssen, 2001). In the current study, the Cronbach alpha coefficient and the composite reliability index were both .79.

Exhaustion. Exhaustion was measured at Time 2 by the Oldenburg Burnout Inventory (Halbesleben & Demerouti, 2005). The exhaustion dimension of the OLBI is seven items, three positively worded and four negatively worded. Example items are "After work, I usually feel wornout and weary" and "After work, I usually feel totally fit for my leisure activities." The response scale is 1 – 4 where 1 = totally disagree and 4 = totally agree. The OLBI English translation has demonstrated adequate reliability (α=.74-.87). In the current study, the Cronbach alpha coefficient and composite reliability estimate were both .88.

Eating behaviors. Eating behaviors were measured at Time 3 using the 21-item Three

Factor Eating Questionnaire (TFEQ-R21). The TFEQ-R21 measures cognitive restraint,

uncontrolled eating, and emotional eating. The psychometric properties and reliabilities

have been demonstrated in obese and normal weight participants in the U.S. and Canada

(Cappelleri et al., 2009). Previously reported alphas were .70-.78, .84-.89, and .92-.94 for

cognitive restraint, uncontrolled eating, and emotional eating, respectively. In the current

study, the Cronbach alpha coefficients were .85, .89, and .94 for the cognitive restraint,

uncontrolled eating, and emotional eating scales, respectively. Similarly, the composite

reliability indices were .86, .89, and .94.

Percent calories from fat. Percent of calories from fat was estimated using Time 3 data

from the 17-item Fat Screener developed by the National Cancer Institute Risk

Monitoring and Methods Branch (Thompson et al., 2007). Participants were asked about

the frequency of intake of foods such as mayonnaise, cheese, bacon that have been shown

to be important predictors of percentage of energy from fat (Williams et al., 2008).

Physical activity. Leisure time physical activity was estimated using Time 3 data from the

4-item Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1997).

Participants were asked how many times in a week that they normally engage in

strenuous, moderate, and light activity for at least 15 minutes. A modified leisure activity

score was computed using the values for moderate and strenuous multiplied by nine and

five, respectively.

Sociodemographics. Demographic data included sex, race, ethnicity, age, marital status,

income, education, and number of children under 18 living in their household. Additional

questions asked about hours worked outside of MTurk, hours worked on MTurk, job title, years of employment at current job, and whether they supervise other employees.

Attention-checking item. The following statement was included on all surveys: "The answer to this item should be Neutral so we know to keep your data." Response options will be a 1 to 5 scale were 1=Strongly disagree to 5=Strongly agree, with the correct answer being 3=Neutral. Respondents who failed to correctly answer the attention-checking item were removed from the data analysis.

Statistical analysis.

The underlying factor structure and hypothesized relationships between variables were tested using the two-step procedure for structural equation modeling outlined by Anderson and Gerbing (1988). In the first step, the measurement model was specified for workload, exhaustion, cognitive restraint, uncontrolled eating, and emotional eating. Model fit was evaluated by the following fit indices: χ^2 goodness-of-fit, the standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), and comparative fit index (CFI). The model was considered to have good fit when the χ^2 was not significant, SRMR <.09, RMSEA <.06, and CFI >.90 (Hu & Bentler, 1999). The Bayesian information criterion (BIC) and the Akaike information criterion (AIC) are provided for each measurement model for a comparison to the hypothesized models. In the second step, the path model was specified and the parameters were estimated using Full Information Maximum Likelihood. A Tobit model censoring was applied to the physical activity variable to account for the skewness in the data. M*Plus* provides the BIC and AIC with the use of the Tobit model but does not provide traditional fit statistics (χ2 goodness-of-fit, SRMR, RMSEA). Indirect effects were specified by the product

terms of the path between workload (X) and exhaustion (M) and the paths between

exhaustion and each dependent variable (Y_1-Y_5). The Sobel test was used to test the

significance of the indirect effect (LeBreton, Wu, & Bing, 2009; Koopman, Howe, &

Hollenbeck, 2014). The model was ran for the full sample and separately by sex. The

MODEL CONSTRAINT command was used to test differences in path coefficients

between males and females. All analyses were completed in M*Plus* statistical package

(version 8.0).

Results

The study sample was comprised of 473 females and 478 males who were

predominantly White (84.7%) and non-Hispanic (94.6%). The sociodemographic

variables are presented in Table 4.1. The mean age of participants was 36.1 years (range

19 – 71). Most participants had some college or technical school training (93%).

Participants represented varying levels of income across a variety of occupations. On

average, participants worked 41.9 hours per week outside of Mturk and an additional 10.8

hours per week on Mturk. Table 4.2 provides the means, standard deviations of the

variables and the estimated latent variable correlation matrix for the model. Workload

had a significant positive correlation with exhaustion. Both workload and exhaustion had

significant positive correlations with emotional eating, uncontrolled eating, and percent

of calories from fat. Workload and exhaustion had significant negative correlations with

physical activity.

Model fit

A confirmatory factor analysis was conducted to evaluate the fit of the

measurement model. The measurement model had a significant chi-square test of model

fit (χ^2 = 1568.69, p<.001) due to the large sample size but acceptable fit per relative fit indices. SRMR was .05, RMSEA was .05, and CFI was .92. The AIC was 50079.71 and the BIC was 50594.83.

Path model

The AIC for the hypothesized path model was 61158.79. Similarly, the BIC was 61678.77. Figure 4.1 shows the hypothesized model and the standardized path coefficients. Workload had a significant positive relationship with the mediator, exhaustion (b=.678, SE=.081, p<.001). The mediator, exhaustion had a significant positive relationship with emotional eating (b=.708, SE=.066, p<.001), uncontrolled eating (b=.637, SE = .063, p<.001), and percent of calories from fat (b=1.013, SE=.309, p=.001). Exhaustion (mediator) had a significant negative relationship weight physical activity (-6.948, SE=1.798, p<.001). No relationship between exhaustion and cognitive restraint was observed.

Indirect effects

Path coefficients for the indirect effects are shown in Table 4.3. Hypothesis 1 was partially supported. The indirect paths of workload to emotional eating and uncontrolled eating through exhaustion were significant and positive; however, there was no indirect relationship between workload and cognitive restraint. Hypothesis 2 was supported – the indirect path of workload to percent of calories from fat was significant and positive. Finally, the indirect path of workload to physical activity through exhaustion was significant and negative supporting Hypothesis 3.

<u>Indirect effects by sex</u>

The indirect paths between workload and each dependent variable through exhaustion were estimated separately for males and females. Using the MODEL CONSTRAINT feature in M*Plus,* differences in path coefficients between the sexes were tested for statistical significance. The results from this analysis are shown in Table 4.4. There were no significant differences in path coefficients for the indirect effects on emotional eating, uncontrolled eating, percent of calories from fat, or physical activity. There was a significant difference between the path coefficients for males and females for the indirect relationship between workload and cognitive restraint through exhaustion ($p=.05$). For males, there was no indirect relationship observed between workload and cognitive restraint. For females, there was a significant, negative relationship between workload and cognitive restraint through exhaustion.

Discussion

The results from this study provide evidence of an indirect relationship between workload and obesity through exhaustion. High workload has negative indirect effects on nutrition and physical activity behaviors through exhaustion. Specifically high workload was related to more emotional eating, more uncontrolled eating, higher intake of fat, and lower levels of physical activity. The effects were mediated through exhaustion. These results provide evidence for the health impairment process of the JD-R model and extend previous use of this model for organizational measures to modifiable health behaviors that are important antecedents to obesity and chronic disease. To our knowledge, this is the first study to report these indirect relationships.

The observed relationships with emotional eating, uncontrolled eating, percent of calories from fat, nor physical activity did not differ by sex. Previous studies had reported inconsistent effects between work factors and health behaviors by sex. For example, Hellerstedt and Jeffery (1997) reported that men but not women with the highest job demands consumed more fat. Lallukka and colleagues (2004) reported that, for women, low demands and high control and mentally strenuous work were associated with a healthier diet while no relationships between work factors and diet were observed. Similarly, Kouvonen and colleagues (2005) reported that women who had passive jobs and high strain jobs had lower physical activity when compared to women who had low strain jobs. For men, those who had active jobs, passive jobs, and high strain jobs had lower physical activity than those in low strain jobs. We found a small but significant indirect effect of workload on cognitive restraint for women but not men, which had not been previously reported. Cognitive restraint refers to the conscious control of food intake. In this sample, females had a statistically significantly (p=.01) higher mean cognitive restraint value (2.45) compared to males (2.29). We did not assess whether participants were currently attempting weight loss and it is possible that more women in our sample were "dieting" or attempting weight loss and as such they were engaging in cognitive restraint more frequently.

These findings point to a need to develop strategies that target workload and exhaustion to improve nutrition and physical activity behaviors, which are the crux of weight management. Obesity is a complex and multifactorial disease (NHLBI, 2013). Worksite weight loss programs have had significant but quite small effects (Anderson et al., 2009). It is quite possible that weight loss efforts in worksites have been hindered by

the lack of attention given to workload and burnout. Further, it is possible that weight loss programs in working adults more broadly have been limited due to high workload and exhaustion. The findings from this study suggest that strategies that directly target workload and exhaustion will be important for improving eating behaviors and increasing physical activity. Strategies that include information and education about nutrition and physical activity supported by behavioral therapy continue to be important for weight loss. Additionally, it is important to ensure adequate access to both nutrition and physical activity at the workplace. The findings in this study indicate that in addition to these strategies, individual and organizational strategies that target either workload, burnout or both need to be developed.

The JD-R model motivational process offers a framework for developing and testing strategies that increase job resources to buffer the negative effects of job demands (Bakker & Demerouti, 2007). Among job resources, social support has been studied in worksite weight loss previously (Tamers et al., 2011; Wilson, DeJoy, Vandenberg, Padilla, & Davis, 2016, DeJoy, et al., 2012). Social support in these studies has taken the form of either emotional or informational support. It may be that provision of more tangible support, particularly support that decreases or offsets workload, may be more important for weight loss. More research in this area is needed to better understand how the different types of social support may relate to weight loss.

In addition to strategies informed by the JD-R model, it is important to consider other strategies that may reduce workload or burnout such as training of either employees (time management, increase in knowledge or skills to effectively do their job) or training

of supervisors to identify and address excessive workload (Bowling and Kirkendall, 2012; Maslach, Schaufeli, & Leiter, 2001).

This study has several strengths, including a large sample size that allowed for testing the relationships in a structural equation model that included simultaneous estimation of the paths for multiple outcomes using the approach recommended by LeBreton, Wu, and Bing (2009). We tested a full mediation model using full information maximum likelihood (FIML). The causal model was informed by the Job Demands-Resources framework using time separated data between the predictor, mediator, and outcomes reducing the likelihood that the relationship observed were, in part, due to common method variance.

To summarize, this study showed that high workload is indirectly associated with eating behaviors that are detrimental to weight management – uncontrolled eating and emotional eating – through exhaustion. Additionally, high workload was indirectly associated with more calories from fat and less physical activity through exhaustion. Taken together, these results suggest that high workload contributes to energy imbalance that favors weight gain and limits weight loss. Worksite weight management programs need to include strategies that identify and directly address workload and exhaustion as they relate to nutrition and physical activity behaviors.

Table 4.1. Sociodemographic variables for the overall sample and by sex.

	Overall (n=953)	Males (n=478)	Females (n=473)
Mean age (yrs)	36.1 ± 9.7	35.6 ± 9.4	36.7 ± 10.0
Weekly hours worked outside of MTurk	41.9 ± 5.1	42.3 ± 5.4	41.6 ± 5.4
Weekly hours worked on MTurk	10.8 ± 9.0	10.5 ± 8.6	11.18 ± 9.5
Ethnicity			
Hispanic	48 (5.1%)	26 (5.4%)	22 (4.7%)
Non-Hispanic	902 (94.9%)	452 (94.6%)	448 (95.3%)
Race			
White	807 (85.1%)	400 (84.4%)	406 (86.0%)
Black/African American	72 (7.6%)	29 (6.1%)	43 (9.1%)
Asian	61 (6.4%)	38 (8.0%)	22 (4.7%)
Other[1]	8 (0.8%)	7 (1.4%)	1 (0.2%)
Education			
High school graduate or GED or less	67 (7.0%)	36 (7.5%)	31 (6.6%)
Some college or technical/vocational training	190 (20.0%)	9 (19.7%)	96 (20.3%)
Associate degree	132 (13.9%)	54 (11.3%)	78 (16.5%)
Bachelor degree	379 (39.9%)	200 (41.9%)	178 (37.7%)
Postgraduate work	51 (5.4%)	29 (6.1%)	22 (4.7%)
Postgraduate degree	131 (13.8%)	64 (13.4%)	67 (14.2%)
Income			
$0-$20,000	71 (7.5%)	34 (7.1%)	37 (7.8%)
$20,001-40,000	296 (31.1%)	126 (26.4%)	170 (35.9%)
$40,001-60,000	295 (31.0%)	143 (29.9%)	151 (31.9%)
$60,001-80,000	178 (18.7%)	103 (21.5%)	75 (15.9%)
$80,001 or more	113 (11.9%)	72 (15.1%)	40 (8.5%)
Job Category			
Executive, administrator, or senior manager	52 (5.5%)	28 (5.9%)	24 (5.1%)
Professional	305 (32.2%)	167 (35.0%)	137 (29.2%)
Technical support	148 (15.6%)	101 (21.2%)	46 (9.8%)
Sales	104 (11.0%)	63 (13.2%)	41 (8.7%)
Clerical and administrative support	198 (20.9%)	41 (8.6%)	157 (33.5%)
Service occupation	79 (8.3%)	29 (6.1%)	50 (10.7%)
Precision production and crafts worker	20 (2.1%)	14 (2.9%)	6 (1.3%)
Operator or laborer	42 (4.4%)	34 (7.1%)	8 (1.7%)

[1]*American Indian, Alaska Native, Native Hawaiian or other Pacific Islander*

Table 4.2. Means, standard deviations, and estimated correlation matrix for latent variables.

Variable	Mean[1]	SD[1]	1	2	3	4	5	6	7
1. Workload	2.56	.46	1						
2. Exhaustion	2.36	.56	.450**	1					
3. Cognitive restraint	2.37	.82	-.022	-.049	1				
4. Emotional eating	2.05	.82	.218**	.485**	.080*	1			
5. Uncontrolled eating	2.21	.58	.218**	.484**	-.024	.235**	1		
6. % calories from fat	32.76	3.73	.065*	.145*	-.007	.070*	-.079*	1	
7. Physical activity	35.49	20.39	-.074**	-.163**	.008	-.079**	.070**	-.024*	1

*p<.05, **p<.001

SD = standard deviation

[1] Means and SD were computed using raw data in SPSS 24.

Table 4.3. Path coefficients for structural equation models testing indirect paths.

	Full sample		
	b	SE	p-value
Workload → Exhaustion → Cognitive restraint	-.045	.040	.271
Workload → Exhaustion → Emotional eating	.480	.065	<.001
Workload → Exhaustion → Uncontrolled eating	.432	.061	<.001
Workload → Exhaustion → % of calories from fat	.687	.221	.002
Workload → Exhaustion → Physical activity	-41.690	10.786	<.001

b: unstandardized coefficient
SE: standardized error

Table 4.4. Path coefficients for structural equation models testing indirect paths by sex.

	Males		Females		Between-group differences
	b	SE	b	SE	p-value
Workload → Exhaustion → Cognitive restraint	.008	.051	-.158	.068	.051
Workload → Exhaustion → Emotional eating	.451	.081	.437	.089	.900
Workload → Exhaustion → Uncontrolled eating	.439	.081	.400	.081	.713
Workload → Exhaustion → % of calories from fat	.546	.290	.743	.335	.653
Workload → Exhaustion → Physical activity	-4.457	1.787	-3.297	1.719	.635

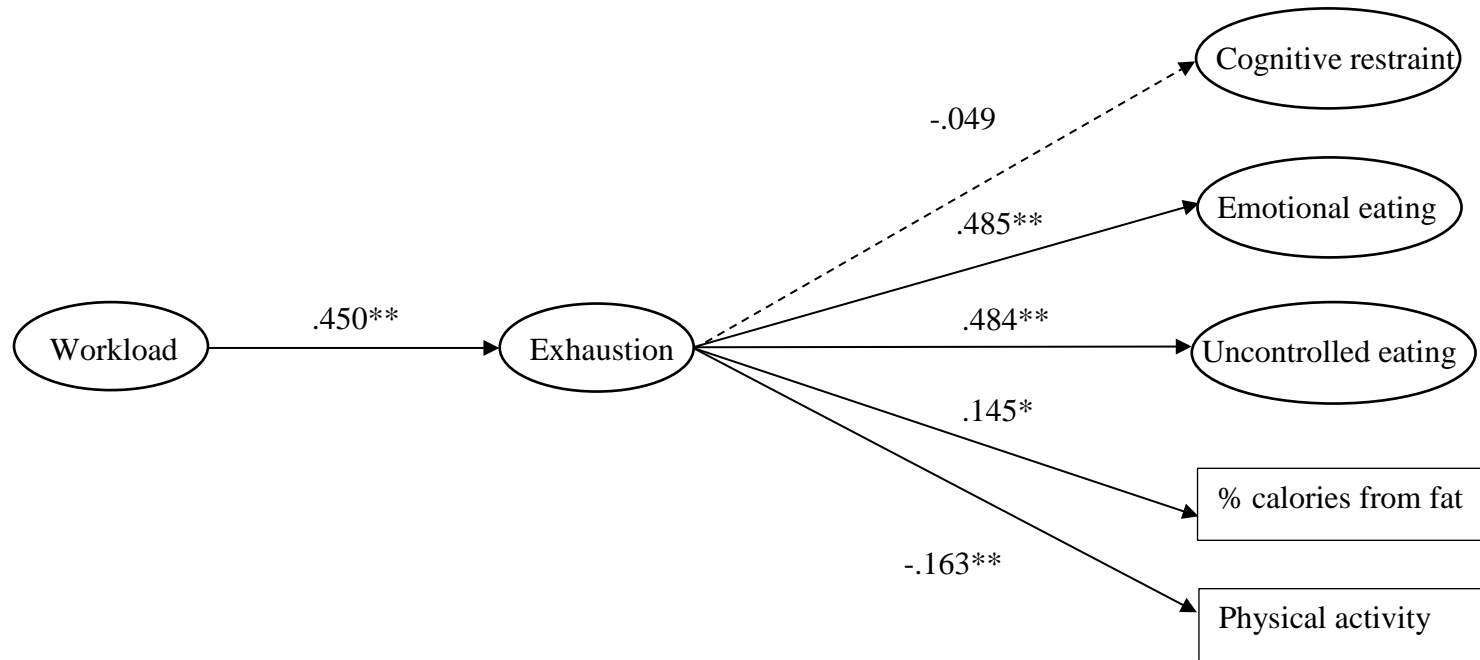b: unstandardized coefficient
SE: standardized error

Figure 4.1. Path model and standardized coefficients for paths. Solid lines indicate significant paths and dashed lines indicate nonsignificant paths (*p<.05; **p<.001).

CHAPTER 5

CONCLUSIONS

Introduction

Weight management and weight loss are complex and involve genetic, individual,

behavioral and environmental factors. From decades of research, it is quite clear that

behavioral strategies must include reduced caloric intake and increased physical activity

to create a caloric deficit (NHLBI, 2000). Such strategies have been the focus of weight

loss programs in worksite settings (Anderson et al., 2009). These strategies have been

complemented in the worksite setting by efforts to increase access to healthy foods and

physical activity opportunities as well as strategies to increase the supportiveness of the

worksite social environment for healthy eating and physical activity (Goetzel et al., 2010;

French et al., 2010; Lemon et al., 2010). These efforts have resulted in small but

significant effect sizes of ~2.8 pounds (Anderson, et al., 2009). New strategies are needed

for weight loss programs if any significant progress is going to be made in reversing the

trend of obesity. Previous calls have been made for understanding the role of work

factors on the risk of obesity (Quintiliani, Poulsen, & Sorensen, 2010); however, little

attention has been given to this area. The research thus far has been guided by Karesek's

Job Strain model whereby job demands and job control interact to predict job strain. This

model ignores the potential separate main effects of job demands on negative outcomes.

The JD-R model is an extension of Karesek's Job Strain model and describes a

separate health impairment process whereby job demands deplete mental and physical

energy leading to exhaustion and negative organizational outcomes (Bakker &

Demerouti, 2007; Schaufeli & Taris, 2014; Demerouti & Bakker, 2011). The purpose of

this dissertation was to extend the JD-R model to health behaviors to investigate the

relationship of workload, burnout, and health behaviors critical to weight loss – nutrition

and physical activity. This was accomplished through two studies described in Chapter 3

and 4 of this dissertation. Each chapter is reviewed briefly below.

Chapter 3 summary

In Chapter 3, the cross-sectional relationships with nutrition and physical activity

behaviors were examined separately for workload and exhaustion. Mturk workers were

recruited for a survey that measured workload, exhaustion, three eating behaviors –

cognitive restraint, emotional eating, and uncontrolled eating, % of calories from fat, and

physical activity at a single time point. Using structural equation modeling, path

coefficients were estimated between the work factors and health behaviors separately.

Differences in path coefficients by sex were explored as a research question using the

MODEL CONSTRAINT feature in M*Plus*. The study sample included 951 participants

with a mean age of 36.1 years. The sample was 50% male, 85% White, and 95% non-

Hispanic. The following job categories were represented in the sample at high

proportions: professional (32%), clerical and administrative support (21%), and technical

suport (16%). Participants worked, on average, approximately 42 hours per week outside

of Mturk and an additional 10.8 hours per week on Mturk. High workload and exhaustion

were significantly related to emotional eating and uncontrolled eating with stronger

effects observed for exhaustion compared to workload. Exhaustion explained 18% of the

variance in emotional eating and 21% of the variance in uncontrolled eating compared to

workload which explained only 4% and 6% of the variance in emotional and uncontrolled eating, respectively. Additionally, high workload and exhaustion had small but statistically significant associations with higher fat intake. Finally, exhaustion but not workload had significant negative associations with physical activity. No relationships were found between workload nor exhaustion and cognitive restraint. Nor did any of the observed relationships differ by sex. These findings support the hypotheses that job demands and exhaustion have significant negative relationships with healthy eating and physical activity. This suggests that job demands should be considered for their role in weight management and weight loss programs. This data is limited by the cross-sectional design which does not allow for examination in causal pathways nor investigation of the possible mediated path whereby the effects of workload on health behaviors occurs through exhaustion.

Chapter 4 summary

In Chapter 5, the indirect relationship between workload and health behaviors through exhaustion was examined by time-separated measures for workload, exhaustion, and nutrition and physical activity. Data were collected from Mturk workers in three surveys that were administered every two weeks. The measures for this study included workload at time 1, exhuastion at time 2, and outcomes from time 3 – cogntive restraint, emotional eating, and uncontrolled eating. The indirect relationships were estimated simulatenuously using Full Information Maximum Likelihood estimation and the Sobel test to determine significance of the indirect effects. Full information maximum likelihood uses all available information to estimate the parameters. The covariance coverage of the model ranged from 73 – 100%. The sample included 953 participants

including 478 males and 473 females. The mean age was 36 years old and participants

reported working 42 hours per week outside of Mturk and 11 hours per week on Mturk,

on average. The sample was predominantly non-Hispanic, White. More than half of the

sample held a Bachelor's degree or higher. The indirect paths from workload to

exhaustion were significant for all outcome variables with the exception of cognitive

restraint. High workload was indirectly associated with more emotional eating and

uncontrolled eating through exhaustion. Additionally, high workload was associated with

higher fat intake and lower physical activity mediated by exhaustion. Although there was

no indirect effect of workload on cognitive restraint observed in the full sample, there

was a signficant effect for females when the models were estimated separately for males

and females. The indirect path between workload and cognitive restraint was significant

for females in the hypothesized direction. That is, high workload was associated with

lower cognitive restraint in females only. These findings provide support for the health

impairment process of the JD-R model and extend the JD-R model to health behaviors.

Additionally and perhaps more importantly, these findings provide evidence that high

workload contributes to energy imbalance that favors weight gain through poor eating

behaviors, high intake of fat, and less physical activity.

<center>**Key findings**</center>

Several key findings have been identified from this research. First, results from

these studies demonstrate that job demands have negative effects on nutrition and

physical activity behaviors that favor weight gain and interfere with weight loss. It is

possible that the lack of attention given to both workload and exhaustion in the context of

nutrition and eating behaviors may explain weight gain observed in working adults over

<center>77</center>

time or the limited effectiveness of weight loss programs in worksite settings. Second, Study 2 described in Chapter 4 provides evidence that the negative effects of workload are mediated through exhaustion. As such, this causal model provides evidence of intervention points for reducing the negative impact of workload on nutrition and physical activity behaviors. Finally, this research demonstrates the importance of an interdisciplinary approach to solving problems of significant magnitude such as obesity. The studies described in this dissertation demonstrate the use of the Job Demands-Resources Model in an investigation of health behaviors beyond its prior use in organizational effectiveness and represent an interdisciplinary approach to employee health and well-being.

Strengths

The results from these studies come from a large sample of working adults in the United States that includes employees from a variety of occupations and income levels, thus increasing the generalizability to working adults in the U.S. Additionally, the large sample size allowed for testing of these relationships using structural equation modeling to account for measurement error in the latent variables and to simulatenously estimate the parameters for the multiple outcomes. This allowed us to examine the two critical behaviors in weight management – nutrition and physical activity in the same model. Additionally, measures were included to represent both what people eat (calories from fat) and how people eat (eating behaviors – cognitive restraint, emotional eating, uncontrolled eating). Finally, the study tested these relationships in a cross-sectional design and in a time-separated model that allowed for temporal sequencing of the

predictor, mediator, and outcome. The time-separate design reduces the likelihood that the parameter estimates are biased by common method variance.

Limitations

Several limitations are worth noting. The use of the Amazon Mturk sample may not be representative of all workers. The sample was young, highly educated, and predominantly White, non-Hispanic. It is under representative of older workers, persons without access to the internet, and Hispanic and minority workers. The measures in this study were all self-report and are subject to recall bias. In the cross-sectional relationships the measures were collected at the same time using the same instrument and are, therefore, subject to common method variance that may result in inflated parameter estimates. The time-separated mediation analysis addresses the concerns related to common method variance, however, this study does not examine change in the measures over time, and therefore, it is not longitudinal in the strictest of definitions. Finally, the study is a between-person approach that provides evidence that persons who report high workload also report high emotional and uncontrolled eating, more fat intake, and less physical activity. The studies do not provide information about what happens within-person.

Summary and future directions

With the high rates of overweight and obesity among working adults and the known impacts of these conditions on health related quality of life, morbidity and mortality, and organizational effectivenss, it is critical to identify strategies that promote weight management among all persons and weight loss among those who are overweight and obese. Our current approaches in worksite weight management programs have

limited effectiveness and little progress has been made in weight loss overall (Anderson et al., 2009; Ashfin et al., 2017). Continuing to offer the same individual and environmental strategies is not likely to produce different results. In this dissertation, I provide evidence that high workload has negative impacts on nutrition and physical activity behaviors in both males and females. Further, through mediation testing guided by the JD-R model I show that these effects occur through exhaustion.

Based on these results, I suggest that from a practitioner standpoint, assessments of high workload and exhaustion be incorporated in weight loss programs for working adults and, when identified, behavioral therapy be directed to address workload and exhaustion through individual approaches.

With regard to future research, I suggest that we develop and test intervention strategies that target workload and exhaustion to support weight management and weight loss in working adults. Such strategies should consider individual interventions, organization-level interventions or a combination of both. I argue that we must go beyond the current strategies to promote individual behavior change supported by increased access to healthy foods and physical activity at the worksite.

The motivational process of the JD-R model provides some guidance on where to start with such strategies. Future research should investigate whether and what types of job resources may buffer or offset the effects of high workload and exhaustion as proposed by the JD-R model (Bakker & Demerouti, 2007). An interdisciplinary approach to this problem is likely necessary as industrial-organizational psychologists have been studying workload and exhaustion in the context of organational effectiveness for a number of years. Strategies to improve employee time management as well as

strategies to increase employee knowledge and skills that improve their efficiency on the

job have been used previously and may be applied in the context of weight loss.

Strategies that help supervisors identify and address workload may be combined with or

offered separately from indivdidual approaches (Bowling and Kirkendall, 2012; Maslach,

Schaufeli, & Leiter, 2001). Such combination approaches may be particularly important

in worksites that have a culture that rewards long work hours.

Finally, I suggest that future research examine these relationships within person

using an ecological momentary assessment design. Such an approach would help us

understand whether persons engage in negative eating and physical activity behaviors

when they experience high workload relative to periods of lower workload.

Understanding these processes within-person could further inform intervention strategies

to minimize the impact of workload and exhaustion on nutrition and physical activity

behaviors and promote maintenance of a healthy weight.

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APPENDIX A

PARTICIPANT INFORMED CONSENT LETTER

June 2, 2017

Dear Participant:

I am a graduate student under the direction of Dr. Mark Wilson in the Department of

Health Promotion and Behavior at The University of Georgia. I invite you to participate

in a research study entitled "An examination of how job demands and burnout relate to

nutrition and physical activity behaviors in working adults." The purpose of this study is

learn more about how job demands and exhaustion from work are related to nutrition and

physical activity.

To participate in this study, you must be a MTurk user, over the age of 18 years of age,

reside in the United States and be employed more than 30 hours per week at a worksite

with five or more coworkers.

Your participation will involve completing a survey about your work and health on three

different occasions. Each survey should take less than 15 minutes to complete. After the

completion of the survey and verification in the MTurk system, you will receive an

incentive. For the first survey, you will receive $2. For the second and third survey, you

will received $3 each.

Your name will NOT be on your completed survey. Your involvement in the study is

voluntary, and you may choose not to participate or to stop at any time without penalty or

loss of benefits to which you are otherwise entitled. It is important for the integrity of the

study that you answer all questions, however, if there is any question that you are uncomfortable answering you may skip that question by leaving that answer blank and going on to the next question. If you decide to withdraw from the study at any time, the information that can be identified as yours will be kept as part of the study and may continue to be analyzed, unless you make a written request to remove, return, or destroy the information.

The results of this participation will be **confidential** and will not be released in any individual identifiable form. This research involves the transmission of data over the Internet. Every reasonable effort has been taken to ensure the effective use of available technology; however, confidentiality during online communication cannot be guaranteed. Your survey responses will NOT be used to inform any employers of their employees. This survey does contain questions regarding your work. If you are completing this survey using employer provided equipment or on a work server it is possible that the information that you provide may be monitored or viewed by your employer.

Amazon Mechanical Turk participants' IDs and IP addresses will NOT be shared with anyone outside the research team and will be removed from the data after the data collection is complete and responses from the three surveys are matched. The results of the research study may be published, but your name or any identifying information will not be used. In fact, the published results will be presented in summary form only.

The quality of your responses will be monitored by using an attention-checking item at the end of the survey. Your response to this item should be neutral. If you fail to answer this item correctly, you will be paid for your completion of first survey; however, you will not be invited to participate in the second or third survey.

The findings from this project may provide information on how work impacts health

behaviors needed for weight loss and may be used to design strategies for effective

weight loss. There are no anticipated direct benefits to you from this survey. There are no

known risks or discomforts associated with this research.

If you have any questions about this research project, please feel free to contact Mark

Wilson at (706) 542-1221 or mwilson@uga.edu. Questions or concerns about your rights

as a research participant should be directed to The Chairperson, University of Georgia

Institutional Review Board at (706) 542-3199 or irb@uga.edu.

By completing this questionnaire, you are agreeing to participate in the above described

research project.

Thank you for your time and participation.

Sincerely,

Heather Padilla

APPENDIX B

PARTICIPANT SURVEY

Please provide your MTurk Worker ID in the space below.

_____

General Instructions:

Please answer each question or statement by choosing the response that best represents your opinion. If none of the choices fits exactly, choose the option that comes closest. Please answer all questions in each part of the survey. There are no right or wrong answers, and it is very important that you answer each question as honestly as possible.

Do you have to work fast?

○ Never

○ Rarely

○ Often

○ Always

Do you have too much work to do?

○ Never

○ Rarely

○ Often

○ Always

Do you have to work extra hard to finish a task?

○ Never

○ Rarely

○ Often

○ Always

Do you work under time pressure?

○ Never

○ Rarely

○ Often

○ Always

Can you do your work in comfort?

○ Never

○ Rarely

○ Often

○ Always

Do you have to deal with a backlog at work?

○ Never

○ Rarely

○ Often

○ Always

Do you have problems with the pace of work?

○ Never

○ Rarely

○ Often

○ Always

Please indicate your level of agreement with the statements below.

There are days when I feel tired before I arrive at work.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

After work, I tend to need more time than in the past in order to relax and feel better.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

I can tolerate the pressure of my work very well.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

During my work, I often feel emotionally drained.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

After working, I have enough energy for my leisure activities.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

After my work, I usually feel worn out and weary.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

Usually, I can manage the amount of my work well.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

When I work, I usually feel energized.

○ Strongly agree

○ Agree

○ Disagree

○ Strongly disagree

Please select the best option below.

I deliberately take small helpings to control my weight.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

I start to eat when I feel anxious.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

Sometimes when I start eating, I just can't seem to stop.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

When I feel sad, I often eat too much.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

I don't eat some foods because they make me fat.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

Being with someone who is eating, often makes me want to also eat.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

When I feel tense or "wound up," I often feel I need to eat.

    ⭕ Definitely true

    ⭕ Mostly true

    ⭕ Mostly false

    ⭕ Definitely false

I often get so hungry that my stomach feels like a bottomless pit.

    ⭕ Definitely true

    ⭕ Mostly true

    ⭕ Mostly false

    ⭕ Definitely false

I'm always so hungry that it's hard for me to stop eating before finishing all of the food on my plate.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

Please select the best option below.

When I feel lonely, I console myself by eating.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

I consciously hold back on how much I eat at meals to keep from gaining weight.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

When I smell a sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating even if I've just finished a meal.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

I'm always hungry enough to eat at any time.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

If I feel nervous, I try to calm down by eating.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

When I see something that looks very delicious, I often get so hungry that I have to eat right away.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

When I feel depressed, I want to eat.

○ Definitely true

○ Mostly true

○ Mostly false

○ Definitely false

Please answer the questions below by selecting the best answer.

How often do you avoid "stocking up" on tempting foods?

   ○ Almost never

   ○ Seldom

   ○ Usually

   ○ Almost always

How likely are you to make an effort to eat less than you want?

   ○ Unlikely

   ○ A little likely

   ○ Somewhat likely

   ○ Very likely

Do you go on eating binges even though you're not hungry?

○ Never

○ Rarely

○ Sometimes

○ At least once a week

How often do you feel hungry?

○ Only at mealtimes

○ Sometimes between meals

○ Often between meals

○ Almost always

On a scale of 1 to 8, where 1 means no restraint in eating and 8 means total restraint, what number would you give yourself?

○ 1 - No restraint

○ 2

○ 3

○ 4

○ 5

○ 6

○ 7

○ 8 - Total restraint

Think about your eating habits over the past 12 months. About how often did you eat or drink each of the following foods?

Remember breakfast, lunch, dinner, snacks and eating out.

Choose only 1 response.

Cold cereal

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Skim milk, on cereal or to drink

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Eggs, fried, or scrambled in margarine, butter or oil.

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Sausage or bacon, regular-fat

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Margarine or butter on bread, rolls, pancakes

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Orange juice or grapefruit juice

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Fruit (not juices)

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Beef or pork hot dogs, regular-fat

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Cheese or cheese spread, regular-fat

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

French fries, home fries, or hash brown potatoes

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Margarine or butter on vegetables, including potatoes

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Mayonnaise, regular-fat

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Salad dressings, regular-fat

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Rice

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Margarine, butter, oil on rice or pasta

○ Never

○ Less than once per month

○ 1-3 times per month

○ 1-2 times per week

○ 3-4 times per week

○ 5-6 times per week

○ 1 time per day

○ 2 or more times per day

Over the past 12 months, when you prepared foods with margarine, how often did you use a reduced-fat margarine?

○ Didn't use margarine

○ Almost never

○ About 1/4 of the time

○ About 1/2 of the time

○ About 3/4 of the time

○ Almost always or always

Overall, when you think about the foods you ate over the past 12 months, would you say your diet was high, medium, or low in fat?

○ High

○ Medium

○ Low

During a typical 7-day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time?

Strenuous exercise (Heart beats rapidly) Examples: running, jogging, hockey, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling

○ 0 times

○ 1 time

○ 2 times

○ 3 times

○ 4 times

○ 5 times

○ 6 times

○ 7 times

○ 8 times

○ 9 times

○ 10 times

○ 11 times

○ 12 times

○ 13 times

○ 14 times

○ 15 times

Moderate exercise (Not exhausting)

Examples: fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy
swimming, alpine skiing, popular and folk dancing

○ 0 times

○ 1 time

○ 2 times

○ 3 times

○ 4 times

○ 5 times

○ 6 times

○ 7 times

○ 8 times

○ 9 times

○ 10 times

○ 11 times

○ 12 times

○ 13 times

○ 14 times

○ 15 times

Mild exercise (Minimal effort)

Examples: yoga, archery, fishing from the river bank, bowling, horseshoes, golf,

snowmobiling, easy walking

○ 0 times

○ 1 times

○ 2 times

○ 3 times

○ 4 times

○ 5 times

○ 6 times

○ 7 times

○ 8 times

○ 9 times

○ 10 times

○ 11 times

○ 12 times

○ 13 times

○ 14 times

○ 15 times

During a typical 7-day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

○ Often

○ Sometimes

○ Never/rarely

Please answer the following questions by selecting the best answer.

What is your sex assigned at birth?

○ Male

○ Female

How old are you in years?

_____

Do you consider yourself Hispanic or Latino?

○ Yes

○ No

What is your race?

○ Black or African American

○ White or Caucasian

○ Asian

○ American Indian or Alaska Native

○ Native Hawaiian or other Pacific Islander

What is your highest education level?

○ Some high school

○ High school graduate or GED

○ Some college or technical or vocational training

○ Associate degree (2 years)

○ Bachelor degree (4 years)

○ Postgraduate work (working towards a Master's degree, PhD, or MD)

○ Postgraduate degree (Master's degree, PhD, MD, etc.)

During the past year, what was your individual (not household) income from all sources before taxes? Include all sources of income including wages, pensions, alimony, child support, dividends, etc.

○ $0 - $20,000

○ $20,001 - $40,000

○ $40,001 - $60,000

○ $60,001 - $80,000

○ $80,001 or more

What is your marital status?

○ Single

○ Divorce/separated/widowed

○ Married/living with a partner

How many children under the age of 18 live in your household?

○ None

○ 1 child

○ 2 children

○ 3 children

○ 4 children

○ 5 children

○ 6 or more children

Choose the category that best describes your main job. If none of the categories fit you exactly, please respond with the closest category.

○ Executive, administrator, or senior manager (e.g., CEO, sales VP, plant manager)

○ Professional (e.g., engineer, accountant, systems analyst)

○ Technical support (e.g., lab technician, legal assistant, computer programmer)

○ Sales (e.g., sales representative, stockbroker, retail sales)

○ Clerical and administrative support (e.g., secretary, billing clerk, office supervisor)

○ Service occupation (e.g., security officer, food service worker, janitor)

○ Precision production and crafts worker (e.g., mechanic, carpenter, machinist)

○ Operator or laborer (e.g., assembly line worker, truck driver, construction worker)

What is your job title?

_____

How many years have you been employed in your current position?

    ○ Less than 1 year

    ○ 1 year

    ○ 2 years

    ○ 3 years

    ○ 4 years

    ○ 5 years

    ○ 6 years

    ○ 7 years

    ○ 8 years

    ○ 9 years

    ○ 10 or more years

Do you supervise other employees?

    ○ Yes

    ○ No

How many hours do you work in a typical week (7 days) at your job outside of MTurk?

_____

How many hours do you work in a typical week (7 days) on MTurk?

_____

The answer to this item should be Neutral so we know to keep your data.

○ Strongly disagree

○ Disagree

○ Neutral

○ Agree

○ Strongly agree