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DEMAND-CONTROL INTERACTIONS IN OLDER WORKERS:
HEALTH AND WELL-BEING AS OUTCOME MEASURES

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Industrial-Organizational Psychology

by
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Accepted by:
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ABSTRACT

The current study used structural equation modeling to examine the relationship between demands and control on the outcome variables stress and health. Karasek's (1979) Demand-Control model was used as a conceptual framework and age was also examined as a variable of interest. Multiple operationalizations of both age (chronological and subjective) and control (decision latitude and problem focused coping) were examined using a sample of 155 call center employees. Contrary to hypotheses, direct effects were not found for demands or decision latitude on either stress or self-rated health and no moderating effects were found for either decision latitude or problem focused coping. A direct effect was found for problem focused coping in that an increase in problem focused coping led to higher self-rated health. Subjective age was found to predict problem focused coping. Future research should further investigate problem focused coping as an important resource for employees given the relationships found in this study.

DEDICATION

This dissertation is dedicated with love to my husband, Brandon, and our precious daughter Audrey. You are my world and my motivation. This work would have not been possible without your love and encouragement every step of the way. I love you both dearly.

ACKNOWLEDGMENTS

I would like to acknowledge my Chair, Dr. Mary Anne Taylor, for all of the support and encouragement that she has given me throughout this lengthy process. Without her understanding, compassion, and insight, this project may have never been completed. I would also like to thank Dr. Moore, Dr. Switzer, and Dr. McCubbin for their expertise and invaluable contributions to this project. Thank you all.

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CHAPTER ONE

INTRODUCTION

The world is facing a labor shortage that has already begun, but will continue to increase over the next several decades. Every day, 11,000 Baby Boomers turn 50, and there are only 43 million Gen Xers to fill the 152 million vacancies that Boomers are leaving (Kaye & Cohen, 2008). This mass retirement of long-employed workers will affect all areas of the labor market – from the private sector to the public sector, across both white and blue collar positions, and across all industries. Statistically, there are simply not enough younger employees with the needed knowledge, skills, and abilities to replace these retiring Baby Boomers. According to projections for the year 2008 to 2018 by the Bureau of Labor Statistics, the labor force of those aged 18 to 24 will actually decrease by 4/10 of a percent; 25 to 54 year olds will show growth at only 1/10 of 1%. In contrast, those who are 55 and older are projected to show labor growth rates of 3.6%, given increasing reliance on this demographic to meet labor demands that cannot be met by younger workers (Toossi, 2009). Declining birth rates, better health care extending work lives, countered with a trend toward earlier retirement is resulting in a “war for talent” (Michaels, Handfield-Jones & Axelrod, 2001) which is reflected in both labor and skill shortages (Burke, Cooper, & Field, 2013). Companies will likely be in a position where they need to compete for skilled older workers, and to create an environment that encourages retention of this demographic group.

The approaching mass retirement of Baby Boomers across a twenty year span comes after a century-long trend of people living longer and retiring earlier (Shultz,

Taylor, & Morrison, 2003). The trend is global, and will have a significant impact on the labor force in the United States. From 1950-2000, the percentage of the world's population older than 60 grew approximately 8-10%. From 2000-2050, this figure is expected to more than double to 21%. In some countries such as Japan and Western Europe, an astonishing 40% increase is expected (Burke, Cooper, & Field, 2013).

This reduction in the available labor pool is exacerbated by the fact that these older workers are retiring at much earlier ages than in previous years. For example, in 1950, more than 70% of all 65-yr old men were in the labor force, but by 1985, that had decreased to about 30% (Quinn, 2000). According to Penner, Perun, and Stuerle (2002) and Wellner (2002), it is estimated that labor force participation by employees over the age of 55 will have to increase by 25% in order to maintain a constant ratio of employees to the population. While there was some increase in labor participation rates prior to the recession, this trend has shifted. Between 1977 and 2007, employment of workers age 65 and over increased 101%, as compared to the 59% increase in total employment (age 16 and over), with the majority of older workers working fulltime (Bureau of Labor Statistics, 2008). During the recent recession, the employment rates of older workers declined despite changes in pensions and retirement investments. By 2020, baby boomers will be 56-74 years old and are expected to have lower labor force participation rates than their younger cohorts, despite the recent recession (Toossi, 2012). An anticipated labor shortage leads to the expectation that this demographic will become more a more attractive segment of the labor force for employers.

Interest in the aging workforce can be traced back to the 1950s, but it has had little impact on policy and practice until recently (Burke et al., 2013). Recent research suggests that the typical organizational climate may be more favorable for older employees than in the past, given that current stereotypes of and attitudes toward older workers are generally favorable (Bertolino, Truxillo & Fraccaroli, 2013). Thus, obstacles facing older workers in the past may be reduced in the sense that negative stereotypes may be weakening. To be successful, both companies and society will have to facilitate a long term productive engagement of older adults in the workforce (Feyrer, 2007).

It is important for both employers and employees that older workers continue to contribute in the workforce. Employers are interested in retaining older workers to avoid potential skill shortages and the loss of organizational specific knowledge that can occur when older workers leave the workforce, and older workers may be interested in remaining in the workforce for financial concerns and a desire to remain active and maintain social relationships (Guido & van der Heijden, 2013). Thus, it is imperative to study workplace phenomena that affect older workers, and the predictor-outcome relationships relevant to retaining and recruiting older adults at work, though few researchers have done so (Ebner, Freund, & Baltes, 2006; Kanfer & Ackerman, 2004; Ng & Feldman, 2008; Truxillo, 2009). Maintaining a positive environment that is supportive for older workers is an important means of retaining or recruiting them, and is also beneficial from the standpoint of the employee. Understanding the factors that impact stress among this demographic has implications for organizational competitiveness for this resource and for worker well-being.

The Current Study: The Demand-Control Model and the Older Employee

Two of the factors that impact stress in the workforce in general are job demands and job control. Researchers have reached conflicting conclusions regarding the relationship of job demands and job control to stress and perceived health. While early theorists suggested that demands and control interact, with the impact of higher job demands on stress buffered by high control on the part of the employee, there is some evidence to suggest that simpler additive effects of the two variables emerge more often. Personal control over demands is typically framed as a positive influence on stress since it may give the individual a heightened sense of efficacy over work related outcomes. While simple effects of control have been found, many of these studies were based on findings using young employees. In the current study, we suggest that control and demands may indeed interact to predict levels of stress in a sample of older workers.

We further hypothesize that the nature of the interaction may depend on the operationalization of control, one of the more controversial variables in most stress models. In order to examine possible interactive effects of control with job demands in older employees, we use two alternative definitions of control and have distinct hypotheses associated with each. When control is defined as decision latitude, we expect it will serve as a buffer for stress under high job demand conditions. However, when control is defined as problem focused coping, as it is in some prior research, we would expect that stress may be exacerbated under high demands condition due to increased pressure on individual resources. Thus, a main goal of the present study is to examine the Demands x Control interaction as a predictor of levels of stress within older individuals

using Karasek's (1979) Buffer Hypothesis as a conceptual framework. By investigating the impact of two definitions of control on this interaction, we hope to clarify inconsistencies in the control x demand interaction found in the literature.

Simply stated, the Buffer Hypothesis posits that high work demands tend to lead to high levels of workers' stress, but having high control will help buffer (attenuate) the stress caused by the high work demands, resulting in lower levels of stress in workers when control is defined as the ability to have input and an impact on solving problems related to stress (Shultz, Wang, Crimmins, & Fisher, 2010). However, when control is defined as problem focused coping, an internal resource, increased demands may deplete this critical internal resource and lead to more stress.

Recent work indicates that older workers experience demands, controls, and the interaction of demands and controls differently than younger workers (Shultz et al. 2010). This provides additional rationale for examining the demand X control interaction in this group. Given the lack of research on older workers in this area, the main goal of the current study focuses on how the Buffer Hypothesis functions for older individuals.

An additional goal of the current study is also related to construct definitions in the literature. The definition of "older" individual poses intriguing questions for this area of research. As part of this investigation, we will examine both subjective (self-perceived) and objective measures of age and their relationship to perceived stress. While past research often uses chronological age as a measure of stress, research suggests that self-perceived or subjective age is more strongly related to both physical and psychological functioning (Bowling, See-Tai, Ebrahim, Gabriel & Solanki, 2005). Thus,

this study will also investigate the utility of both chronological and subjective age in understanding the factors that predict stress levels in older adults. In summary, we will investigate how two alternative measures of control and two alternative definitions of age contribute to our understanding of how job demands and job control predict stress in older employees.

First, we will review the general literature on job stress and its relevance to worker well-being, and then we turn to a discussion of stress among older workers. We begin this segment by defining “older” workers through both subjective and objective age. We then present the Job Demands-Control model as a framework for understanding the relationship between the demands of work and the potentially buffering impact of control on this stressor. This is followed by a discussion of Karasek’s extension of the original model and its implications for understanding stress among older employees.

Job Stress

Job stress is a growing problem for many adults. Job stress can be defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker, and is the greatest source of everyday stress in adults’ lives (NIOSH, 1999). Forty six percent of adults say workload is the main cause of stress in their employment setting (American Institute of Stress, n.d.). Workload is a common dimension of the larger classification of work demands, which consistently emerges as a predictor of stress related outcomes. Despite receiving more attention recently, the problem of job stress continues to grow, as stress at work has steadily increased over the last few decades (American Institute of Stress, n.d.).

Stress is known to have a number of negative implications for psychological and physical functioning, including increased susceptibility to illness and depression (Jex, 1998). In addition to the negative physical and psychological outcomes of individuals, job stress has been shown to relate to a variety of other outcomes of importance to employers, including increasing health care costs in the United States (Ganster et al. 2001), lower overall productivity and performance (Manning et al. 1996), and also higher levels absenteeism and turnover (Hoel, Sparks & Cooper, 2001). Job stress alone carries a price tag for U.S. industry estimated between \$200 million accounting for absenteeism and turnover (NIOSH, 2009) and \$300 billion annually when accounting for accidents, absenteeism, turnover, diminished productivity, workers' compensation awards, and direct medical, legal and insurance costs (American Institute of Stress, n.d.; Rosch, 2001).

Older workers may be particularly influenced by workplace stressors such as longer hours and shiftwork. This type of finding suggests that there may be unique interactions or simple effects of variables among older employees that are not observed among younger employees. In fact, existing research suggests that this demographic group may be unique in terms of outcomes related to health and well-being at work. For example, while they report fewer injuries than other demographic groups, the severity of their injuries is more extreme (Loeppke et al., 2013). Given the increased demand for this group of skilled workers, attending to factors that can lower stress and the negative physical consequences that accompany heightened job stress is a priority for researchers and employers. The following is a brief review of several outcomes associated with

stress. The severity of these outcomes for both employer and worker provides a rationale for investigating the precursors to stress.

Health outcomes and healthcare costs. Healthcare costs in the United States continue to escalate. In 2004, healthcare spending totaled \$1.8 trillion and in 2011 it was close to \$3 trillion (NIOSH, 2012). NIOSH estimates that healthcare expenditures are nearly 50% greater for workers who report high levels of stress. According to Perkins (1994), 60-90% of doctor visits are stress related. NIOSH has reported that leading health problems associated with job stress are cardiovascular diseases, musculoskeletal disorders, and psychological problems (Murphy, 2002; Ordin, 1992). In a 20-year study, Cryer (1996) found that unmanaged reactions to stress were a more dangerous risk factor for cancer and heart disease than either cigarette smoking or high cholesterol foods. Self-rated health is commonly used as a proxy in studies to understand health outcomes of participants, and has also been found to significantly relate to stress in a variety of populations (e.g. Kumar & Kumar, 2014; Kim, Cho, Lee, Marion & Kim, 2005; Weyers, Peter, Boggild, Jeppesen, & Siegrist. 2006).

Productivity, absenteeism and turnover. Research has shown that poor worker health contributes to negative outcomes for organizations. An estimated 1 million workers are absent every day due to stress (American Institute of Stress, n.d.). Estimates on the cost of absenteeism vary, but NIOSH reports the average cost of absenteeism in a large company is more than \$3.6 million/year, and there are estimates that 40% of job turnover is due to stress (Hoel, Sparks, & Cooper, 2001). Workers with high stress were over twice as likely to be absent 5+ days a year (Jacobson et al., 1996). Proper treatment

can help reduce absenteeism - absenteeism drops for workers are appropriately treated for depression (Claxton, Chawla, & Kennedy, 1999). Productivity has also been found to be related to worker health, as Burton and colleagues (1999) found a direct relationship between modifiable health risk factors and work output for telephone call center operators at a bank.

Given the implications of stress for personal health and the direct and indirect costs incurred by organizations, it is important to understand the precursors of stress in the workplace. It is particularly important to understand the implications of stress in the workplace for older adults given that organizations wish to retain older adults and that 40% of turnover is caused by stress (Hoel et al.,2001). In fact, older workers' self-perceived work ability, or the ability to meet job demands is related to absenteeism, retirement, and disability leave (McGonagle, Fisher, Barnes-Farrell & Brosch, 2014).

In examining the relationship between age and stress, no simple relationship emerges. Recent meta-analyses suggest that the relationship between stress and age is complex, and may be moderated by factors such as physical job demands and other occupational characteristics (Rauchenbach, Krumm, Thielgen & Hertel, 2013). Thus, additional research in this area is needed to clarify the age-stress relationship to develop and refine existing theory. Furthermore, identifying and understanding factors that are related to stress can also inform organizational interventions designed to decrease or buffer these effects. In the current study, the Demand-Control model will be used as a theoretical framework for understanding stress in older adults in the workplace.

Research on age and stress in the work place will be reviewed next, followed by a review of Karasek's (1979) Demand-Control model. Understanding the unique aspects of stress in older adults based on prior empirical research is a necessary first step in gaining an appreciation of the environmental and psychological factors that are most challenging for this group. The Demand-Control model provides a theoretical foundation for making predictions about the relationship between demands and control in this population of employees.

Work stress among older employees. Research has shown that adults' life experiences in specific domains differ across age groups (Clark, Oswald, & Warr, 1996; Hochwarter, Ferris, Perrewé, Witt, & Kiewitz, 2001; Rhodes 1983), and this is evident in work experiences as well. These patterns are often inconsistent with expectations or stereotypes regarding older workers. For instance, it was long been believed that a negative relationship exists between age and job performance, however, empirical research examining the relationship between age and job performance has failed to find evidence of a negative association and instead some research suggests a positive relationship between the two (McEvoy & Cascio, 1989; Ng & Feldman, 2008; Waldman & Avolio, 1986). Ng and Feldman's (2012) meta-analysis found that such performance oriented stereotypes held about older workers are generally inconsistent with the cumulated research evidence. Many negative attributes believed to be associated with chronological aging - such as poor health and low work motivation - are not related to age or may be modestly inversely related to age (Ng & Feldman, 2012; Bertolino et al., 2013). Thus, an investigation of the relationship of age to work stress is much more

complex than simply assuming that age brings vulnerability. Existing stereotypes are overly general and may provide an inaccurate portrayal of their strengths and weaknesses.

As a first step, we investigate how to define “older” employees. In terms of the current study, it is likely that self-perceived or subjective age is more relevant to work stress than a simple chronological measure. In the next segment, we examine the literature that supports this perspective.

Defining “Older:” Objective and Subjective Age

The first step in investigating the relationship between age and stress related outcomes is to examine the way in which age is operationalized. Traditionally, age has been defined in the literature using chronological age. There has been a call from researchers to expand this to include other operationalizations of age that may be more relevant to understanding the work experience such as functional age or subjective age (Cleveland & Hollmann, 1991; Cleveland & Shore, 1992). Chronological age measures have limited utility in understanding subjective dependent variables such as perceived stress because they don't fully reflect the meanings that individuals associate with age (Cleveland, Shore & Murphy, 1997). Subjective age may be more closely aligned with the psychological and physical variables associated with stress (Bowling et al., 2005).

Subjective age refers to how old or young an individual perceives themselves to be (Steitz & McClary, 1988)). Studies consistently find that despite age related changes, the majority of healthy older adults feel younger than they actually are (Montepare, 2009; Mock & Eibach, 2011; Rubin & Berntsen, 2006). Subjective age is typically measured by

asking participants to specify in years how old they felt most of the time (Kleinspehn-Ammerlahn, Kotter-Gruhn, & Smith, 2008; Kotter-Gruhn et al., 2009; Mock & Eibach, 2011; Rubin and Berntsen, 2006; Weiss & Lang, 2012; Westerhof & Barrett, 2005).

Interestingly, the discrepancy between subjective age and chronological age in healthy adults is not constant through the life span - it emerges in early adulthood and changes across the life span (Galambos, Turner & Tilton-Weaver, 2005; Montepare, 2009; Rubin & Berntsen, 2006). Specifically, younger adults feel the same age or slightly older than their actual age, but as an individual grows older they will begin to feel increasingly younger than their actual age (Galambos et al., 2005; Rubin & Berntsen, 2006). There is some debate over when this happens. Both Barnes-Farrell and Piotrowski (1991) and Gana and colleagues (Gana, Alaphilippe, & Bailly, 2002) find a turning point of age 30 where those under 30 view themselves as older and those over 30 view themselves as younger. Other researchers have seen 25 as the turning point (Rubin & Berntsen, 2006). Rubin and Bernsten (2006) have also found that the discrepancy between subjective age and chronological age levels out after age 40 – after age 40, adults consistently feel 20% younger than their age.

In a study of French workers across three sectors, Rioux and Mokoukolo (2013) examined both objective or chronological age and subjective age at work in relation to satisfaction with professional life and workplace attachment. Rioux and Mokoukolo (2013) found subjective age at work to be a separate construct than chronological age, though the two were highly correlated. They also found confirmation of an age bias, where workers under 30 tended to see themselves as older, and workers over 30 tended to

see themselves as younger, similar to findings of Barnes-Farrell and Piotrowski (1991) and Gana and colleagues (Gana et al., 2002). Additionally, it was found that subjective age at work was positively related to both satisfaction with professional life and workplace attachment (Rioux & Mokoukolo, 2013). These studies suggest that there is a psychological component associated with age identity. Further research has attempted to uncover the variables that underlie this discrepancy between subjective and chronological age.

Given the substantial variability in subjective age for individuals who are at the same chronological age, researchers have tried to identify the factors that explain this variance. Self-rated health has consistently been found to account for a substantial proportion of variance in subjective age for those at the same chronological age (Barak & Stern, 1986; Barrett, 2003; Hubley & Russell, 2009; Infurna, Gerstorf, Robertson, Berg, & Zarit, 2010; Rubin & Berntsen, 2006). Stephan, Demulier, & Terracciano (2012) found that self-rated health was associated with subjective age in middle aged and older adults, but was unrelated to subjective age in younger adults. More positive levels of health are associated with lower subjective age. In research that further explored the discrepancy between chronological and subjective age, Stephan, Demulier, & Terracciano (2012) found that feeling younger at older ages was more common among individuals with good self-rated health and with a youthful personality (extroversion and open to experience). In summary, this body of research suggests that chronological and subjective age, while correlated, are not interchangeable and may be influenced by unique factors such as health and personality variables.

Further work reveals additional findings regarding the unique aspects of subjective age. Evidence has also been found that attitudes on aging can moderate the relationship between subjective age and psychological wellbeing. Eibach, Mock and Courtney (2010) experimentally examined subjective age and aging attitudes in a sample of middle and older aged adults. Participants who were induced to feel older and primed with negative aging attitudes reported more negative self-evaluations than those were also primed to feel older but primed with *positive* aging attitudes. Control participants were not primed to feel older and reported relatively positive self-evaluations in both the negative and positive aging attitude priming conditions. Research suggesting that this psychological component of subjective aging is important is substantiated by more recent research (Mock & Eibach, 2011). In summary, much of the existing research suggests that psychological, social, and health related variables produce meaningful differences between chronological and subjective age. Given the stronger relationship between subjective age with attitudinal and psychological variables, it may be more strongly related to affective definitions of stress than is chronological age.

While chronological age and subjective age are central in the current study, it is also important to briefly address a pragmatic definition of “older” based on a legal perspective that is relevant to employee well-being. Much of the prior research has used the “older worker” definition based on the U.S. Age Discrimination in Employment Act definition (McGonagle et al., 2014), which protects workers over the age of 40 from discrimination in the workplace. “Old age” is defined differently by other researchers: in lifespan theories it is typically adults over age 65 (Rauschenbach et al., 2013), and we

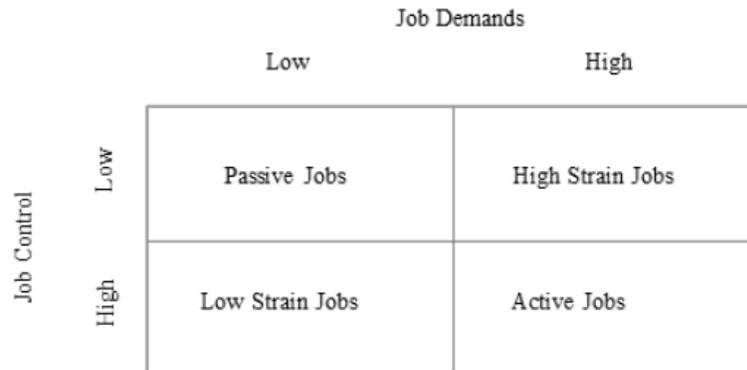
also see over age 70 (Infurna et al., 2013), over age 45 (de Lange et al., 2006) and over age 50 (Rauschenbach & Hertel, 2011) in the literature. Hertel and colleagues (Hertel, Rauschenbach, Thielgen, & Krumm, 2015) refers to older workers as those between the ages of 50 and 65.

Following this legal precedent, we will define “older worker” as those age 40 and above given its relevance to work and to industrial/organizational psychology. Defining those over 40 as older is legally defensible and also methodologically desirable in that it should provide adequate variability in the older (age 40 and up) age range gathered in this study. Both objective and subjective measures of age will be gathered from participants. We did not confine the ceiling age as a means to broaden the scope and variability of both chronological and subjective age. As noted, we hypothesized, given the nature of the research reviewed, that subjective age would be a more significant factor in the prediction of work stress than objective age.

Given our definition of age and the importance of measuring both chronological and subjective age, we turn to a well-established model of stress in order to examine the dynamics of stress in this older population. In the next segment, research on this major model of work stress, the Demand-Control model, is reviewed. First, we review the basic components of the Demand-Control model, and then move into a discussion of more specific issues encountered when using the model which have led to controversy regarding the model’s utility. We believe that this model may hold promise for understanding the relationship between job demands and control among older workers.

Demand-Control Model

Figure 1. Karasek's (1979) Demand-Control Model



In 1979, Karasek published his seminal Demand-Control model of stress, which has led a number of investigations into the causes of stress in the workplace. A mismatch between the demands of the job and the resources of the worker, specifically control, lead to increased stress. Indeed, recent reviews of the literature suggest that exposure to job demands reduce available resources and this, in turn, leads to stress or job fatigue (Frone & Tidwell, 2015).

Despite the multitude of studies investigating the model, evidence for one core tenet of the model remains elusive – that of the Buffer Hypothesis. The Buffer Hypothesis posits that high work demands tend to lead to high levels of workers' stress, but having high control may attenuate the stress caused by the high work demands, resulting in lower levels of stress in workers (Schultz et al., 2010).

While the model has garnered some support, there are conflicting findings regarding the interactive effects of job demands and control on job stress. There are multiple potential reasons that findings have been mixed. Many researchers have argued that the issue lies in the operationalization of constructs and a mismatch between the

demands and controls that are investigated (Presseau et al., 2013). In terms of construct definition, job demands are often broadly defined as psychological or physical, even though the two types of demands have very different implications for stress in older adults (Tobiasz-Adamczyk et al., 2013). Similarly, operationalization of stress often incorporates both subjective measures such as general psychological wellbeing as well as objective medical outcomes such as coronary heart disease, cortisol levels, and blood pressure. In addition, short term measures of stress such as irritation measures may yield very different data than those that look at longer term measures (Rauschenbach et al., 2013). Current definitions of stress incorporate “job fatigue,” a multidimensional approach that incorporates physical, mental, and emotional exhaustion (Frone & Tidwell, 2015). In the current study, we incorporate both a popular global measure of perceived stress (Cohen, Kamarck & Mermelstein, 1983) as well as the newer definition of work fatigue offered by Frone and Tidwell (2015) as an exploratory variable. These measures of stress may logically be more related to the psychologically based measures of demands and control. Thus, definition of stress as a psychologically self-defined construct is key in understanding the relationships proposed by the model in the current study..

Karasek presented the Job Demand-Control Model in 1979 as an environmentally-based stress management model of job strain, and initially tested it using national survey data from both U.S. and Swedish populations. Karasek (1979) felt that the utility of the model was in the separation of job demands and control, which had not previously been done in the literature. The initial model postulated that psychological strain results from the combined effects of the demands of a work situation and the

amount of decision latitude available to the worker facing those demands (Karasek, 1979).

Karasek's original work (1979) defined job demands as stress sources (e.g. work load demands) present in the work environment, and included psychological stressors involved in accomplishing the workload, stressors related to unexpected tasks, and stressors of job-related personal conflict. Subsequent research on the model has incorporated a broad range of demands though they have been typically operationalized in terms of quantitative aspects such as workload and time pressure (Karasek, 1985; van der Doef & Maes, 1999). Role conflicts, physical demands, and emotional demands are also analyzed frequently as job demands (Karasek et al., 1998). As noted earlier, the treatment of physical and psychological demands as interchangeable in the model may be responsible for inconsistencies in findings utilizing Karasek's model. In the current study, demands will be operationalized as psychological demands of workload and time pressure, utilizing Karasek's job demands scale in the Job Content Questionnaire (Karasek et al., 1998).

Job control was initially viewed as "decision latitude," with job decision latitude defined as the working individual's potential control over his tasks and his conduct during the work day (Karasek, 1979). This distinction came to be known as skill discretion (person's opportunity to use specific job skills in the work process or control over his tasks) and decision authority (extent to which a person is autonomous in task-related decisions such as timing and method control or his conduct during the day), and studies have shown these to be distinct constructs (Smith, Cohen, Stammerjohn, & Happ,

1981). Job control and decision latitude are separate and distinct constructs, though studies using each are compared to each other as if the constructs are interchangeable. Other researchers have defined job control fairly generally as a person's ability to control his or her work activities (van der Doef & Maes, 1999), and is operationalized and measured by researchers in a variety of ways (e.g. Sargent & Terry, 1998; Morgeson & Humphrey, 2006). Job control has been found to be positively related to reduced absenteeism, individual growth satisfaction, supervisor and co-worker satisfaction, organizational commitment, and job involvement (Fried & Ferris, 1987; Humprey, Nahrang, & Morgeson, 2007; van der Doef & Maes, 1999). It is also considered a major pre-requisite for activated states of well-being at work such as reduced anxiety, stress, and burnout/exhaustion (Weigl et al., 2013). It is worth noting that current research suggests that the nature of control may be qualitatively different for younger and older workers, since older workers may use more internalized, problem oriented strategies (Hertel et al, 2015). Thus, while decision latitude is an important variable to understand, the unique aspects of the older employee population led us to incorporate a second definition of control.

In the current study, job control will be operationalized in two ways. When control is defined as decision latitude we would expect that it would have a buffering effect on job demands. Such measures of control are exemplified by the Decision Latitude scale of Karasek et al.'s (1998) Job Content Questionnaire which includes subscales for both skill discretion and decision authority. We will also measure problem oriented coping as an alternative means to operationalize control. As noted earlier, this is

particularly relevant to understanding older employees' coping styles when faced with stressful situations. While decision latitude measures of control may yield an inverse relationship between control and stress, strengthened under high stress conditions, problem oriented definitions of control may yield a different pattern of results, with higher stress levels experienced when demands are high and control is high due to the internal drain of resources over time.

Next we turn to Karasek's (1979) seminal work which incorporated more specific hypotheses regarding demands and control. Two of these hypotheses, the Strain and Buffer hypotheses will be explored in greater depth. While the focus of our study is on the Buffer Hypothesis, it is important to understand that the Buffer Hypothesis is a specification of the Strain Hypothesis.

Karasek's Strain and Buffer Hypotheses: Additive and Interactive Impact of Control and Demands

Strain hypothesis. The Strain Hypothesis posits that a combination of high demands and low decision latitude leads to job strain and the most adverse health outcomes (Phipps, Malley, & Ashcroft; 2012), such as exhaustion and psychosomatic health complaints (de Jonge, van Vegchel, Shimazu, Schaufeli, & Dormann; 2010), as well as an increased likelihood of mental or physical illness and reduced well-being (van Vegchel, de Jonge, & Landsbergis; 2005). It is important to note that the resulting strain can be the result of additive or interactive effects (van Vegchel et al., 2005). Jobs high on demand and low on control were dubbed "high strain jobs" and risk illness and reduced wellbeing (Karsek, 1979). The opposite situation, jobs low on demand and high on

control, are considered “low strain jobs,” and are unlikely to result in adverse reactions (Karasek, 1979).

Buffer hypothesis. The Buffer Hypothesis is one specific way in which the Strain hypothesis could function, and also investigates the relationship between high demands and low control, but as an interactive effect. Karasek himself did not elaborate on the specific aspects of a Demand X Control interaction in his 1979 work, though he did introduce the idea of both additive and interactive effects. It is important to note that control is operationalized as decision latitude in this model, not as problem focused coping.

Simply stated, high work demands tend to lead to high levels of workers’ stress, but having high control in terms of decision latitude will buffer (attenuate) the stress caused by the high work demands, resulting in lower levels of stress in workers (Shultz et al. 2010). In other words, the Buffer Hypothesis is exclusively an interactive effect of demands and control with control reducing the negative effects of demands on worker well-being (van der Doef & Maes, 1999). Research conducted thus far has provided mixed support for this hypothesis.

Karasek (1979) found, as predicted, that workers in both the U.S. and Sweden in jobs with low job decision latitude and high job demands reported more exhaustion after work, trouble awakening in the morning, depression, nervousness, anxiety, and insomnia. These findings supported the Strain Hypothesis in regards to additive effects. Only moderate evidence was found that the variables interacted to produce strain, making it unclear if high control actually acts as a buffer for high job demands. In the Swedish

sample, jobs low in decision latitude and high demand were also strongly associated with objective behavioral outcomes of pill consumption and sick days (Karasek, 1979). Strong dissatisfaction was evident in jobs high in demands and low in control, although again there were no interactive effects. Karasek (1979) was also able to test the model longitudinally with the Swedish sample, confirming the cross-sectional findings mentioned above. Thus, in this particular study, a simple additive model consistent with the Strain Hypothesis was supported.

A plethora of studies have investigated Karasek's model over the years, and as a result, several reviews have been published to consolidate the vast amount of findings related to the model, specifically the Strain and Buffer Hypotheses. The reviews of the model (van der Doef & Maes, 1999; Hausser et al., 2010) are fairly consistent in their findings, as well as with Karasek's initial findings (1979). In general, support is found for additive effects of demands and decision latitude on stress (Strain Hypothesis). Hausser et al. (2010) concluded that the existence of additive effects has been established "beyond a doubt" with 57% of tests included in their analysis providing at least partial support (42% providing full support) for additive effects (strain hypothesis). The Strain Hypothesis suggests that a lack of decision latitude coupled with job demands have an additive effect in terms of lower general psychological wellbeing, lower job satisfaction, more burnout, and more job-related psychological distress (van der Doef & Maes, 1999; Hausser et al., 2010).

The Buffer Hypothesis, which suggested that high decision latitude should decrease these negative effects of high job demands, was not clearly delineated by

Karasek (1979). Many studies have since investigated the Buffer Hypothesis, and findings have been mixed (e.g. van der Doef & Maes, 1999; Hausser, et al., 2010). Often, decision latitude does not moderate the impact of high job demands as this hypothesis would suggest. The elusiveness of evidence for the Buffer Hypothesis has resulted in its being labeled as a pervasive “urban myth” of Industrial-Organizational Psychology (Taris, 2006). Taris (2006) pointed out that only 10% of studies examining the Job Demand-Control Model have shown full support for the demand-control interaction effect, and Hausser’s review (Hausser et al., 2010) found only 30% of tests provided partial support. It is possible that the lack of support for the interactive effect indicates that demands and control only operate independently to predict stress. It is also possible that the demand-control interaction only operates for specific operationalizations of the constructs, or only within certain populations. In the next segment we examine varied definitions of control and demands along with demographic variables that may impact the discovery of a buffering effect of control. Thus, we examine the possibility that the Buffer Hypothesis may emerge in the older population if the definition of the variable of control is broadened.

Conceptualization of Variables. The conceptualization and operationalization of demands and control by various researchers has been pointed out as a concern in reviewing the tests of the model (de Jonge et al., 2010). Both variables have been defined in a variety of ways, and these alternative definitions may have an impact on whether the Buffer Hypothesis is supported.

Past work suggests that definitions of the constructs in the Job Demands-Control Model have led to inconsistent findings. Studies that do provide support for the Buffer Hypothesis are varied in methodology and the conceptualization of independent and dependent variables. For instance, where job demands are concerned, Ganster et al. (2001) found that both objective and subjective workload interacted with control to account for healthcare costs over a 5 year period. Fox and colleagues (1993) found that perceived quantitative workload interacted with control to predict job satisfaction, systolic blood pressure at work, systolic and diastolic blood pressure at home, and cortisol level at work. Wall, Jackson, Mullarkey, and Parker (1996) investigated multiple operationalizations of control and found support for the interactive effect between demand and control to predict strain, but did not find support for the demand-decision latitude interaction. Similarly, Sargent and Terry (1998) found evidence of the interactive effects with high task control but not for a more global measure of control. These findings suggest that inconsistencies across studies may be due in part to discrepant definitions of constructs.

Similarly, Wall, Jackson, Mullarkey, and Parker (1996) have argued that the lack of support for the demand-control model stems from an inadequate specification and operationalization of the variables. Using more focused measures of both demands and controls, they found clear evidence of the predicted interactive effect. Wall et al. (1996) found support for the demand – control interaction to predict strain, but did not find support for the demand-*decision latitude* interaction. Demand-control interactions were as expected – demands were negatively associated with job satisfaction when employees

reported low and very low levels of control, but there was little or no effect of demands on job satisfaction at moderate and high levels of control (Wall et al., 1996). Other researchers have also found differing results based on the operationalization of “control.”

In related research, Sargent and Terry (1998) also found weaker evidence for the buffer hypothesis when using a global measure of control than when using a more specific measure of control. Sargent and Terry’s (1998) results revealed some support that the effects of job demands are buffered by high levels of task control, but not for more peripheral aspects of work control. Assessing a single aspect of control may mask the various effects of different types of control (Sargent & Terry, 1998). Task–relevant sources of control that can be exercised by the individual may be more likely to moderate effects of work demands than other types of control (resource allocation, mobility, etc.).

Hausser et al.’s (2010) review suggests that buffering effects may depend on whether or not demands and control are based on qualitatively identical demand and control dimensions. Karasek himself seems to believe the match is important, as the initial model postulated that psychological strain results from the combined effects of the demands of a work situation and the amount of decision latitude available to the worker facing *those* demands (Karasek, 1979). Cohen and Wills (1985) also argued for a match between the type of demand and control. Interestingly, studies that do find interaction effects are more specific in definitions of demands and controls – and those demand and controls match in domain (de Jonge, van Vegchel, Shimazu, Schaufeli, Dormann; 2010). van der Doef and Maes (1999) also found that the conceptualization of demands and control was a key factor in finding support for the buffer hypothesis – that is, aspects of

control that correspond to the specific demands experienced on the job moderated the impact of job demands on well-being (van der Doef & Maes, 1999).

Newer research indicates that problem focused coping may function as a form of control in dealing with the effect of demands on stress. Older workers have higher job experience, routines and general knowledge than their younger counterparts, which provides means for handling work stressors more successfully (Ackerman, 1996). Older workers also often possess higher emotional skills and self-management competencies that support more functional strategies to cope with stress at work (Charles, 2010). Active problem focused coping includes strategies that refer to an individual's attempts to change the external sources of stress, rather than addressing internal reactions to stressors, which would be emotion focused coping (Hertel et al. 2015). Hertel and colleagues (2015) found that age was positively correlated with the use of problem focused coping, replicating previous research, and also that the use of active problem focused coping reduced reported strain 8 months later.

In a 2002 meta-analysis, Penley, Tomaka, & Wiebe (2002) found that problem focused coping was related to lower stress responses, and that most types of emotion focused coping (distancing, self-control, accepting responsibility, avoidance, and wishful thinking) were related to higher stress responses. They also found that many of those associations were moderated by the type, controllability, and duration of the stressor, suggesting that coping strategies have situation-specific effects.

While positive effects of problem focused coping abound - better well-being in the form of reduced stress and better performance (Brown et al., 2005; Cohen et al.,

1998; Gaudreau & Blondin, 2004; Hockey, 1997), it may also have deleterious effects according to both Cohen's Cost of Coping theory (Cohen et al., 1986) and Hobfoll's (1989) Conservation of Resources theory. To understand this seemingly counterintuitive finding, treating problem focused coping as a valued resource possessed by individuals is key.

According to Cohen's Cost of Coping theory, even if the direct effects of a stressor are neutralized by an apparently adaptive coping strategy like problem focused coping, some negative side effects may occur. Examples of these negative side effects could be cumulative fatigue or pathogenic physiological responses. Hobfoll's (1989) Conservation of Resources theory asserts that individuals aspire to preserve, protect, and build resources (objects, conditions, personal characteristics, or energies that have specific importance for the individual). Stress occurs when individuals are threatened with resource loss, actual loss of resources, or the failure to gain resources following resource investment. Thus, while problem focused coping may be adaptive in the short term, it may also be maladaptive in the long term, because continuous use provides less opportunities for resource recovery from loss of this effortful resource.

We expand past investigations of control by incorporating an alternative perspective. Newer research operationalizes control as a problem focused as opposed to emotion focused coping. While we expect control, operationalized as decision latitude, should ameliorate stress under high job demand conditions, control operationalized as problem focused coping may have very different effects. As demands increase, the Demand-Control model predicts that internal resources become increasingly challenged.

For older workers, particularly for those high in problem oriented coping, increased control may lead to resource depletion and heightened stress under high control high demands conditions. This could stem from the value placed on problem focused coping by those who possess this resource, and their increasing realization that the resource is both depleted and ineffective. It may be the case this is found in settings where the efforts to problem solve are ineffective, although this was not examined specifically in the current study.

Thus, we believe that the interactive effects of control and job demands depend in part on the way in which the construct of control is defined. When defined as additional decision making freedom and latitude, it should buffer stress under high job demand conditions. When defined as a heightened problem solving coping style, it may actually be associated with increased stress in high job demand conditions, due to the increased depletion and pressure on internal resources.

Differences in the Buffering Hypothesis as a Function of Age

Lacking in the extant literature investigating the Demand-Control model is an understanding of how the relationship between job demands and job control function in older workers, despite other research findings that older adults and younger adults have differing experiences at work, and more specifically, behave differently in regards to demands and control at work. van der Doef and Maes (1999) showed that the typical samples that have investigated the model are young adults (with most average ages

between 27 and 36). In fact, in most empirical studies, age is often treated as a control variable (de Lange et al., 2010).

One approach that may be of particular interest in explaining the relation between demand and control at work is to compare data gathered from older and younger workers. Shultz and colleagues (2010) have recently found evidence that age does moderate the relationship between job demands and control at work. The findings of Schultz and colleagues (2010) are in line with previous findings regarding age and stress at work, namely, that older workers experience more stress from high workloads and time demands than do younger workers (Osipow & Doty, 1985). While research in this area is limited, investigators have found that the interaction between high demands and low control is stronger among older workers, leading to negative outcomes such as increased intention to leave the workforce (Elovainio, 2005). Again, this may be contingent on the definitions of control across studies. Decision latitude measures of control are, in general, buffers of stress under high demands since it affords the worker more freedom in dealing with the problem at hand and more opportunity to have input in problem solving.

Mayes, Barton, and Ganster (1991) found that older workers responded more negatively to role conflicts compared to younger workers, and suggested that it may be due to the fact that balancing role conflicts might require higher levels of cognitive resources than older employees possess. de Zwart, Frings-Dresen, and van Duivenbooden (1999) found that older construction workers complained more about working under excessive time pressure than did their younger counterparts, and also found that older workers reported decreased physical demands and increased mental demands. This is

more consistent with a problem focused coping conceptualization of control, where functioning may actually be impeded by high control. The stress of expending internal coping resources under high job demands may lead to increased rather than decreased stress.

In further research arguing that older populations have unique responses to demands, Barnes-Farrell and Matthews (2007), Hansson et al. (2001), and Ilmarinen (2001) have all argued that granting older workers more autonomy at work would help them overcome the high job demands that exist in their work. Park (1994) found that older adults typically perform as well as younger workers on their job tasks when given enough decision-making freedom. Shultz et al. (2010) concluded that it may be more important and beneficial for older workers to possess high levels of control in their jobs than younger workers in order to effectively deal with the high stress caused by high job demands, given age-related declines in cognitive resources. Thus, a number of researchers suggest that control over tasks may be critical in ameliorating stress for older employees. Given the centrality of this concern in the current study, we will examine this relationship in more detail. Note again that the definition of control is important and we expect the outcomes to be contingent on the definition of control as well as the definition of “older.”

Research examining the relationship between control, demands, and stress older workers is limited and relatively new. Shultz, Wang, Crimmins, and Fisher (2010) were the first to explore age differences using the Demand-Control Model and found evidence that different controls may buffer different types of job demands for older and younger

workers. Shultz and colleagues (2010) were limited to archival data, and investigated two types of demands (tight deadlines and problem-solving), and three types of control (flexibility in scheduling, time to get the job done, and perceptions of autonomy). Older and younger workers reported similar main effects of demands and controls from their jobs after controlling for numerous demographic variables (gender, job type, employment sector, hours worked per week, etc.). Further examination of these effects showed that demands and control interacted.

Specifically, Shultz et al. (2010) found evidence supporting Karasek's (1979) Buffer hypothesis. Interaction effects between demands and controls for younger and older workers differed. For younger workers, only one type of control (having enough time to get the work done) buffered the stressful experience associated with the problem solving demand, whereas three separate control mechanisms acted as buffers for older adults (Shultz et al., 2010).

In younger workers who had enough time to complete their tasks, the positive relationship between problem solving demands and the probability of perceiving work stress was less pronounced than for those younger workers who did not have enough time to complete their tasks (Shultz et al., 2010). Also supporting the Buffer hypothesis, older workers who reported having enough time to complete their work were less likely to report stress even with high deadline demands. High levels of autonomy helped buffer stress associated with strong deadline demands in older adults, as did schedule flexibility in reducing the likelihood of reporting stress associated with high problem solving demands (Shultz et al., 2010). In summary, the limited data comparing older and younger

employees in terms of the Buffer Hypothesis suggests that there are age differences in the way this emerges in both populations.

Newer research also suggests that the definition of control should be expanded in the older population of workers in order to adequately test the Buffer Hypothesis. A new line of research focusing on problem solving styles has revealed that those who are older are more likely to draw on active problem focusing coping skills as opposed to their younger counterparts (Hertel, Rauchenbach, Theilgen & Krumm, 2015). Younger workers may be more likely to engage in avoidance while older employees engage in the more resource-intensive problem focused coping. This may lead to more drain on internal resources among older workers when job demands are high. As noted earlier, while the internal, problem oriented coping mechanisms of older adults may initially appear to be a favorable influence on dealing with stress, experienced strain as a result of enacting these coping strategies may reduce the older employee's ability to engage in these strategies. Thus, especially in conditions of prolonged demands, high problem focused coping may cause more strain on an individual as a result of continued effort to problem solve.

Overall, the findings of Shultz et al. (2010) suggest that the demand x control interaction of Karasek's Buffer Hypothesis is likely to emerge in older workers. In the current study, we expect to find the demand-control (operationalized as decision latitude) interaction in older workers. We expect that that the interaction will be stronger in older groups when their age is defined by the subjective rather than the objective measure. As noted earlier, subjective age is tied more closely to both physical and psychological well-being than is chronological age. If this general finding holds for the Buffering

Hypothesis, it suggests that an understanding of self-perceived age is central in applying Karasek's model in order to predict and lessen stress among older employees.

The Current Study and Integration of Hypotheses

The current study seeks to expand the literature on Karasek's Demand-Control Model by investigating Karasek's (1979) Buffer Hypothesis with age as a variable of interest. We explore alternate definitions of both control and age to provide a more robust test of how demands and control interact in the workplace. We expect demands and control to interact in older adults to predict stress and self-rated health. We expect the variability explained in stress and self-rated health will be higher when subjective age is used to define the participants as opposed to chronological age.

The current study seeks to improve upon previous investigations that have not used consistent and specific definitions of demands and control. In the current study, we use two operationalizations of control. The first is decision latitude, defined as skill discretion (person's opportunity to use specific job skills in the work process or control over his tasks) and decision authority (extent to which a person is autonomous in task-related decisions such as timing and method control or his conduct during the day). We expect that decision latitude will function as a buffer against stress under high job demands.

The second definition of control is consistent with a current and more psychologically oriented operationalization of control as coping, and is defined in the literature as problem focused coping. Consistent with this body of research, we would

expect that control does not serve as a buffer against stress when it is defined in this manner. Instead, those with high problem oriented coping styles may actually perform worse in sustained high demand job conditions.

Thus, by using alternative definitions of control within the Demands-Control model, we may contribute to the literature by examining how results vary based on whether job control is defined as latitude, or whether it is defined by problem focused coping styles, more characteristic of older than younger adults. We also examine whether subjective age is more helpful in explaining variability in job stress than the simple chronological definition.

In the current study, we extend the work of previous researcher's studies such as Schultz et al. (2010), who used archival data and were not able to use concise definitions of demands and controls. Our study is customized and designed to address the unique demands of call center associates working for a large U.S insurance company, providing both an expansion of the research on Karasek's (1979) model as well as practical implications for a working population.

Hypotheses

Strain Hypothesis. Consistent with the majority of findings investigating the Demand-Control Model (Karasek, 1979), we expect to find evidence of additive or main effects of high demands on the outcomes of interest: stress and self-rated health.

H1: Demands will be directly and positively related to stress.

H2: Demands will be directly and negatively related to self-rated health.

Buffer Hypothesis. Combining previous research that supports using a narrow operationalization of control (Wall et al., 1996; Hausser et al., 2010) and the findings that suggest that the Buffer Hypothesis is more likely to manifest in older adults (Schultz et al., 2010), we expect the following results when control is operationalized as *decision latitude*:

H3: Stress will be highest when demands are high and decision latitude is low (demands x decision latitude interaction).

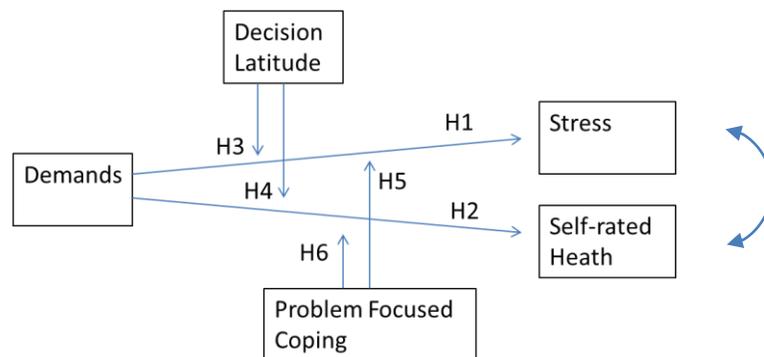
H4: Self-rated health will be lowest when demands are high and decision latitude is low (demands x decision latitude interaction).

When control is operationalized as *problem focused coping*, we expect the following results:

H5: Stress will be highest when demands are high and problem focused coping is high (demands x problem focused coping interaction).

H6: Self-rated health will be lowest when demands are high and problem focused coping is high (demands x problem focused coping interaction).

Figure 2. Hypothesized Model



Role of Age. We anticipate that more variance will be explained in the above hypothesized interactions (H3 – H6) when “older worker” is defined using subjective rather than objective measures.

CHAPTER TWO

METHOD

Participants

One hundred eighty-three employees working in a call center in a large insurance company were invited to participate. 154 usable responses were recorded. The sample that responded mirrored that of the population, and was primarily comprised of Customer Care Specialists (79%, 122 employees), with the remaining 21% consisting of other various roles that support the call center, including Nurses (4), Analysts (2), Supervisors (15), and Managers (11). Seventy-eight percent (121) work from home and 22% (34) worked in an office setting. Chronological Age ranged from 23 to 68, with a mean of 46.65 years ($SD=11.76$). Eight-four percent (130) of the sample are women and 53% (82) are Caucasian. This is a very experienced group of call center employees, with a mean tenure in role of 5.95 years ($SD=3.3$) and 11.79 mean years ($SD= 7.98$) of contact center experience. Only four employees had been in their role for less than one year.

Design and Procedure

Participants were invited via email to complete an online questionnaire consisting of demographic items (including chronological age, sex, marital status, number of dependents, type of dependents, tenure, time in role, years of experience in similar role), and items measuring job demands, decision latitude, problem focused coping, subjective age, perceived stress, work fatigue, and self-rated health. Participants were scheduled time between calls to complete the questionnaire.

Measures

Demographic Information. Demographic information including gender, marital status, number of dependents, organizational tenure, role tenure, and years of relevant experience was collected for examination as control variables. Chronological age was also collected as a main variable of interest. Please see Appendix A for details.

Job demands. Job demands were measured using the five items of the Psychological Demands subscale of Karasek et al.'s (1998) Job Content Questionnaire. The Job Content Questionnaire is a questionnaire instrument that was designed to measure the content of a respondent's work environment in a general way that is applicable to all jobs in the United States. Participants responded on a seven point Likert scale with 1= strongly disagree and 7 = strongly agree. Demands had acceptable reliability ($\alpha = .75$). A sample item is "My job requires working very fast." Please see Appendix B.

Decision latitude. Decision latitude was measured using Skill Discretion and Decision Authority subscales of the Job Content Questionnaire, which together make up the Decision Latitude scale. Skill Discretion is measured by questions that assess the skill and creativity required on the job and flexibility permitted the worker in deciding what skills to employ. Participants responded on a seven point Likert scale with 1= strongly disagree and 7 = strongly agree. Decision Latitude had acceptable reliability ($\alpha = .86$). A sample item from the Skill Discretion subscale is "My job requires that I learn new things," and a sample item from the Decision Authority subscale is "I have a lot of freedom to decide how I do my work." See Appendix C for information on this scale.

Problem focused coping. Problem focused coping was assessed with the four item Active Coping scale from the COPE (Carver et al., 1989), one of the best established measures of coping strategies (Hertel et al., 2015). The response scale was adapted to have 7 points and participants were asked how they usually respond when under a lot of stress where 1= Never do this, and 7= Always do this. A sample item from the Active Coping scale is: “I concentrate my efforts on doing something about it.” Active Coping had acceptable reliability ($\alpha = .79$). See Appendix D for details on this scale.

Subjective age. Participants were asked to specify in years how old they feel most of the time (Kleinspehn-Ammerlahn, et al., 2008; Kotter-Gruhn et al., 2009; Mock & Eibach, 2011; Rubin & Berntsen, 2006; Weiss & Lang, 2012; Westerhof & Barrett, 2005). Relative age (Cleveland et al., 1997) was also assessed and participants were asked how old they feel in relation to others that they work with (much younger, younger, slightly younger, about the same age, slightly older, older, much older). See Appendix E for information on this measure.

Perceived stress. Cohen and colleagues’ (1983) Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. Questions in the PSS ask about the frequency of thoughts and feelings during the last month. The scale was adapted to have 7 points where 1= Never and 7= Always and the four reverse coded items were positively reworded. Examples of items include: “In the last month, how often have you felt that things were not going your way?” and “In the last month, how often have you been upset because of something that happened

unexpectedly?” The PSS had great reliability ($\alpha = .97$). See Appendix F for more information.

Work Fatigue. Work Fatigue was included as an exploratory dependent variable in the domain of stress and was measured using Frone and Tidwell’s (2015) Three-Dimensional Work Fatigue Inventory (3D-WFI). The 3D-WFI measures three aspects of work fatigue: physical, mental, and emotional fatigue. Example items include: “During the last 12 months, how often did you feel physically drained at the end of the day?” and “During the last 12 months, how often did you feel mentally worn out at the end of the day While a global measure of self-rated health is typically used in studies such as the present work, fatigue may capture more subtle aspects of stress related physical symptoms. Please see Appendix G. Proper fit for the 3D-WFI to the current data using confirmatory factor analysis could not be established in the current study and was subsequently eliminated from further analysis.

Self-rated health. Hobfoll, Vinokur, Amiram, Pierce, & Lewandowski-Romps’ (2012) four item Perceived Health Questionnaire was used to measure self-rated health ($\alpha = .81$). The scale was adapted to have a 7-point Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree) to measure responses to items such as “I feel healthy enough to carry out all of the things that I would like to do” and a 5-point scale was used to measure the question “In general, how would you rate your health?” where 1= terrible and 5 = excellent. Please see Appendix H.

Negative Affect. The data was cross-sectional and assessed with the same method, so Negative Affect (NA) was included as a method effect with each indicator to

account for potential method bias (Podsakoff, MacKenzie, & Podsakoff, 2012). Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Schedule (PANAS) was used to measure Negative Affect. Respondents were asked how often (7-point Likert-type scale where 1=never, 7=always) they experienced a list of 20 (10 positive and 10 negative) one word emotions/feelings in the last few weeks. The 10 negative emotion words make up the Negative Affect subscale of the PANAS. Please see Appendix I.

CHAPTER THREE

RESULTS

The analyses used structural equation modeling to test the hypothesized relationships and overall model fit. The software program EQS 6.3 was used, and recommendations were taken from Kline (2005) in order to test model fit, including the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Chi Square. RMSEA measures absolute fit from the model chi-square with a correction for parsimony depending on the degrees of freedom (Steiger, 1990). The CFI is a fit index that is relative and influenced by degrees of freedom with the degree of parsimony of the model (Bentler, 1990). Finally the Chi Square is a measure of misfit that examines the difference between the observed model and the replicated model with parameter estimates. Data cleaning was conducted in Excel and descriptive statistics conducted in Minitab 17.1. Univariate and multivariate outliers were examined. One respondent (#72) responded particularly high on several Negative Affect items, but this was not observed on the other scales and the decision was made to keep the respondent in the analyses. Missing data was handled using the EM Imputation method in EQS 6.3.

Descriptive Statistics and Correlations among measured variables

Table 1 provides means and standard deviations for each measure used in the present study. Correlations among latent variables for all employees are reported in Table 2. Chronological age and subjective age were significantly correlated ($r = .56, p < .05$). Chronological age was not significantly correlated with any of the latent variables, but subjective age was significantly related to problem focused coping ($r = -.17, p < .05$),

stress ($r = .19, p < .05$), and health ($r = -.36, p < .05$). The relationship between subjective age and problem focused coping was not in the expected direction and is at odds with previous research that indicates older adults are more likely to employ problem focused coping than their younger counterparts. Problem focused coping was also significantly related to health ($r = .16, p < .05$). Surprisingly, neither demands nor decision latitude was significantly correlated with any other latent variables or either age variable. This may be due to the inclusion of Negative Affect (NA) as a method factor, which will be described in greater detail below.

Control Variables relationships with Outcome Variables

Office location (in office or work from home), Education level, Marital status, Gender, Minority class, Hierarchy Group (Non-exempt, Individual Contributors, Managers and People Leaders), Years of Contact Center Experience, Tenure, Time in Role, and Number of dependents were examined as potential control variables. No potential control variables were found to be related to stress. Gender differences were found for Health ratings, where women ($n=130$) reported significantly more positive levels of health ($M=3.81, SD=.58$) than did men ($n=24, M=3.56, SD=.32$), $t(54)=2.94, p = .005$. Once included in the model, gender was not significant and therefore not used for subsequent analyses (see Table 3).

Measurement Model: Scale Refinement

All analyses were conducted on the full sample. Robust estimates are reported to correct for non-normal data in the present study (Satorra & Bentler, 2001). Robust fit indices are provided in Table 4 for the proposed, modified, and final measurement

models for all scales which required a Confirmatory Factor Analysis (CFA), and the final measurement and structural models. Factor loadings, Cronbach's alpha, reliability coefficient rho, and average variance extracted (AVEs) are provided in Table 5. All scales had reliabilities .75 or higher.

In order to create the overall measurement model, CFAs were first conducted on all of the latent measures. First, Demands was examined to ensure it was unidimensional and initially had poor fit. Items 4 ("I have enough time to get the job done - R") and 5 ("Some demands I face are in conflict with other demands at work") had low factor loadings, .36 and .48 respectively, and harmed model fit. After the 2 variables were removed, the resulting model had only 3 variables and had perfect fit, $\chi^2(0) = 0$.

Decision Latitude was examined next and consists of two subscales, Skill Discretion and Decision Authority. Decision Latitude was found to initially have poor fit. Examination of Decision Latitude as a unidimensional scale did not improve model fit. Items 1 ("My job requires that I learn new things"), 2 ("My job involves a lot of repetitive work - R") and 4 ("My job requires a high level of skill") in the Skill Discretion subscale had very low factor loadings (.15, .08, and .35 respectively) on Skill Discretion and harmed the model fit. Once removed from analysis, the model displayed excellent fit, $\chi^2(8) = 8.35$, CFI= 1.0, RMSEA =.02. Examination of the reduced model as a unidimensional scale also displayed excellent fit, $\chi^2(7) = 8.98$, CFI= 1.0, RMSEA =.03, and was thus retained for future analyses.

Problem focused coping was examined to ensure it was unidimensional and also initially had poor fit. A covariance was added between items 3 ("I do what has to be

done, one step at a time.") and 2 ("I concentrate my efforts on doing something about it."). Once the covariances were added, the model displayed acceptable fit, $\chi^2(1) = 1.661$, CFI= 0.99, RMSEA = 0.07.

Next, outcome measures were examined. First, stress as measured by the Perceived Stress Scale (PSS), was examined to ensure it was unidimensional and initially exhibited poor fit. Two covariances were added between items 1 ("been upset because of something that happened unexpectedly?") and 3 ("felt nervous and 'stressed'?"), and items 1 and 9 ("been angered because of things that were outside of your control?"). Once the covariances were added, the model displayed acceptable fit, $\chi^2(14) = 21.362$, CFI= 0.98, RMSEA = 0.06.

Next, self-rated health was examined and initially had poor fit. A covariance was added between items 3 ("I feel healthy enough to carry out the things that I would like to do") and 4 ("I have health problems") and 3 cases contributing to normalized multivariate kurtosis were deleted (cases 106, 122, and 132). Once the covariance was added and 3 cases deleted, the model displayed excellent fit, $\chi^2(1) = .848$, CFI= 1.0, RMSEA = 0.00.

Next, the factors (demands, decision latitude, problem focused coping, stress, and self-rated health) were added into one model to examine overall model fit. The model had good fit, $\chi^2(310) = 368.43$, CFI= .97, RMSEA = 0.04. An additional modification was made to the measurement model. The data was cross-sectional and assessed with the same method, so Negative Affect (NA) was included as a method effect with each indicator to account for potential method bias (Podsakoff, MacKenzie, & Podsakoff, 2012). Including the composite variable NA in the model improved model fit: $\chi^2(310) =$

349.55, CFI= .98, RMSEA = 0.03. Because NA is an observed composite variable, the models are not nested and therefore a chi square difference test cannot be performed. However, a .01 improvement in CFI is meaningful (Byrne, 2006), and therefore the model with NA was retained (Satorra & Bentler, 2001; see Table 4).

Some of the items most affected by the addition of NA were items in the PSS scale. Additionally, the hypotheses were tested with and without the method effect (NA) to illustrate differences between both models. As seen in Tables 6-8, significant relationships exist in the model without NA for the direct effects of demands, decision latitude, and problem focused coping on both stress and self-rated health. With NA in the model, only significant direct effects were found for problem focused coping on self-rated health (using robust estimates). It is important to note the difference in results, as most research does not test for relationships among variables controlling for a method effect. The results of this study suggest that without the inclusion of NA as a method effect, the results would be biased. The significant effects found for demands and decision latitude on stress and health are confounded by NA, so the effect may be due to NA rather than demands and decision latitude.

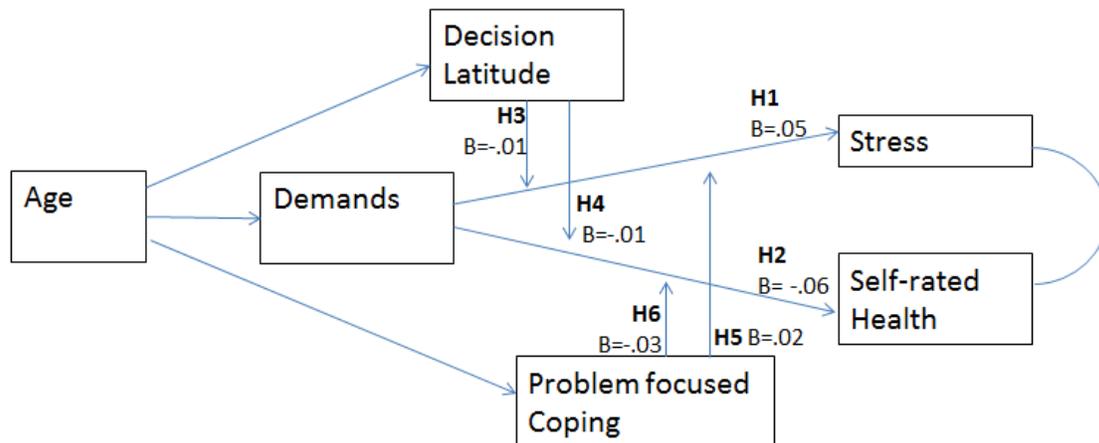
Finally the moderating factors were included in the model. To include interactions in the model, the Marsh et al. (2004) approach was used. The indicators for the predictors (demands, decision latitude, and problem focused coping) were mean centered and then product indicators were created by matching pairs of factor loadings from highest to lowest to examine the demands x decision latitude and demands x problem focused

coping interactions. Good fit was established for the full structural model: $\chi^2(482) = 554.72$, CFI= .96, RMSEA = 0.03 and hypotheses can now be examined.

Test of Hypotheses

With good fit established for the structural model, the hypotheses were examined. The hypotheses are included below, with the empirical results following each hypothesis. Full results are included in the tables listed with each hypothesis. Results provided in text are non-robust unless otherwise noted. Robust estimates are provided in Tables 5-10.

Table 3. Hypothesized Model with Results



Strain Hypothesis

H1: Demands will be directly and positively related to stress.

Results analyzing the relationship between demands and stress revealed that demands did not have a significant direct effect on stress (B=.05, z=.98, SE=.05, ns), therefore hypothesis 1 was not supported. See Table 6.

H2: Demands will be directly and negatively related to self-rated health.

Results analyzing the relationship between demands and health revealed that demands did not have a significant direct effect on health ($B=-.06$, $z=-1.75$, $SE=.04$, *ns*), therefore hypothesis 2 was not supported. See Table 6.

Buffer Hypothesis

H3: Stress will be highest when demands are high and decision latitude is low (demands x decision latitude interaction).

Decision latitude did not significantly moderate the relationship between demands and stress, ($B=-.01$, $z=-.25$, $SE=.04$, *ns*), therefore hypothesis 3 was not supported. See Table 9.

H4: Self-rated health will be lowest when demands are high and decision latitude is low (demands x decision latitude interaction).

Decision latitude did not significantly moderate the relationship between demands and health, ($B=-.01$, $z=-.33$, $SE=.03$, *ns*), therefore hypothesis 4 was not supported. See Table 9.

H5: Stress will be highest when demands are high and problem focused coping is high (demands x problem focused coping interaction).

Problem focused coping did not significantly moderate the relationship between demands and stress, ($B=.02$, $z=.53$, $SE=.03$, *ns*). See Table 10.

H6: Self-rated health will be lowest when demands are high and problem focused coping is high (demands x problem focused coping interaction).

Problem focused coping did not significantly moderate the relationship between demands and health, ($B=-.03$, $z=-1.18$, $SE=.03$, ns). See Table 10.

Role of Age

We anticipate that more variance will be explained in the above hypothesized interactions (H3 – H6) when “older worker” is defined using subjective rather than objective measures.

As the above hypothesized interactions were not found to be significant, the role of age as hypothesized could not be tested. Chronological age and subjective age were added to the model independently as well as together as predictors of demands, decision latitude, and problem focused coping. Subjective age was found to be a significant predictor of problem focused coping above and beyond chronological age ($B=-.02$, $z=-2.84$, $SE=.01$, $p<.05$), but did not significantly predict demands or decision latitude. No relationships between the other variables changed as a result of the addition of chronological age or subjective age to the model.

CHAPTER FOUR

DISCUSSION

In the current study, many of the predicted relationships did not emerge. However, the investigation incorporated a set of unique and newly formulated variables. The current study is the first to include problem focused coping as an alternate definition of control in the investigation of Karasek's (1979) Buffer Hypothesis. It is also the first to explore the relationships between demands and control with subjective age. Furthermore, it is the first to investigate the addition of Negative Affect (NA) as a method effect in analysis of the Demand-Control model, which has significant implications for future research. The remainder of this section will highlight the results, identify the implications for theory, and discuss limitations and future research.

Negative Affect

Including NA as a method effect in the model proved to be valuable as the relationships between independent and dependent variables changed as a result of its inclusion. NA accounted for additional variance in how employees responded to each item, and accounted for a large percent of the variance in the Perceived Stress Scale (PSS) in particular. While it is important to examine the results with and without the NA method effect, the current study focuses on the results with NA included, and the remainder of the discussion will focus on the results with NA included unless otherwise indicated.

Demands and Control

With NA included in the model as a method effect, demands did not significantly predict stress or self-rated health, and neither moderating effect of control (defined as decision latitude or problem focused coping) moderated the relationship between demands and outcomes. Problem focused coping did have a direct effect on self-rated health when looking at robust estimates such that higher levels of problem focused coping predicted higher levels of self-rated health.

These findings are inconsistent with the majority of findings investigating Karasek's (1979) Demand-Control model, which have typically found main effects for both demands and control. Previous studies have mainly used younger samples and have not incorporated method effects into analysis of relationships. Unknown third variables are always a concern in understanding the relationships between two variables of interest and it is possible that previous significant findings may have been the result of third variables such as NA that were not measured or analyzed in those studies. It is also possible that significant direct effect of demands on stress and self-rated health was not found as a result of unique characteristics of this population, which will be discussed further.

Without NA included in the model, more significant direct effects were evident. Demands significantly predicted self-rated health (robust estimates only) in the expected direction, but did not predict stress. Problem focused coping predicted both stress and self-rated health, and decision latitude significantly predicted stress, all in the expected directions. These findings are more consistent with previous research.

The moderating effect of control (defined as decision latitude or problem focused coping) was not affected by the inclusion or exclusion of NA - it did not moderate the relationship between demands and outcomes in either model. While the hypothesized findings did not emerge, these findings are consistent with previous investigations that have found weak or insignificant effects when control is treated as a moderator.

It was hypothesized that the lack of attention to age in previous studies may be the cause of non-significant findings regarding the potential buffering effects of control, but that does not appear to be the case in the current study. Neither chronological age nor subjective age affected the relationships between demands, control, stress and self-rated health. The addition of the alternate operationalization of control (problem focused coping) did not provide support for the Buffer Hypothesis in this setting. It may simply be that control does not moderate the effects of demands, or that it only does in unique circumstances specific to particular populations.

The current study used Karasek's Job Content Questionnaire (Karasek et al., 1998) for psychological demands and decision latitude subscales, with the rationale that the wide variety in operationalizations of control by other researchers may have contributed to the lack of significant findings for the interactive effect in previous studies. At least in terms of the confines of the current study, this was not the case. Employing the Confirmatory Factor Analysis (CFA) technique resulted in reducing both the demands and decision latitude scales by over 30%. The demands scale went from five items to three items, and the decision latitude scale from nine items to six items. With this sample, at least, the items that were removed from each scale seemed to tap into very unique

aspects of decision latitude that were not related to the other items. The Job Content Questionnaire subscales are meant to generalize across occupations. While there is value in measures that can generalize across occupations, it may have been better to assess demands and control unique to this type of working environment.

Problem focused coping, the alternative operationalization of control in this study, was found to significantly predict health using robust estimates. As problem focused coping increased, so did self-rated health. This finding is not in line with what was hypothesized. Perhaps in the current setting, where demands were not found to be significantly related to stress or self-rated health, problem-focused coping resources do not become depleted. When this resource is abundant, it makes sense that it would be related to better self-rated health. It's possible that employees are using problem focused coping to create a better working environment and problem focused coping may only be a liability in situations where demands are high and cannot be changed when problem focused coping is applied. This is an important finding, as problem focused coping is seen by researchers as an effective way or "adaptive" technique to deal with demands and stressors (Hertel et al., 2015). Problem focused coping appears to be a teachable skill, which has implications for older adults in particular, who are more likely to experience health issues than their younger counterparts in the workplace.

One way in which problem focused coping skills may be increased is through Mindfulness training. Halland and colleagues (2015) recently found that students who were randomly assigned to a 7- week mindfulness-based stress reduction program increased their use of problem focused coping compared to a control group. In addition,

participants high in neuroticism benefited from the mindfulness training in terms also reducing avoidance focused coping and increasing the use of seeking social support compared to the control group. Caution should be taken in generalizing this study to a group of working adults, but it is encouraging and a line of research that should be more fully explored.

While additional resources other than control (such as organizational support) were not investigated in the current study, they have been investigated with demands in other studies. The Job Demand Resources (JD-R) model (Bakker & Demerouti, 2007) was developed as an alternative to Karasek's (1979) Demand-Control model, and extends the Demand-Control model to include a broader definition of demands as well as additional resources that may be beneficial in understanding the interplay between demands, resources, and wellbeing outcomes. According to the JD-R, demands are "physical, psychological, social, or organizational aspects of the job that require sustained physical and /or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs" (Bakker & Demerouti, 2007, p. 312). According to the model, resources include physical, psychological, social, and/or organizational aspects of the job that may be useful in meeting job requirements. These resources may therefore reduce the associated costs (physiological and/or psychological) and/or stimulate personal growth and development. Resources can be located in the work context, in interpersonal and social relationships, or the tasks themselves. This broader model may be beneficial in understanding the specific demands

and resources pertinent to a specific population such as what was used in the current study.

The inclusion of two alternate definitions of control in the current study provides a more test understanding of how demands and control interact in the workplace. While neither problem focused coping nor decision latitude moderated the relationship between demands and the outcomes of interest, both did have some significant direct effects on the outcomes when NA was not included in the model, and problem focused coping had a significant direct effect on self-rated health when NA was included. Clearly these two forms of control operate differently and warrant further investigation.

Subjective and Chronological Age

Subjective age significantly predicted problem focused coping, though not in the expected direction. Previous research shows that older adults are more likely to employ problem focused coping than younger adults (Hertel et al., 2015), but results of the current study indicate that as subjective age increases, the use of problem focused coping decreases slightly. Previous research defined “older adult” using chronological age, however, not subjective age. Subjective age may be, as discussed earlier, dependent on health and related variables that impact the ability to function well in the workplace. More research is needed to understand this discrepancy and if it is unique to this sample.

The current study’s findings regarding age are not consistent with Shultz and colleagues’ (2010) work that found interactive effects between demands and control differed for younger and older adults (defined using chronological age). Shultz et al. (2010) were limited to archival data, but did investigate multiple types of demands and

multiple types of control in a large European sample. It is possible that this study did not replicate their results due to the more general measures of demands and decision latitude used in the current study and/or the characteristics of this population compared to a European population.

More recent work has found evidence that personal control can buffer the impact of job demands on mental health in older adults (Besen, Matz-Costa, James, & Pitt-Catsouphes, 2015). Besen and colleagues (2015) utilized data from the Age & Generations Study conducted in 2007/2008 by the Sloan Center on Aging and Work (SCAW; Pitt-Catsouphes, Matz-Costa, & Besen, 2009) which spanned industry sectors and had over 2,000 participants. Personal control was measured using an adaptation of Judge et al.'s (2003) Core Self-Evaluations Scale and incorporates locus of control, self-efficacy, self-esteem, and chronological age was used to measure age, as is typical in the research. Again, the nature of the problem or demands may be key. Insurmountable challenges may drain the resources of those with high problem focused coping skills and may be associated with higher stress. More positive functioning among those high in problem focused coping may be found when the challenges faced are more responsive to their efforts.

Understanding the experience of older workers in the workplace is imperative for employers who are interested in retention of this group to avoid loss of organizational knowledge (Guido & van der Heijden, 2013). Maintaining a positive environment that is supportive for older workers is an important means of retaining or recruiting them, and is also beneficial from the standpoint of the employee. Understanding the factors that

impact stress among this demographic has implications for organizational competitiveness for this resource and for worker well-being. In the current study, subjective age and chronological age were found to be related but distinct constructs ($r = .56, p < .05$). Chronological age was not significantly correlated with any of the latent variables, but subjective age was significantly related to problem focused coping, stress and health. We feel that subjective age is a construct that should be more fully explored in the research on older adults in the workplace.

Limitations and Future Research

Several limitations in this work exist. The sample is fairly homogenous and does not allow for wide generalizability, though it does allow for a deeper understanding of this group specifically. Caution should be taken in generalizing results from this small, unique population. With a mean tenure of 8.1 years ($SD=5.2$ years) and mean role tenure of 6 years ($SD= 3.3$ years), this group may not find the demands of the job as demanding as a group with less experience, or they may have developed effective techniques for dealing with these demands. The mean demands reported was only slightly higher than the midpoint of the scale (4.08 on a 7-point scale), but the mean stress reported was lower than what was expected (2.7 on a 7-point scale). While call center work is prevalent, this group in particular has a large work at home population, and most report that they are happy with their current work at home or in office status. Leadership over this group is very focused on the engagement and wellbeing of employees and is often looking for ways to improve the work environment for this population. It is likely that employees have high perceived organizational support, or the perception that the organization values

and cares about an employee's wellbeing (Eisenberger, Huntington, Hutchison, & Sowa, 1986). This organizational support may lead to the lower levels of turnover they experience compared to external and internal benchmarks for similar departments.

All data were collected via self-report, which can lead to common method bias. There is debate on how much of a concern common method bias is (Conway & Lance, 2010; Podsakoff, Whiting, Welsh, & Mai, 2013). In the current study we mitigate this limitation with the inclusion of Negative Affect as a method effect, the value of which was discussed previously. All data was collected at a single point in time, which makes it difficult to establish causal inferences.

Limitations also exist in the measurement of variables in this study. As stated previously, both the Demands and Decision Latitude scales are purposely intended to be broad so as to generalize across occupations. In the current study, both were significantly reduced as a result of CFA. Additionally, a handful of reverse coded items were included in the subscales used in this study. The items were positively worded and changing the language would have altered the meaning of the item, so the decision was made to keep the items as is. Some of these items were later removed from analysis. Inclusion of the items as is may have caused confusion for participants.

Future research should further investigate Problem Focused Coping as a resource within the Job Demands Resources model. This model is less restrictive than the Demands Control Model employed in this study, and can be more carefully tailored to reflect the unique demands and resources of a population of interest. The relationship between Mindfulness and Problem Focused coping should also be investigated further, as

there are great implications for the generalizing of Halland et al.'s (2015) findings to an older working population.

Conclusion

In conclusion, this study failed to find direct effects of demands and decision latitude on the outcomes of interest, stress and self-rated health, and there was a lack of support for their interactive effects as proposed by Karasek's (1979) Buffer Hypothesis. The alternate operationalization of control, problem focused coping, did significantly predict self-rated health and warrants further investigation. Subjective age was found to significantly predict problem focused coping, though not in the hypothesized direction, and also should be investigated further. Subject age was also found to be related to the outcome variables whereas chronological age was not. These findings overall suggest that problem focused coping may be more valuable than decision latitude in understanding stress and health in employee populations and that subjective age should be investigated further as an alternative to chronological age in understanding the experience of older adults in the workplace.

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APPENDICES

Appendix A

Demographic Information

Please enter your age in years.

Dropdown menu: 18-100

Please indicate your gender.

Female Male Prefer not to respond

Please indicate your marital status.

Single Married Divorced Widowed

Please indicate your number of dependents.

Dropdown menu: 0-10+

What are the ages of your dependents?

Open text box

How long in years have you worked with Humana?

Dropdown menu: 0-40+

How long in years have you worked in your current role?

Dropdown menu: 0-40+

How many years of contact center experience do you have, including your tenure at Humana?

Dropdown menu: 0-40+

Appendix B

Psychological Demands

Please indicate your level of agreement with the following statements about your work.

Strongly Disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Agree

Strongly Agree

My job requires working very fast.

My job requires working hard.

I am asked to do an excessive amount of work in my job.

I have enough time to get the job done.

Some demands I face are in conflict with other demands at work.

Appendix C

Decision Latitude

Please indicate your level of agreement with the following statements about your work.

Strongly Disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Agree

Strongly Agree

My job requires that I learn new things.

My job involves a lot of repetitive work.

My job requires me to be creative.

My job requires a high skill level.

I get to do a variety of things on my job.

I have an opportunity to develop my own special abilities at work.

My job allows me to make a lot of decisions on my own.

I have a lot of say about what happens in my job.

Appendix D

Active Coping

The next questions ask you about ways in which you cope with difficult or stressful situations in your life. Obviously, different events bring out somewhat different responses, but think about how you **usually** respond when you are under a lot of stress.

Never do this

Rarely do this

Occasionally do this

Sometimes do this

Frequently do this

Usually do this

Always do this

I take additional action to try to get rid of the problem.

I concentrate my efforts on doing something about it.

I do what has to be done, one step at a time.

I take direct action to get around the problem.

Appendix E

Subjective Age

In years, how old do you feel most of the time?

Open text box

How old do you feel in relation to your coworkers?

Much younger

Younger

Slightly younger

About the same age

Slightly Older

Older

Much Older

Appendix F

Perceived Stress Scale

These questions ask about how you have felt in the last month. In the **last month**, how often have you:

Never
Rarely
Occasionally
Sometimes
Frequency
Usually
Always

been upset because of something that happened unexpectedly?
felt that you were unable to control the important things in your life?
felt nervous and “stressed”?
lacked confidence about your ability to handle your personal problems?
felt that nothing is going your way?
found that you could not cope with all the things that you had to do?
been unable to control irritations in your life?
felt that you were not on top of things?
been angered because of things that were outside of your control?
felt difficulties were piling up so high that you could not overcome them?

Appendix G

Three-Dimensional Work Fatigue Inventory (3D-WFI)

The questions on this page ask you about different types of fatigue – physical, mental, and emotional. For each question, please indicate how often you have felt that way during the past 12 months.

Never

Less than once a month

At least once a month

At least once a week

Everyday

Physical fatigue involves extreme physical tiredness and an inability to engage in physical activity.

During the **past 12 months**, how often did you ...

feel physically exhausted at the end of the workday?

have difficulty engaging in physical activity at the end of the workday?

feel physically worn out at the end of the workday?

want to physically shut down at the end of the workday?

feel physically drained at the end of the workday?

want to avoid anything that took too much physical energy at the end of the workday?

Mental fatigue involves extreme mental tiredness and an inability to think or concentrate. During the **past 12 months**, how often did you ...

feel mentally exhausted at the end of the workday?

have difficulty thinking and concentrating at the end of the workday?

feel mentally worn out at the end of the workday?

want to mentally shut down at the end of the workday?

feel mentally drained at the end of the workday?

want to avoid anything that took too much mental energy at the end of the workday?

Emotional fatigue involves extreme emotional tiredness and an inability to feel or show emotions. During the **past 12 months** how often did you ...

feel emotionally exhausted at the end of the workday?

have difficulty showing and dealing with emotions at the end of the workday?

feel emotionally worn out at the end of the workday?

want to emotionally shut down at the end of the workday?

feel emotionally drained at the end of the workday?

want to avoid anything that took too much emotional energy at the end of the workday?

Appendix H

Perceived Health Questionnaire

In general, how would you rate your health?

Terrible
Poor
Average
Good
Excellent

Thinking about the past 2 months, how much of your time has your health kept you from doing the kind of things other people your age do? **R**

Never
Rarely
Occasionally
Sometimes
Frequently
Usually
Always

To what extent do you agree with the following statements?

Strongly Disagree
Disagree
Somewhat disagree
Neither agree nor disagree
Agree
Strongly Agree

I feel healthy enough to carry out the things that I would like to do.
I have health problems. **R**

R – Reverse coded

Appendix I

Negative Affect

The questions on this page consist of words that describe different feelings and emotions. Read each item and then check the appropriate response in the space next to each word, indicating how often you have felt this way in the **last few weeks**.

Never
Rarely
Occasionally
Sometimes
Frequently
Usually
Always

Distressed
Upset
Guilty
Scared
Hostile
Irritable
Ashamed
Nervous
Jittery
Afraid

Appendix J

Results Tables

Table 1. *Means and Standard Deviations of composite variables*

	Mean	SD	Minimum	Maximum	Possible Range
Demands	4.60	1.08	1.0	6.4	1-7
Decision latitude	4.73	.97	2.3	6.8	1-7
PSS	2.70	1.44	1.0	7.0	1-7
Problem focused coping	5.04	1.17	1.5	7.0	1-7
Negative Affect	2.44	1.01	1.0	7.0	1-7
Health	3.77	.55	2.5	7.0	1-7
Age	46.65	11.76	23	68	
Subjective age	40.73	12.07	18	75	

Table 2. *Correlations among latent factors and chronological and subjective age*

	1	2	3	4	5	6
1 Demands	(.74)					
2 Decision latitude	-.15	(.74)				
3 Problem focused coping	.04	.07	(.73)			
4 Stress	.11	-.17	-.02	(.88)		
5 Health	-.17	.10	.16*	-.23*	(.74)	
6 Chronological Age	.07	-.06	-.07	-.07	-.17	
7 Subjective Age	.06	-.01	-.17*	.19*	-.36*	.56*

* $p < .05$

Note. The square root of AVE is included in the diagonal () for latent factors.

Table 3. *The relationships between gender (control variable) with stress and health*

Outcome	B (SE)	Z
Stress	.09(.12)	.80
Health	.03(.08)	.31

* $p < .05$

Note. Robust estimates

Table 4. *Proposed and Modified Models fit indices*

		Chi Square (DF)	CFI	RMSEA	RMSEA Confidence Interval
Demands	Proposed	35.48(5)	.85	.20	.14 - .26
	Final	0.0(0)	1.00	.00	
Decision latitude	Proposed	73.97(26)	.89	.11	.08 - .14
	Modified	8.35(8)	1.00	.02	.00 - .10
	Final	8.98(7)	1.00	.03	.00 - .10
Problem focused coping	Proposed	40.53(2)	.85	.36	.26 - .45
	Final	1.66(1)	.99	.07	.00 - .24
Stress	Proposed	122.26(35)	.95	.13	.10 - .15
	Final	21.36(14)	.98	.06	.02 - .09
Health	Proposed	17.73(2)	.93	.23	.14 - .33
	Final	.85(1)	1.00	.00	.00 - .21
Measurement Model	Proposed/ Final	368.43(310)	.97	.04	.02 - .05
Measurement Model (NA)	Proposed/ Final	349.55(310)	.98	.03	.00 - .04
Structural Model	Proposed/ Final	554.72(482)	.97	.03	.02 - .04

Note. Measurement Model includes demands, decision latitude, problem focused coping, stress, and self-rated health.

Structural model includes demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction.

Table 5. *Factor Loadings, Cronbach's Alpha, Reliability Coefficient Rho and AVE for latent factors*

Factor	Item	Factor Loading	Cronbach's Alpha	Reliability Coefficient Rho	AVE
Demands	Demands1	.64	.78	.78	.54
	Demands2	.72			
	Demands3	.83			
Decision Latitude	DL3	.57	.85	.85	.54
	DL5	.49			
	DL8	.88			
	DL6	.76			
	DL7	.79			
	DL9	.84			
Active Coping	AC1	.74	.79	.75	.53
	AC2	.93			
	AC3	.73			
	AC4	.43			
Stress	PSS1	.77	.97	.96	.77
	PSS2	.84			
	PSS3	.82			
	PSS4	.93			
	PSS5	.95			
	PSS6	.91			
	PSS7	.80			
	PSS8	.90			
	PSS9	.86			
	PSS10	.95			
Health	H1	.66	.81	.93	.54
	H2	.80			
	H3	.84			
	H4	.63			

Note: Cronbach's alpha, reliability coefficient rho, and AVE are for final scales

Table 6. *The relationships between demands, stress, and health with and without NA*

Outcome			B(SE)	Z
Stress	With NA	All Predictors	.05(.04)	1.20
		All Main Effects	.05(.04)	1.23
		Only Demands	.06(.04)	1.48
	Without NA	All Predictors	.10(.11)	.89
		All Main Effects	.11(.12)	.99
		Only Demands	.18(.12)	1.49
Health	With NA	All Predictors	-.06(.04)	-1.77
		All Main Effects	-.06(.04)	-1.80
		Only Demands	-.07(.04)	-1.80
	Without NA	All Predictors	-.08(.04)	-2.06*
		All Main Effects	-.08(.04)	-2.20*
		Only Demands	-.09(.04)	-2.45*

* $p < .05$

Notes. Robust estimates.

“All Predictors” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction

“All Main Effects” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health

“Only Demands” refers to the model containing demands, stress, self-rated health

Table 7. *The relationships between problem focused coping, stress, and health with and without NA*

Outcome			B(SE)	Z
Stress	With NA	All Predictors	.001(.06)	.01
		Main Effects	.004(.06)	.07
		Only PFC	-.01(.06)	-.16
	Without NA	All Predictors	-.26(.14)	-1.81
		Main Effects	-.24(.14)	-1.64
		Only PFC	-.34(.16)	-2.07*
Health	With NA	All Predictors	.08(.04)	2.08*
		Main Effects	.08(.04)	2.05*
		Only PFC	.08(.04)	2.05*
	Without NA	All Predictors	.14(.06)	2.4*
		Main Effects	.13(.06)	2.3*
		Only PFC	.15(.06)	2.4*

* $p < .05$

Notes. Robust estimates.

“All Predictors” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction

“All Main Effects” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health

“Only PFC” refers to the model containing problem focused coping, stress, self-rated health

Table 8. *The relationships between decision latitude, stress, and health with and without NA*

Outcome			B(SE)	Z
Stress	With NA	All Predictors	-.06(.02)	-1.85
		Main Effects	-.06(.03)	-1.88
		Only DL	-.07(.03)	-1.96*
	Without NA	All Predictors	-.21(.06)	-3.72*
		Main Effects	-.22(.06)	-3.87*
		Only DL	-.26(.06)	-4.39*
Health	With NA	All Predictors	.02(.02)	.85
		Main Effects	.02(.02)	.92
		Only DL	.03(.02)	1.40
	Without NA	All Predictors	.04(.02)	1.72
		Main Effects	.04(.02)	1.86
		Only DL	.06(.02)	2.69*

* $p < .05$

Notes. Robust estimates.

“All Predictors” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction

“All Main Effects” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health

“Only DL” refers to the model containing decision latitude, stress, self-rated health

Table 9. *Decision latitude as a moderator of the relationship between demands and stress and demands and health with and without NA*

Outcome			B(SE)	Z
Stress	With NA	All Predictors	-.01(.03)	-.42
		Demands, DL and interaction	-.01(.03)	-.31
	Without NA	All Predictors	-.08(.05)	-1.54
		Demands, DL and interaction	-.05(.05)	-.93
Health	With NA	All Predictors	-.001(.02)	-.05
		Demands, DL and interaction	-.01(.02)	-.45
	Without NA	All Predictors	.01(.02)	.46
		Demands, DL and interaction	-.003(.02)	-.11

* $p < .05$

Notes. Robust estimates.

“All Predictors” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction.

“Demands, DL and interaction” refers to the model including demands, decision latitude, demands*decision latitude interaction, stress, and self-rated health.

Table 10. *Problem focused coping as a moderator of the relationship between demands and stress and demands and health with and without NA*

Outcome			B(SE)	Z
Stress	With NA	All Predictors	.01(.02)	.36
		Demands, PFC, and interaction	.02(.03)	.66
	Without NA	All Predictors	.06(.07)	.94
		Demands, PFC, and interaction	.1(.12)	.86
Health	With NA	All Predictors	.01(.02)	-.51
		Demands, PFC, and interaction	-.03(.02)	-1.30
	Without NA	All Predictors	-.02(.02)	-1.04
		Demands, PFC, and interaction	-.04(.04)	-1.02

* $p < .05$

Notes. Robust estimates.

“All Predictors” refers to the model including demands, decision latitude, problem focused coping, stress, self-rated health, demands*decision latitude interaction, and demands*problem focused coping interaction.

“Demands, PFC and interaction” refers to the model including demands, problem focused coping, demands*problem focused coping interaction, stress, and self-rated health.