The Job Demands-Control-Support Model: Understanding the Implications of Age

Author: Elyssa Tracy Besen

Persistent link: http://hdl.handle.net/2345/3028

This work is posted on eScholarship@BC,
Boston College University Libraries.

Boston College Electronic Thesis or Dissertation, 2013

BOSTON COLLEGE
Lynch School of Education

Department of Counseling, Developmental and Educational Psychology

Applied Developmental and Educational Psychology Program

THE JOB DEMANDS-CONTROL-SUPPORT MODEL:
UNDERSTANDING THE IMPLICATIONS OF AGE

Dissertation
by

ELYSSA BESEN

submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

May 2013

ABSTRACT

The Job Demands-Control-Support Model: Understanding the Implications of Age

Elyssa Besen

Dissertation Chair: Rebekah Levine Coley, Ph.D.

In recent decades, the average age of the United States workforce has been on the rise, a trend that is expected to continue as the Baby Boomer generation, which constitutes the largest segment in the workforce in this country, reaches older adulthood. The aging of the workforce has raised concerns from researchers, policy-makers, and organizations. As a result, there have been calls for research regarding how experiences at work vary across the life-span, although few studies have addressed this topic. To begin to address this gap in the literature, this dissertation aims to explore the association between job demands and well-being and how the processes employees use to cope with job demands vary with age. Using data from two waves of Midlife in the United States: A National Study of Health & Well-Being, with a sample of over 7,000 working adults ranging from ages 20 to 83, I attempt to integrate the Job Demands-Control-Support Model with the Life-Span Theory of Control in order to examine how multiple factors influence the relationship between job demands and well-being outcomes across the life-span. Results of random effects linear regression models show that job demands were negatively related to job satisfaction and mental health and that the relationship between job demands and job satisfaction was weakest at younger ages and remained constant after midlife. With regard to the factors that moderate the relationships with job demands, findings indicated that job control and job support buffered the relationship with job

satisfaction, while job support buffered the relationship with mental health. The buffering roles of job control and job support were found to vary based on levels of primary and secondary control for workers of different ages. Findings are discussed in terms of their implications for both workplace theory and developmental theories, which help to provide a better understanding of how work experiences vary across the life-span.

ACKNOWLEDGEMENTS

First, I would like to thank the members of my dissertation committee, Dr. Rebekah Levine Coley, Dr. Jacquelyn James, and Dr. Sara Moorman, for their unwavering support and guidance throughout the dissertation process. I would like to especially thank Jackie for always being there for me as both a mentor and friend.

I would also like to thank the Boston College Institute on Aging for funding my work through their Dissertation Fellowship and the Lynch School of Education for funding through their Summer Dissertation Development Grant.

In addition, I would like to thank my friends and family for their encouraging words and constant support during this process. To Christina Matz-Costa, Melissa Brown, everyone at the Sloan Center on Aging and Work, and all of my peers in the Applied Developmental and Education Psychology Program, I could not have done this without the support and friendship of each of you. To my mother Lynne, thank you for teaching me that at any age, quality of life matters. You have truly been an inspiration for my work.

Lastly, I want to thank the two most important people in my life. Thank you to my husband Zach for always being there and for encouraging me to continue even when I felt like giving up. Finally, to my new little lady Ava, thank you for being the greatest motivation of all. I love you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: PROBLEM STATEMENT

The United States population is aging. It is estimated that by 2030, one out of every five Americans will be over the age of 65 (Vincent & Velkoff, 2010). This trend is influenced primarily by increases in life expectancy and decreases in fertility rates. Life expectancy in the United States has experienced a drastic change during the 20th century. In the early part of the 1900s, life expectancy at birth was less than 50 years, but by the end of the century, it was approximately 77 years at birth (Shrestha, 2006). This increase is expected to grow by another 5 years by 2050 (U.S. Census Bureau, 2009). At the same time that life expectancy is increasing, fertility rates in this country are falling. At the turn of the 20th century, the fertility rate for a woman during her childbearing years was approximately 3.5 children, a number that fell to roughly 2 children by the turn of the 21st century (Munnell, 2004). "A consequence of the improved survival, coupled with declining fertility rates, is that the United States is in the midst of a profound demographic change: rapid population aging, a phenomenon that is replacing the earlier "young" age-sex structure with that of an older population" (Shrestha, 2006, p. 21).

This "rapid population aging" has already, and is expected to continue to affect the workforce in the United States. Fewer prime age workers, traditionally defined as workers aged 25-54, and a greater proportion of older workers, aged 55 and older are expected in the coming years (Toossi, 2007). As the labor force is aging, the overall growth of the labor force is actually slowing and is expected to continue to decrease in the coming decades (Toossi, 2006). Interestingly, the number of workers 55 and older is expected to grow at a rate of five times that of the overall workforce over the next ten

years (Toossi, 2012), suggesting that although overall the labor force growth rate is slowing for workers of all ages, the growth rate is considerably higher when focusing only on older workers. In fact, by 2020, a quarter of the workforce is expected to be age 55 and older, and the workforce age 65 and older is expected to be more than double what it was in 2000 (Toossi, 2012). For adults 75 and older, the labor force participation rate is expected to rise from 4.3% in 1990, to 10% by 2020 (Toossi, 2012).

In light of desires expressed by many of today's older workers and also out of necessity, a large number of older workers are expected to delay retirement and continue to work in paid employment in some capacity (Mermin, Johnson & Murphy, 2006; Roper ASW, 2004). With older workers remaining in the workforce past traditional retirement ages and fewer younger workers entering the workforce, employers are faced with an older workforce than has previously been seen. The aging of the workforce has thus become a concern for organizations and with that, there have been calls for further research on the differences between workers of different ages and their implications for employee outcomes, such as job performance (Truxillo, 2009). Accordingly, there has been a call for research on the role of age as a possible moderator in predictor-outcome relationships at work, although few studies have examined this possibility (Ebner, Freund, & Baltes, 2006; Kanfer & Ackerman, 2004, Ng & Feldman, 2008; Truxillo, 2009).

Despite the lack of research on age as a moderator, several studies have shown that adults' work experiences differ across age groups (Bernal, Snyder, & McDaniel, 1998; Clark, Oswald, & Warr, 1996; Hochwarter, Ferris, Perrewé, Witt, & Kiewitz, 2001;

2

Rhodes, 1983). For example, in cross-sectional studies, age and job satisfaction are positively related (Ng & Feldman, 2010). In addition, work engagement levels vary across the life-span (James, McKechnie, & Swanberg, 2011), and even the meaning of work itself is thought to vary with age (Mor Barak, 1995).[1] One aspect of work that has been under-researched with regard to aging at work is how the experience of psychological job demands, like pressure to complete a task quickly, may affect employee outcomes like job satisfaction and employee health and whether these relationships vary based on workers' ages.

There have been many assumptions made about the ability of older workers to deal with job demands (Hedge, Borman, & Lammlein, 2006; Lyon & Pollard, 1997; Rosen & Jerdee, 1976). Even though there is little research on whether workers of different ages cope with job demands differently, there are reasons to expect that dealing with job demands does vary with age. It is well known that with age come certain cognitive and physical declines, such as decreases in processing speed, memory, and motor functioning, all of which could negatively influence the ability of older workers to deal with job demands (Ilmarinen, 2001; Salthouse, 2004). For example, a stocker at a retail store may have trouble completing tasks like lifting heavy boxes onto shelves due to declines in muscle density associated with age.

Research has focused on how physical and cognitive declines in older adulthood might impact workers' ability, and accordingly job performance (Ilmarinen, 2001; Salthouse, 2004; Schroeder & Salthouse, 2004; Sluiter, 2006; Wegman & McGee, 2004).

---

[1] Research is lacking on the relationship between age and these outcomes longitudinally, and thus it is possible that these relationships are due to cohort effects and not actual age change overtime.

Regarding physical functioning, research suggests that physical capacity begins declining at the age of 30 and can become especially detrimental to workers in physically demanding jobs starting around age 45 (Ilmarinen, 2001). Moreover, older workers are thought to be more susceptible to environmental hazards at work, such as being unable to do heavy lifting and having an increased risk for workplace injury like falling, compared to younger workers (Wegman & McGee, 2004). However, in the current economy, with the numbers of physically demanding jobs decreasing, research has focused more on a result declines in cognitive abilities in relation to age-related performance.

Several studies have focused on the impact of age-related declines in cognitive ability in relation to performance. In one review of the research, Salthouse (2004) reports that vocabulary abilities increase with age until around age 50 at which point they level off. In contrast, relatively large negative age relationships are found in terms of processing speed, space/reasoning skills, and recall. These differences are found starting at age 20 and continue (Schroeder & Salthouse, 2004). Accordingly, it has been suggested that age deficits are only seen in measures of fluid intelligence as opposed to measures of crystallized intelligence which levels off with age or continues to increase into older adulthood (Horn, 1970; Horn & Cattell, 1966; 1967; Horn & Hofer, 1992). Regarding the impact of these declines on work performance, research has shown that cognitive ability is strongly related to performance and thus, age-related declines in cognitive ability should be associated with declines in work performance (Hunter & Hunter, 1984; Kanfer & Ackerman, 2004; McEvoy & Cascio, 1989; Schmidt, Hunter, Outerbridge, & Goff, 1988).

Yet, research specifically examining the relationship between age and job performance fails to find negative associations and instead some research suggests a positive relationship between the two (Davies & Sparrow, 1985; McEvoy & Cascio, 1989; Ng & Feldman, 2008; Spirduso, 1995; Waldman & Avolio, 1986), suggesting that older workers are capable of continued productive work despite age-related declines. In contrast to the expectations that the ability to deal with job demands would be negatively impacted by age, there are also reasons to expect the opposite, that older workers may actually be better able to cope than younger workers. Salthouse (2004) proposes several explanations for why age-related cognitive declines do not directly relate to real-life performance declines. For example, cognitive ability alone cannot fully account for performance in activities; thus, there are likely other factors which help to compensate for cognitive losses. Work-related experience, which is often greater with age, is an important protector against cognitive decline (Avolio, Waldman, & McDaniel, 1990; Czaja & Sharit, 1998; Schroeder & Salthouse, 2004). Finally, according to Salthouse (2004), older adults are rarely required to perform at maximum levels.

In the model of Selective Optimization with Compensation, Baltes and colleagues suggest that individuals have a limited number of resources at any time that they must utilize as best as possible to accomplish their goals (Freund & Baltes, 1998; 2007). This involves three processes: selection, optimization, and compensation. Selection involves deciding which goals and outcomes to pursue. Optimization involves making choices about how to best allocate resources in order to achieve goals. Compensation involves deciding how to use resources to offset losses while maintaining high levels of

functioning (Baltes & Dickson, 2001; Freund & Baltes, 1998). According to this model, despite age-related losses, as adults age they are able to maintain a high level of functioning by appropriately selecting goals, optimizing their resources to the best of their ability, and compensating with other resources when needed. Regarding the lack of findings for a negative relationship between age and job performance despite age-related cognitive losses, it could be that older workers are better able to use such resources to accomplish their goals. For example, an older business man is likely to have a larger work network than a younger business man, which could be considered a resource. If the selected goal is to make as many business deals as possible, the older business man can optimize that resource and may be able to make more business deals as a result of those connections. Research suggests that the use of SOC strategies increases with age (Freund, 2006) and that greater use relates positively to job performance in older workers (Abraham & Hansson, 1995; Yeung & Fung, 2009).

At work, although a certain level of performance is expected, cognitive declines may not practically influence work requirements. In contrast, older workers may actually negotiate work requirements more efficiently than younger workers as a function of experience which is likely to be greater for older workers who presumably have had more time in the workforce. In sum, research does not show uniform support for the idea that age hinders performance at work (McEvoy & Cascio, 1989; Ng & Feldman, 2008; Spirduso, 1995; Waldman & Avolio, 1986).

In the current work environment, demands on workers are always on the rise as many organizations have downsized and moved toward global markets creating greater

6

competition for jobs, both to keep jobs that workers already have and to find new jobs for workers who are currently unemployed. Numerous studies have shown a negative relationship for workers of all ages between high levels of job demands, including feelings of being overloaded at work, intense time pressure to complete tasks, and tasks requiring a very high skill level, and well-being, including mental health, job satisfaction, and physical health (Bakker, Demerouti, & Euwema, 2005; Schaufeli, Bakker, & Rhenen, 2009; Schaufeli, Bakker, van der Heijden, & Prins, 2009; van der Doef & Maes, 1998; 1999).

The effects of job demands are not universal. While one worker may falter under the pressure of high job demands, another worker may actually flourish. One popular theory focused on the impact of job demands on worker outcomes, the Job Demands-Control Support Model, suggests that employee outcomes are not always the same under similar levels of job demands. Instead, certain aspects of jobs may help to lessen the negative influence of job demands such that a worker with high levels of job demand who has other job factors that aid in dealing with these job demands will have less negative outcomes than a worker with high levels of job demands lacking these other buffering job conditions (Johnson & Hall, 1988; Karasek, 1979, Karasek & Theorell, 1990). More specifically, this model proposes that a worker with a high level of job demands, defined as workload, who also has low levels of job control, defined as decision latitude or autonomy in one's job, and job support, defined as coworker or supervisor support, will report worse health than a worker with a high level of job demands who has high levels of job control and support.

7

The Job Demands-Control-Support Model assumes that the job resources of control and support would universally lessen the influence of job demands regardless of employee age. However, there are questions as to the extent to which older workers are able to deal with a high level of job demands, such as constant pressure to work at a fast pace or having to accomplish too many tasks, both of which may require a high level of cognitive resources that decline with age. Another question is how workers of different ages use different resources, or use resources to a different extent than their co-workers, to deal with job demands. For example, a 30 year old may be more likely to use job control to reduce the impact of job demands. In contrast, a 60 year old may be more likely to rely on social support at work in order to reduce the impact of high job demands. If so, job control would play a greater role as a buffer of job demands for younger workers while, while job support would be a greater buffer for older workers. Empirical research on how the relationship between job demands and satisfaction and health varies with age is lacking. Moreover, how the job resources of control and support minimize the impact of job demands on satisfaction and health differentially across the life-span has yet to be investigated. In light of the aging of the workforce and considering the research suggesting cognitive declines with age, it is important to look at how age impacts the ability to deal with job demands. Overall, additional research is needed to further understand how workers utilize different resources, such as job control or personal control, to better deal with job demands and how these may vary based on workers' ages.

The aim of this dissertation is to explore how the association between job demands and outcomes of well-being differs across the life-span and how the processes

employees use to cope with these demands vary with age. To do this, I will test the Job Demands-Control-Support Model (Johnson & Hall, 1988; Karasek, 1979, Karasek & Theorell, 1990) in a sample of working adults ranging from age 20-83. Additionally, I will integrate this model with the Life-Span Theory of Control, which proposes that adults must use primary and secondary control strategies differentially across the life-span in order to successfully deal with challenges (Heckhausen & Schulz, 1995). The concept of primary controls focuses on control exerted in the external environment, while the notion of secondary control focuses on control exerted internally. As adults age, they increasingly rely on secondary control in order to compensate for losses in primary control (Schulz & Heckhausen, 1996). The Life-Span Theory of Control incorporated with the Job Demands-Control-Support Model is utilized in order to explore how multiple factors may influence the relationship between job demands and outcomes of well-being across the life-span. My broad research questions are:

1. What factors moderate the relationship between job demands and outcomes of well-being?

2. Do these factors vary based on employee age?

The findings of this dissertation have important implications for researchers, policy makers, and employers interested in providing a high quality of employment to workers of all ages. Understanding what factors have the greatest influence on lessening the impact of job demands on worker outcomes for workers across the life-span and under what conditions these factors are likely to have the greatest influence is a critical part in the endeavor to create high quality work environments.

CHAPTER 2: LITERATURE REVIEW

Job Demands-Control-Support Model

Job Stress. Work plays a major role in the lives of adults. Stress associated with work, or job stress, has been said to be the greatest source of everyday stress in adults' lives (NIOSH, 1999). Job stress refers to a damaging emotional state which results from perceived adverse conditions at work that may threaten the individual (Appley & Trumbull, 1967; Beehr & Newman, 1978; Jamal, 2007; Kahn & Byosiere, 1990; Karasek, 1979; Lovallo, 2005; Parker & DeCotiis, 1983; Xie & Johns, 1995). Research on job stress as a cause of physiological and psychological problems for employees became a concern for the US Public Health Services in the 1960s. The need for research on this topic was echoed by the National Institute of Occupational Safety and Health (NIOSH) who reported that the leading health problems associated with job stress were cardiovascular diseases, musculoskeletal disorders, and psychological problems (Murphy, 2002; Ordin, 1992). Some research suggests that job stress can help to explain increasing health care costs in the United States (Ganster, Fox & Dwyer, 2001; Manning, Jackson & Fusilier, 1996). Additionally, job stress appears to be related to lower overall productivity and performance (Manning et al., 1996), and higher levels of absenteeism and turnover (Gupta & Beehr, 1979; Hoel, Sparks, & Cooper, 2001). Some of the leading causes of job stress that have been identified include undesirable physical work conditions, such as a noisy workplace, and work characteristics, such as high job demands, low job control, and low job support (Cox & Griffiths, 1996; Fletcher, 1988; House, 1981, 1987; Kahn &

Byosiere, 1990; Karasek, 1979; Spector, 1998). This dissertation will focus specifically on the influence of work characteristics on job stress.

One of the most popular, and well-researched models explaining job stress is the Job Demands-Control-Support Model (JDCS) (Johnson & Hall, 1988; Karasek, 1979; Karasek & Theorell, 1990). The model, originally developed by Karasek (1979), focused on the relationship between job demands and job control on employee outcomes (support was added to model later). In this original model, termed the Job Demands-Control model and also referred to as the job strain model, "psychological strain results not from a single aspect of the work environment, but from the joint effects of the demands of a work situation and the range of decision-making freedom available to the worker facing those demands" (Karasek, 1979, p. 287). According to the Job Demands-Control model, job demands serve to increase job stress, while having job control will help to decrease work stress. Furthermore, providing workers with job control helps to increase worker motivation and to improve workers' coping skills (Karasek, 1979; Karasek &Theorell, 1990). In line with the stress and adaptation model (Selye, 1976), the basic premise for the Job Demands-Control(-Support) model is that at high levels of job demands, individuals experience a state of arousal, or stress, characterized by increased adrenalin levels. Moving beyond the basic stress and adaptation model, according to the Job Demands-Control model, in jobs with high levels of control, the state of arousal can be counterbalanced through coping mechanisms (i.e. control), but in jobs with high demands and low levels of control, the state of arousal remains, ultimately leading to poor health outcomes (Karasek, 1979; Karasek & Theorell, 1990).

The Job Demands-Control-Support model assumes a similar process as the Stress

Process Model (SPM) (Pearlin, Menaghan, Lieberman, & Mullan, 1981). Pearlin and

colleagues argue that stress involves a complex process with several mechanisms

working together to ultimately lead to the stress outcome. There are three major domains

in the stress process: 1. the stressors, 2. the mediators and moderators of stress, and 3. the

outcomes of stress. The first domain, the stressors, "can be seen as arising out of two

broad circumstances: the occurrence of discrete events and the presence of relatively

continuous problems" (Pearlin et al., 1981, p. 338). The Job Demands-Control-Support

model is concerned with the second set of circumstances, those that are relatively

continuous, which in this model are job demands. Job demands may be seen as persistent

life strains which have the potential to result in a stress outcome. A key aspect of

Pearlin's model though, is that just because a life strain is present, this does not

necessarily guarantee the stress outcome will occur. The second domain in the stress

process concerns the mediators or moderators of stress which include both variables that

may serve as conditions through which the stress leads to outcomes (mediators) or as

conditions that attenuate the impact of the potential stressor on outcomes (moderators).

The Job Demands-Control-Support model focuses specifically on the potential

moderators of stress which in this case include job control and job support.[2] Finally, the

third domain in Pearlin's model, the outcomes of stress, which encompass a large number

of possible physical and mental outcomes such as life satisfaction and depression, are

thought to occur only when the potential stressors actually result in stress. According to

---

[2] The Job Demands-Control-Support Model primarily focuses on job control and job support as moderators
of the job demands-outcomes relationship. This is discussed in more detail later in this section.

the Job Demands-Control-Support model, job stress would occur when job demands exceed the ability to overcome those demands either through job control or job support (the moderators). When job stress, which is not directly measured by the model but is more of a latent variable thought to occur through the combination of job demands with job control and support, persists over a period of time, workers will experience the negative outcomes associated with stress, such as anxiety and decreased physical health. While the SPM is applicable to many stress processes, including those in the workplace, it is commonly used to address caregiver stress, whereas the Job Demands-Control-Support model is commonly used to address job stress. For this reason, I have opted to focus on the Job Demands-Control-Support model as the theoretical model for job stress in this dissertation.

Before going into more of the specifics of the Job Demands-Control-Support model, I will first go through the main variables in the model (i.e. job demands, job control, and job support) and how they are thought to relate to stress outcomes.

Job Demands. The concept of job demands refers to an individual's workload, meaning an employee's work-related task requirements (Johnson, 1989; Johnson & Hall, 1988; Karasek & Theorell, 1990; Theorell & Karasek, 1996). Job demands include physical job demands, such as manual labor involved in jobs and psychological job demands, such as problem solving, information processing, and dealing with time pressures on the job to complete job demands (Kahn & Byosiere, 1990; Karasek, 1979, Karasek & Theorell, 1990). Research suggests that there is a positive relationship between job demands and job stress such that as job demands increase, so too does job

13

stress (Karasek, 1979, Karasek & Theorell, 1990; Schabracq, Cooper, & Winnubst, 1996) and in turn, health problems (Cox & Griffiths, 1996; Houtman & Kompier, 1995; Karasek & Theorell, 1990; Kristensen, 1996; Stansfield, Fuhrer, Shipley, & Marmot, 1999). A wealth of empirical work supports these relationships (Calnan, Wadsworth, May, Smith, & Wainwright, 2004; de Lange, Taris, Kompier, Houtman, & Bonger, 2004; Ettner & Grzywacz, 2001; Larsson & Setterlind, 1990; Mikkelsen, Ogaard & Landsbergis, 2005; Neidhammer & Chea, 2003; Pal & Saksvik, 2008; Schaubroeck, Lam & Xie, 2000). However, as will be discussed in more detail below, job demands do not always result in job stress, instead it is only under certain circumstances that the negative outcomes predicted from a high level of job demands will occur. In fact, in some cases, job demands may actually be associated with more positive worker outcomes, such as increased learning and motivation when they are coupled with high levels of job control (Karasek, 1979).

Job Control. The concept of job control, often referred to as decision latitude, refers to an employee's perception of control over his/her job performance (Fox et al., 1993; Karasek, 1979, Karasek & Theorell, 1990). There are two main aspects of job control; skill discretion and decision authority. Skill discretion refers to perceptions of the level of skill one has in a job, the lack of repetitiveness on the job, the ability to be creative at work, and the extent to which an employee feels that he/she has the ability to decide which skills to utilize when completing tasks at work. Decision authority, also referred to as autonomy, is the extent to which an employee feels that he/she has the ability to make decisions about how work gets completed and the extent of influence an

14

employee has in the organization (Karasek, 1979; Karasek & Theorell, 1990; Karasek et al., 1998). In general, a lack of perceived control, in any domain of life, is thought to hinder the coping process and increase the experience of stress (Hobfoll, 1989; Johnson, 1989; Langer, 1983). The domain of work is no exception, and job control is believed to be negatively related to job stress such that having high levels of control at work reduces an employee's perception of work-related stress (Frese, 1989; Ganster & Fusilier, 1989; Hobfoll, 1989; Johnson, 1989; Karasek 1979; Karasek & Theorell, 1990; Langer, 1983; Spector, 1998; 2002). As with job demands, there is ample research supporting the proposed relationship between job control and job stress (Brunborg, 2008; Carayon, 1993; Spector, 2009; Xie, 1996).

Job Support. Perceived social support at work, which is another aspect of work that is thought to impact job stress (Cohen, Gottlieb & Underwood, 2000; Cohen & Wills, 1985; Hobfoll & Shirom, 2001; House, 1981; Viswesvaran, Sanchez & Fisher, 1999), was added to the JDC model later as an additional factor when looking at job demands to form the Job-Demands-Control-Support model (JDCS) (Johnson & Hall, 1988). Social support at work generally encompasses high quality, supportive relationships with supervisors and peers with whom an individual works closely (Dwyer & Ganster, 1991; House, 1981; Johnson, 1989; Karasek & Theorell, 1990). From such positive working relationships, employees gain emotional support, such as someone to talk to if something goes wrong, instrumental support, such as getting help with a task, informational support, such as getting important work-related information, and appraisal support, such as feedback about one's performance (House, 1981). Like job control,

15

social support at work is thought to have an inverse relationship with job stress, with higher levels of social support relating to lower levels of job stress (Cobb, 1976; Cohen et al., 2000; Hobfoll, 1989; House, 1981; Johnson, 1989; Karasek & Theorell, 1990; Viswesvaran et al., 1999). Again, there are several studies that lend support for this negative relationship (Brunborg, 2008; Geller & Hobfoll, 1994; Muncer, Taylor, Green & McManus, 2001; Orpen, 1992).

Karasek's (1979) Job-Demands-Control model (JDC) categorizes jobs into four groups based on the combination of job demands and job control (see Figure 1a below). The first group, labeled "high strain" refers to jobs that have high levels of job demands combined with low levels of job control. As implied in the name, this type of job is thought to lead to the most job strain, or job stress. The physiological stress response is thought to be activated in high strain jobs as a result of workers not having a way to cope with a high level of job demands due to the lack of control over one's work. When the physiological stress response is activated, it in turn is thought to be related to high blood pressure and illness. The second group referred to as "active" jobs have high levels of both job demands and control. This type of job is proposed to lead to the most positive outcomes, such as high levels of job satisfaction, because active jobs are thought to increase worker's sense of self-efficacy, competence, and personal growth. The third group, labeled "passive" jobs, is characterized by low levels of both job demands and control. This type of job is not expected to lead to high levels of job stress as is the case with high strain jobs, but, it is expected to lead to negative work-related outcomes such as job dissatisfaction, boredom at work, lack of motivation, and a decline in work-related

16

skills. The final group of jobs, known as "low strain" jobs, has low levels of job demands

and high levels of job control. This type of job is not expected to result in job strain or

illness (Karasek, 1979; Karasek & Theorell, 1990). The categorization of jobs into these

four groups is based on overall characteristics of a job. So although a job at times could

be categorized into a different group, workers are categorized into one group overall. In

an initial test of the model, Karasek categorized workers in the aforementioned four

groups and found that job satisfaction was highest for workers in low strain jobs. Job

satisfaction was also high for workers in active jobs. Workers with passive jobs had

worse health than workers in low strain and active jobs, as evidenced by higher average

levels of physical symptoms, depression, and anxiety. Finally, workers in high strain jobs

had the worst health compared to the other job categories, showing the highest levels of

physical symptoms, depression, and anxiety (Karasek, 1979).

Figure 1a: Karasek's (1979) Job Strain Model

Johnson and Hall (1998) investigated the relationship between work

characteristics and cardiovascular health and found that in addition to job control, job

support was also a critical factor associated with the impact of job demands. Regardless of levels of job demands or job control, incidence rates of cardiovascular disease were higher when levels of job support were low. Additionally, job support moderated the relationship between demands, control, and cardiovascular disease. In line with this research, it is hypothesized that "iso-strain" jobs which are categorized by low levels of support, or high levels of isolation, low levels of job control, and high levels of demands are associated with the most negative work outcomes (Johnson & Hall, 1988; Karasek & Theorell, 1990). Like job control, job support is another factor that provides workers with resources that help to cope with job stressors. A modified version of Karasek's job strain model which includes the new dimension of job support is presented in Figure 1b below.

Figure 1b: Johnson and Hall's (1988) Job Demands-Control-Support Model[3]

---
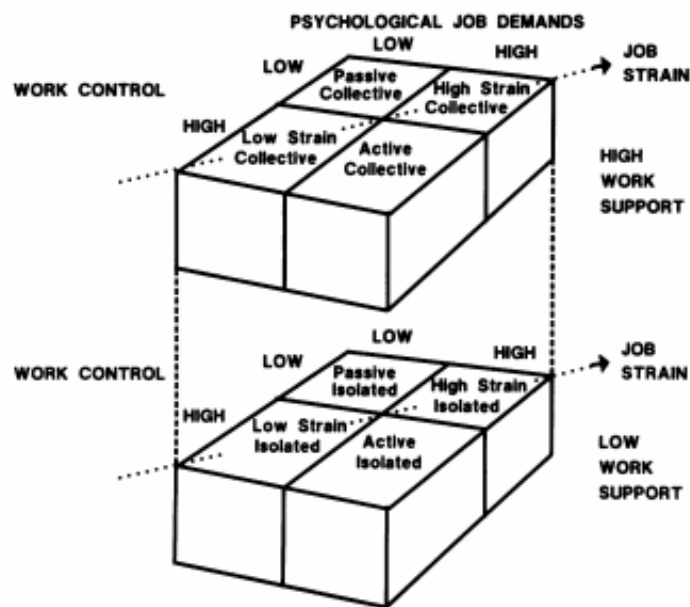
[3] Figure copied directly from Johnson and Hall (1988), p. 1336.

18

Since the inception of the JDCS model, several studies have shown that high levels of job demands, low levels of job control, and low levels of job support are associated with various negative employee outcomes (Baker, Israel, & Schurman, 1996; Chay, 1993; de Croon, Sluiter, Blonk, Broersen, & Frings-Dresen, 2004; McLaney & Hurrell, 1988; Mullarkey, Jackson, Wall, Wilson, & Grey-Taylor, 1997; Theorell & Karasek, 1996; Tummers, Landeweerd, &Van Merode, 2002). These outcomes can be grouped as work-related well-being, general well-being, and physical health (van der Doef & Maes, 1998; 1999). For work-related outcomes, some examples include job satisfaction (Amick & Celentano, 1991; Cahill & Landsbergis, 1996), organizational commitment (Cohen, 1998; Mathieu & Farr, 1991), burnout (Melamed, Kushnir, & Meir, 1991) and employee turnover (de Croon et al., 2004). For general well-being outcomes, some examples include psychological distress (Barnett & Brennan, 1997; Bourbonnais, Brisson, Moisan, & Vezina, 1996), depression (Baker et al., 1996; Fletcher & Jones, 1993; Karasek, 1979), anxiety (Elsass & Veiga, 1997; Fletcher & Jones, 1993; Landsbergis, Schnall, Deitz, Friedman, & Pickering, 1992), and life satisfaction (Fletcher & Jones, 1993). For health outcomes, some examples include cardiovascular disease (Alfredsson, Karasek, & Theorell, 1982; Alfredson & Theorell, 1983; Johnson & Hall, 1988; Johnson, Hall, & Theorell, 1989), fatigue (de Croon et al., 2004), and general illness (Cahill & Landsbergis, 1996; Elovainio & Kivimaki, 1996; Tummers et al., 2002).

The JDC(S) has been empirically tested using two primary approaches. The first approach, which examines the "strain" hypothesis, assesses the unique effects of job demands, job control, and job support on employee outcomes. This approach argues that

19

high job demands, low job control, and low job support have a negative impact on worker health (e.g. Daniels & Guppy, 1994; Moyle, 1995; Stansfield, North, White, & Marmot, 1995; Wall, Jackson, Mullarkey, & Parker, 1996). This approach focuses on the independent effects of each of the job features and how they individually influence worker health but it does not focus specifically on interactions among the job features. The second approach, which examines the "buffer" hypothesis, assesses the moderating effects of job control and job support in the relationship between job demands and employee outcomes. This approach argues that job control and support can buffer the negative effects of high demand jobs on worker health. In this hypothesis, jobs with a high level of job demands are not necessarily detrimental as long as job control or support are high, however when both job control and support are low, job demands are expected to have the previously found negative impact on worker health (e.g. Marshall, Barnett, Baruch, & Pleck, 1991; Parkes & von Rabenau, 1993; van der Doef & Maas, 1999). It is important to note that in this model, job control and job support are viewed as independent factors that reduce the impact of job demands. They are not conceptually linked such that there is not thought to be an interaction between job control and job support, rather the interactions only occur between job control and job demands and between job support and job demands. Some researchers have argued for the necessity of testing the model using a multiplicative interaction (Ganster, 1989), while others suggest that examining the unique effects of the job characteristics are sufficient (Karasek, 1989).

This debate has implications for interventions that may be proposed based on the JDCS. Findings for interactions between job demands and job control or job support,

rather than main effects of the variables, may be more useful as it is likely that job demands will remain high whereas manipulation of levels of job control and support is more feasible. However, very little research has systematically investigated interventions associated with this model such as manipulating levels of job demands, control and support to see the influence on outcomes which would assess whether high levels of job demands and low levels of control and support actually cause poor outcomes.

Research on the JDC(S) has yielded mixed results for the two approaches. In two reviews of the research using the model with physical health outcomes and psychological well-being outcomes, van der Doef and Maas (1998; 1999) found support for the strain hypothesis in 36 out of 75 studies and for the buffer hypothesis in 7 out of 23 studies reviewed for physical health outcomes using either the JDC or the JDCS. For psychological well-being outcomes, support for the strain hypothesis was found in 79 out of 119 studies and for the buffer hypothesis in 31 of 74 reviewed using either the JDC or the JDCS (note: some studies were examined for multiple hypotheses). Inconsistent findings such as these have raised concerns about the validity and applicability of the JDC(S) model.

One of the major concerns with the model is its simplicity (Karasek & Theorell, 1990; Kristensen, 1995). This model is generally thought to apply to employees universally. For example, the model should yield similar findings when examining employees in high prestige jobs, such as doctors or lawyers, as well as those in lower prestige jobs, such as stock boys and cashiers. Moreover, in this model, all employees with high levels of demands and control should have similar outcomes regardless of

personal characteristics like whether employees are confident in their abilities to complete their jobs. Accordingly, some argue that the model omits several key aspects including additional work characteristics, such as job type, occupational group, industry sector, and more importantly, individual characteristics, such as self-efficacy, locus of control, and age (Frese & Zapf, 1994; Parker, Wall & Cordery, 2001; Parkes, 1991; Shultz, Wang, Crimmins, & Fisher, 2010; Van Veldhoven, Taris, De Jonge, & Broersen, 2005). Several researchers have proposed that the JDCS model may only hold for individuals with certain characteristics (Daniels & Guppy, 1994; Schaubroeck & Merritt, 1997). To examine this possibility, research has considered the role of several dispositions including self-efficacy, locus of control, coping ability, and motivation in the applicability of the JDCS model (Daniels & Guppy, 1994; de Rijk, Le Blanc, Schaufeli & de Jonge, 1998; Ippolito, Adler, Thomas, Litz, & Holzl, 2005; Meier, Semmer, Elfering, & Jacobshagen, 2008; Salanova, Peiro, & Schaufeli, 2002; Schaubroeck & Merritt, 1997; Van Yperen & Hagedoorn, 2003).

For example, self-efficacy, defined as "a belief in one's capability to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Bandura, 1997, p.3) may influence individuals' ability to utilize control at the workplace. Accordingly, research has shown that the buffer hypothesis only holds for workers with high levels of self-efficacy, suggesting that increasing job control and support only lessens the impact of job demands on employee outcomes for employees with high levels of self-efficacy who are actually able to utilize the control and support. In contrast, for employees with low levels of self-efficacy, increasing job control was

22

actually related to worse outcomes (Salanova, Peiro, & Schaufeli, 2002; Schaubroeck & Merritt, 1997).

Regarding locus of control, referring "to the degree to which persons expect that a reinforcement or an outcome of their behavior is contingent on their own behavior or personal characteristics [internal locus of control] versus the degree to which persons expect that the reinforcement or outcome is a function of chance, luck, or fate, is under the control of powerful others, or is simply unpredictable [external locus of control]" (Rotter, 1990, p. 489), as with self-efficacy, having an internal vs. external locus of control may impact an employee's ability to capitalize on job control and support. The buffer hypothesis has been supported for individuals with an internal locus of control, whereas high levels of job control have a negative impact on worker outcomes for individuals with an external locus of control (Daniels & Guppy, 1994; Meier, Semmer, Elfering, & Jacobshagen, 2008).

Another factor that has not been extensively researched using the JDCS model is age. Although several studies control for age, there is a clear omission of age as a potential factor influencing the applicability of the model. It is possible that the model may work differently for younger compared to older workers, or that the model is simply not applicable at certain ages. In the review discussed above by van der Doef and Maas (1999), the samples for the studies were fairly young, with average ages ranging from 27 to 36, and so it is unclear how the findings may vary for older employees. It is possible that with older samples, the buffer hypothesis would be more likely to be supported or that it would only be supported for one of the job resources. There are important reasons

to think that the proposed relationships in the JDCS would vary with age. Warr (1997) suggests that the importance of various job characteristics including skill use, job demands, skill variety, feedback, and job security for general and work-related well-being varies with age, although this has not been empirically tested. Moreover, the model of Selective Optimization with Compensation which was discussed earlier, posits that the resources that individuals have available to them to accomplish their goals change across the life-span (Freund & Baltes, 1998). At work, job resources, such as control and support, are likely to also vary with age and the extent to which these resources are used to manage one's job demands would also vary with age. In addition, since older workers, who have had more time in the standard working years, are likely to have been in the workforce longer gaining important work-related experience, older workers have had more time to figure out what resources work best to overcome job demands and would use those resources accordingly.

Two important exceptions to the paucity of research on the JDCS varying with age is the work of de Lange, Taris, Jansen, Smulders, Houtman, and Kompier (2006) and the work of Shultz et al. (2010). In one study examining variation in the strain hypothesis by age, de Lange et al. (2006), found that job demands were related to an increase in emotional exhaustion for middle-age workers but were related to a decrease in emotional exhaustion for younger workers. In older workers, job demands were unrelated to emotional exhaustion. Moreover, only in the older workers model was job support predictive of emotional exhaustion, with higher job support relating to lower emotional exhaustion over time. This study suggests that job support may only serve as a job

24

resource for reducing the impact of job demands at older ages, meaning that the model is not applicable at all ages.

Shultz et al. (2010) examined age as a possible moderator in the relationship between job demands and job control with outcomes of stress controlling for gender, tenure, industry, job type, and supervisor status. The authors found that different facets of job control buffered the relationship between job demands and stress for younger workers (under age 40) compared to older workers (age 40 and older). Specifically, having sufficient time to complete tasks was the only buffer for younger workers, but having sufficient time to complete tasks, autonomy, and schedule flexibility were all buffers for older workers, suggesting that job control may be especially important for older workers. Since this study controlled for tenure, the findings of the study cannot be due to experience on the job alone. Instead, different aspects of job control, specifically autonomy and schedule flexibility, seemed to be buffers of job demands only for the older workers, suggesting that the model may be operating differently at older ages.

Although both the de Lange et al. (2006) study and the Shultz et al. (2010) study provided important insights into potential differences among workers' responses to their job conditions as a function of age, the studies have several limitations. In the de Lange et al. study, the first limitation is that it used sub group analyses by age as opposed to including interaction terms with age measured continuously in the full sample. According to MacCallum, Zhang, Preacher, and Rucker (2002), "dichotomization is rarely defensible and often will yield misleading results" (p. 19). Moreover, the authors argue that splitting age into groups is problematic in the developmental psychology literature

and can result in low statistical power. In addition, the de Lange et al. study did not use statistical tests to assess differences between the coefficients in the sub group analyses and so it is unclear if the differences presented were actually statistically significant. Another major limitation is that this study did not test the buffer hypothesis of the JDCS model, instead it focused on the main effects of the job characteristics and how those varied across the age groups.

The Shultz et al. (2010) study used a single European sample that was collected over 15 years ago. Today's workplace, and especially today's older workers who are largely from the Baby Boomer generation as opposed to the Traditionalist/Silent generation which was the case 15 years ago, may have changed and it is unclear if the findings in the Shultz et al. study were the result of that particular cohort of older workers and the economic climate in Europe at that time or if the results were based on actual age effects. While in this dissertation I propose that differences in the JDCS are due to age effects, it is unclear from the Shultz et al. study if the findings resulted from age effects or just cohort effects. Another limitation was that age was dichotomized into under and over 40, which is the same issue discussed above by MacCallum et al. (2002) for the de Lange et al. (2006) study. Finally, this study omitted the role of social support, which is a key variable in the Job Demand-Control-Support model.

Additionally, there is virtually no previous research on the role of personal control in relation to how the Job Demands-Control-Support model may vary with age. Thus, the purpose of this dissertation is to address those limitations and gaps in the literature in a more comprehensive study on how the Job Demands-Control-Support model may vary

by age. In this effort, the Life-Span Theory of Control is employed as a guiding framework for understanding the role of personal control across the life-span and how this may relate to the ability to utilize control and support at the workplace.

Life-Span Theory of Control

For decades, research has focused on the importance of perceived control in individual functioning. Perceived control has been defined as "the perceived ability to significantly alter events" (Burger, 1989, p. 246). It is a critical aspect of individuals' confidence and self-esteem and is known to help individuals overcome stressful experiences (Bandura, 1986; Parker 1993; Skinner, 1996). In addition, numerous studies have examined the relationship between perceived control and health and well-being. Research has consistently shown that high levels of perceived control predict better physical and mental health outcomes (Bandura, 1989; Skinner, 1996; Wallston, Wallston, Smith, & Dobbins, 1987). However, there has been little consensus on how specifically to measure perceived control. Among the constructs used in this line of research are most notably self-efficacy (Bandura, 1977; 1989), locus of control (Rotter, 1966), mastery (Lachman & Weaver, 1998), and primary and secondary control (Heckhausen & Schulz, 1995; Rothbaum, Weisz, & Snyer, 1982). This dissertation focuses specifically on primary and secondary control as defined in the Life-Span Theory of Control in order to explore how different aspects of perceived control vary across the life-span and what implications this variation may have for adults dealing with stressors at work. I have decided to center my study on the Life-Span Theory of Control's definition of perceived control as opposed to the other constructs used in the study of perceived control because

this theory provides a useful framework for understanding and predicting changes in perceived control over the life-span which are a critical aspect of my research questions.

Two-Process Model of Perceived Control.

The Life-Span Theory of Control grows out of the "Two-Process Model of Perceived Control" proposed by Rothbaum, Weisz, and Snyder (1982). According to this model, the desire for perceived control is so strongly valued that people are likely to shift methods of achieving perceived control in order to avoid abandoning striving for it. Rothbaum et al. suggest that there are two processes involved in perceived control. The first process, primary control, "involves attempts to change the world so that it fits the self's needs" (Rothbaum et al, p. 8). For example, one might strive to accomplish a goal through action in the external world by practicing soccer every day in order to be the best player on the team. In contrast, the second process, secondary control, involves "attempts to fit in with the world and to flow with the current" (Rothbaum et al, p. 8). For example, one might change something internally to maintain a high sense of self, such as changing one's goal from being the best player on the soccer team to just making the team. According to Rothbaum et al., the terms primary and secondary were chosen to represent the primacy of each process. In this model, it is thought that primary control is more powerful than secondary control and is also the type of control that has received more attention in the general personal control literature. These authors also say that secondary control is likely to be used after striving for primary control has failed, and thus temporally, primary control would come first.

Within secondary control, Rothbaum and colleagues (1982) identify four types of control: predictive control, illusory control, vicarious control, and interpretive control. Predictive control refers to the ability to predict an uncontrollable outcome in order to adjust one's expectations to better deal with the outcome, such as predicting that failure in a task is inevitable and changing one's goals accordingly to avoid that failure. Predictive control is a form of secondary control because it focuses on changing the self internally to better deal with a situation rather than doing something externally to deal with the situation, like practicing for a task that one expects to end in failure. The second type of secondary control, illusory control, involves attributing outcomes to chance. For example, people may focus their energies on situations that are more determined by chance than by skill and therefore a failure in these situations would be due to chance as opposed to a lack of control or individual effort. Vicarious control is similar to illusory control. It involves attributing outcomes to a powerful force, such as God or other powerful people in order to share in the powerful other's control. Finally, interpretive control is a combination of all of the previously described types of control in which individuals seek meaning in what would otherwise be uncontrollable situations. When people are better able to interpret events, they are better able to accept those events as well (Rothbaum et al.).

While the authors discuss predictive, illusory, vicarious, and interpretive control as indicators of secondary control, they note that these forms of control may occur with primary control as well. For predictive control, being able to predict an uncontrollable outcome might result in one's ability to better plan a task. For illusory control, believing

29

outcomes are due to chance may result in superstitious behavior which involves outward action and the belief that the outward action is causing an outcome. For vicarious control, believing outcomes are due to God may result in increased praying to God, which again involves an outward action and the belief that the outward action is causing an outcome. For interpretive control, if one can interpret uncontrollable events, the individual may come to believe that there are steps that can be taken to solve the uncontrollable event. The difference between primary and secondary control regarding predictive, illusory, vicarious, and interpretive control is that the action for secondary control is focused inward, however for primary control the action would be focused on the external environment. Furthermore, according to the two-process model, the attempts at secondary control would likely take place after initial attempts at primary control have failed in these uncontrollable events. In turn, using secondary control may then restore primary control, such as making a plan to solve an uncontrollable event (primary control) after finding meaning in that event (secondary control) (Rothbaum et al., 1982).

Building on the two-process model, Heckhausen and Schulz (1995) proposed the Life-Span Theory of Control. According to this theory, when faced with a challenge, individuals use strategies to overcome the challenge. They emphasize the difference between primary and secondary control strategies based on the target of one's action, either the action is directed towards the external world (primary control) or the action is directed towards the self (secondary control). In line with this, primary control "attempts to achieve effects in the immediate environment external to the individual whereas secondary control...attempts to achieve changes directly within the individual"

(Heckhausen & Schulz, 1995, p. 285). Primary control mainly involves external actions, such as persistence in achieving a goal or investing additional time to accomplish something, while secondary control is more focused on internal cognitions, such as using positive reappraisals of a situation or readjusting one's goals to maintain motivation. As with the two-process model, primary control in the Life-Span Theory of Control is thought to hold greater value than secondary control because it allows people to impact the environment to fit with their needs (Heckhausen & Schulz, 1993; 1995).

Moving beyond the two-process model, the Life-Span Theory of Control contains the idea that secondary control is thought to be necessary and facilitates primary control. It does this in two ways. First, failure at some point in life is inevitable and second, people need to be selective about the goals they undertake. Secondary control is related to both of these. If people do not experience failure and are capable of accomplishing every possible goal, secondary control would not be necessary because primary control, that is external control over a task, would always be effective. However, since this is not the case, secondary control is required to buffer against the impact of failure and to help be selective about which goals are achievable.

Primary and secondary control can both be characterized based on selection and compensation, resulting in four types of control processes: selective primary control, compensatory primary control, selective secondary control, and compensatory secondary control. Selective primary control involves the focusing of one's energy and external action on very targeted, i.e. selective, goals (Freund & Baltes, 1998; 2007; Heckhausen & Schulz, 1995). A common example of selective primary control would be investing one's

31

energy towards achieving a specific goal, which is often referred to as persistence in goal striving (Wrosch, Heckhausen, & Lachman, 2000). Since not all goals are easily achievable without external help, compensatory primary control becomes necessary which involves "the use of external resources such as assistance from others or technical aids..." (Schulz & Heckhausen, 1996, p. 710). When secondary control is helping to cognitively inform which goals are being pursued it is thought to be acting as a selectivity function. In contrast, when secondary control serves to reduce the mental effect of failure on a person, secondary control is thought to be acting as a compensatory function. This may be done through positive reappraisals of situations or by lowering one's aspirations to avoid future failures (Heckhausen, 1999; Heckhausen & Schulz, 1993; 1995).

The need for secondary control as a form of compensation results from the need to maintain well-being and self-esteem following a failure. Initially, individuals typically use primary control to accomplish a goal, but this is not always sufficient, and sometimes regardless of how hard people try to accomplish the task, i.e. how much primary control they exert, they may still fail. When a failure occurs, people are likely to suffer from that loss, such as feeling bad about their ability and talents. However, making use of compensatory secondary control strategies, such as believing the task is simply impossible and could not be accomplished by anyone, helps to protect individuals from the loss of primary control because if a task can never be completed then it is not that something is wrong with the individual or that the individual is lacking some special ability, instead it is just that task cannot be done. In turn, secondary control is thought to restore the motivation for primary control when the task is thought to be possible because

if a task is impossible it should not hinder someone from undertaking future tasks which can be accomplished (Heckhausen & Schulz, 1995).

Secondary control does not only occur after a failure in primary control. It also promotes primary control through selectively controlling which goals are even attempted. In life, there are a very large number of possible goals to pursue, some are accomplishable and some are not (Heckhausen & Schulz, 1993). As a result, people must make decisions about which goals, from the vast array of possible goals, are the most appropriate to pursue and also which goals should not be pursued because they are unattainable. This involves focusing on the most important goals, which are possible based on a person's abilities, placing the most value on these goals, and disengaging from unachievable goals. By selecting the most suitable goals, people are likely to be able to achieve those goals. Also, by disengaging from non-suitable goals, failure is likely to be avoided. In turn, according to the theory, this approach will increase primary control for future goals because people will learn that they can accomplish their selectively chosen goals (Heckhausen & Schulz, 1995).

One of the main distinctions of the Life-Span Theory of Control from the two-process model of perceived control is the focus on the impact of developmental changes on the use of the control strategies. As people age, their abilities are known to change based on relevant developmental changes, and thus the interaction between primary and secondary is constantly in flux. For example, a goal that was possible at a younger age through the use of primary control might no longer be attainable with age and so a person might have to switch to secondary control strategies to compensate. Heckhausen and

Schulz (1995) suggest that in young and middle adulthood, primary control may be a more likely choice of control strategy, while in later life, people may use secondary control strategies to a greater extent. Although the use of the control strategies may change across adulthood, the authors discuss that actual striving for primary control is likely to remain stable throughout adulthood, it is just that secondary control will increasingly be needed to maintain primary control. Accordingly, the use of primary control is expected to decrease after middle adulthood and secondary control is expected to increase with age (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010; Schulz & Heckhausen, 1996; 1999).

There is some research to support the predicted patterns of change with respect to primary and secondary control across the life-span for several domains of functioning. For example, in a study examining control over age-related appearance changes, late-middle-aged adults were found to have lower levels of primary control and higher levels of secondary control compared to early-middle-aged adults and young adults (Thompson et al., 1998). Specifically, Thompson and colleagues found that having higher levels of primary control over changes in appearance was associated with less emotional distress, regardless of age. Regarding secondary control, when levels of primary control were high, secondary control was not related to distress, however, in cases where primary control was low, secondary control was related to less distress, confirming the proposition of the Life-Span Theory of Control, that secondary control becomes important when primary control is not sufficient to accomplish one's goals, in this case, controlling appearance (Thompson et al.).

34

In the well-being domain, Wrosch and colleagues (2000) found a similar result with regards to the use of secondary control strategies, with older adults having higher levels than the young or middle-aged adults, however primary control was also found to be higher for the older adults compared to the other age groups. When examining how the use of the control strategies related to well-being, the positive impact of persistence in goal striving, a form of primary control, on well-being decreased with age and became non-significant for the older adults, while the positive impact of positive reappraisals, a form of secondary control increased with age (Wrosch et al.).

In the health domain, research has shown that the use of primary control strategies were more strongly related to better physical health than the use of secondary control strategies for young-old adults (ages 69-79), whereas for old-old adults (ages 80-96), perceived health was found to be higher for those using secondary control strategies compared to primary control strategies (Chipperfield, Perry, & Menec, 1999). In another study, when examining vision loss in a sample of adults age 61-93, compensatory primary control was higher for the younger participants and compensatory secondary control was higher for the older participants, lending support for the predicted age patterns (Wahl, Becker, Burmedi, & Schilling, 2004). In addition, the use of selective primary control was found to be positively related to functional ability as assessed by activities of daily living (Wahl et al., 2004). Finally, among people who had suffered a heart attack or stroke, the use of primary control strategies was lower (Chipperfield, Perry, Bailis, Ruthig, & Loring, 2007).

Research on this theory has yet to explore its implications in the domain of work. This is a serious gap in the literature as work represents a major life domain in which adults spend a large majority of their week over several decades. Additionally, as this theory is based on how individuals deal with challenges, work presents an obvious arena in which adults are faced with daily challenges. To the extent that individuals need to manage job demands at work in order to be successful in that setting, it would seem that individuals must use both primary and secondary control strategies in order to accomplish work-related goals. Furthermore, specific primary and secondary control strategies may involve the use of job control and/or job support. For example, when faced with a high level of job demands, choosing how to allocate one's time in order to accomplish all of those demands could require a form of selective primary control at work which entails using job control. Alternatively, when faced with a high level of job demands that are insurmountable, relying on one's coworkers for external support to complete a task could be a form of compensatory primary control. In contrast, relying on one's coworkers for internal support and guidance to possibly positively reappraise the situation could be a form of secondary control that serves to maintain motivation at work. Along these lines, in order to take advantage of job control, an individual may need high levels of primary control, while taking advantage of job support may require high levels of both primary and secondary control, depending on how the job support is being utilized. Moreover, the likelihood of using these different types of control strategies may vary with age and help to explain how the factors that buffer against the negative impact of job demands may

36

also vary with age. Hence, this dissertation will examine the role of primary and secondary control in the application of the JDCS model.

In summary, the JDCS model has been well-researched but findings using this model have been inconsistent. In addition, concerns have been raised about the omission of possible key variables in the application of this model, specifically individual characteristics, like perceived control, and age. While some studies have examined certain aspects of perceived control in relation to the JDCS, research has neglected to consider the influence of primary and secondary control on the ability to utilize job control and support to overcome the negative impact of high job demands on employee outcomes. Moreover, as theory has suggested that the use of primary and secondary control strategies change across the life-span, these aspects of perceived control may be critical in furthering the understanding of the impact of age on the JDCS model. As the workforce continues to age and employers are faced with an increasingly age diverse workplace, it is important to better understand how workers of different ages manage their job demands in order to maintain a high quality of employment and worker well-being.

Present Study

The present study uses data from two waves of a large, nationally representative study of adults across the life-span in order to better understand the factors that help employees deal with their job demands without suffering negative health outcomes. This dissertation will address several research questions. Figure 2 presents the full conceptual model.

Figure 2: Conceptual Model
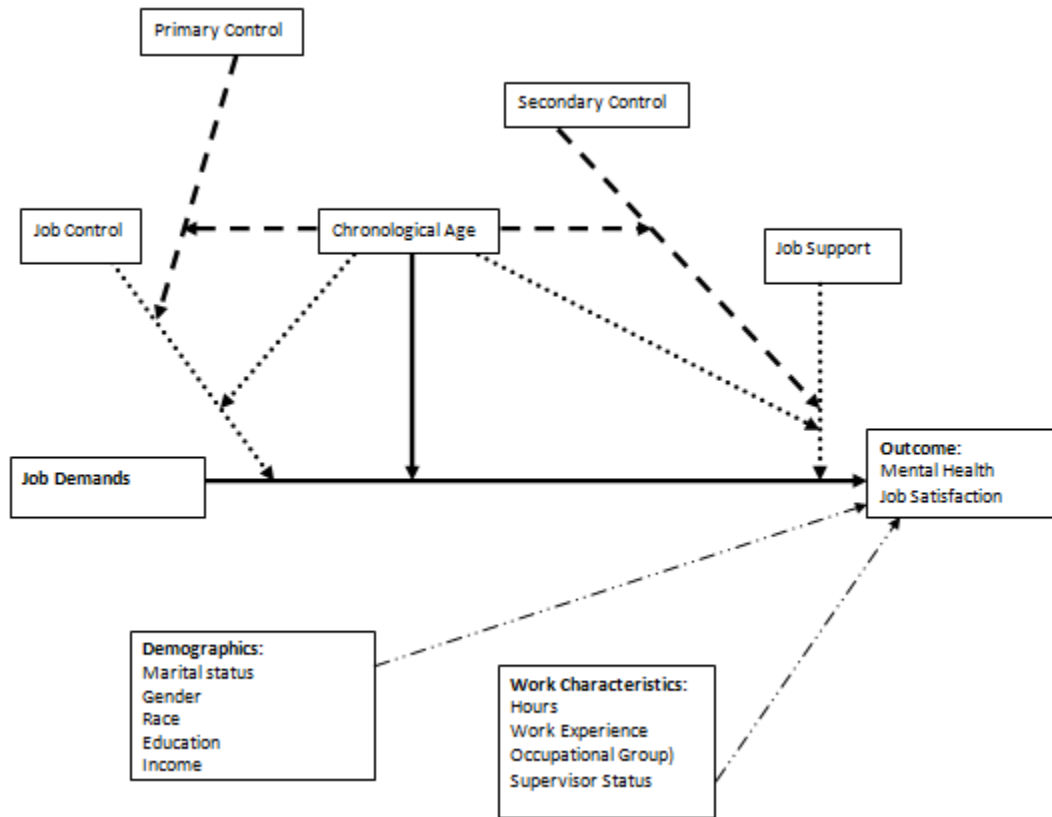
The first set of research questions focuses on the relationship between job demands and the outcomes of health and well-being (represented by the thick solid lines in the figure). Specifically:

Research Question 1A: Is there a relationship between job demands and the outcomes of health and well-being?

Research Question 1B: Do the relationships between job demands and the outcomes vary by age?

Based on previous research showing a negative relationship between job demands and employee outcomes including mental health and job satisfaction (Cahill &

Landsbergis, 1996; Clegg, Wall & Kemp, 1987; Dwyer & Ganster, 1991; Parkes, 1991; Warr, 2000),

> *Hypothesis 1A*: I expect there to be a negative relationship between job demands and the outcomes.

Regarding age, there are two possible hypotheses in the literature. On the one hand, there have been assumptions that with age, workers will suffer more from a high level of job demands (Hedge et al., 2006; Lyon & Pollard, 1997; Rosen & Jerdee, 1976), suggesting that the negative relationships between job demands and the outcomes will increase with age. On the other hand, with age comes experience and more efficient resource use to accomplish goals (Abraham & Hansson, 1995; Yeung & Fung, 2009), suggesting that the negative relationships will decrease with age. As there is little research to support the assumption that as workers age they are less able to deal with a high level of job demands,

> *Hypothesis 1B:* I expect that the negative relationships between job demands and the outcomes will decrease with age.

The second set of research questions examines the relationship between job control, job support, and job demands with the outcomes of health and well-being (represented by the dotted lines in the figure). As was discussed above, research utilizing the JDCS has tested two primary hypotheses, the strain hypothesis which examines the main effects of each of the job characteristics and the buffer hypothesis which examines interactions between job demands and job control/support (van der Doef & Maas, 1998; 1999). It has been argued that a true test of the JDCS necessitates multiplicative

interactions (Ganster, 1989). Based on Karasek's (1979) formulation of the original JDC

and the associated description of passive and active/high strain and low strain jobs, it

seems more appropriate to test the model using interactions instead of simple main

effects, since Karasek (1979) proposes different outcomes for employees in jobs with

high job demands depending on the level of job control. For this reason, I focus on the

buffer hypothesis of the JDCS instead of the strain hypothesis, however, the main effects

of the different job characteristics may still be examined in my analyses. My specific

research questions are:

Research Question 2A-1: Does job control buffer the relationships between job

demands and outcomes of health and well-being?

Research Question 2A-2: Does job support buffer the relationships between job

demands and outcomes of health and well-being?

Research Question 2B-1: Does the buffering role of job control on the job

demands – outcomes relationship vary by age?

Research Question 2B-2: Does the buffering role of job support on the job

demands – outcomes relationship vary by age?

Based on the propositions of the JDCS model and in line with the buffer

hypothesis (van der Doef & Maas, 1998),

Hypothesis 2A-1: I expect job control to serve as a buffer of the job

demands-outcomes relationship, with the relationship between job

demands and the outcomes being less negative at higher levels of job

control.

40

Hypothesis 2A-2: I expect job support to serve as a buffer of the job

demands-outcomes relationship, with the relationship between job

demands and the outcomes being less negative at higher levels of job

support.

Regarding age, there has been little previous research assessing how the JDCS

varies with age. Shultz et al. (2010) found that the use of different facets of job control to

buffer the impact of job demands varied with age, but this study did not use a general

measure of job control. To the extent that job control may be a form of primary control at

the workplace and job support may be a form of secondary control at the workplace, in

line with the Life-Span Theory of Control, job control would be used more at younger

ages than older ages with its use peaking in midlife, whereas job support would be used

more as age increases. Thus:

Hypothesis 2B-1: I expect job control to buffer the relationship more at

younger ages than at older ages

Hypothesis 2B-2: I expect job support to buffer the relationship more at

older ages than younger ages.

The third set of research questions focuses on the role of primary control and

secondary controls as buffers in the ability of individuals to utilize job control and job

support (represented by the dashed lines in the figure). Specifically:

Reserach Question 3A-1: Does primary control moderate the buffering capacity of

job control on the job demands-outcomes relationship?

Reserach Question 3A-2: Does secondary control moderate the buffering capacity of job support on the job demands-outcomes relationship?

Research Question 3B-1: Does the moderation by primary control on the buffering role of job control on the job demands-outcomes relationship vary by age?

Research Question 3B-2: Does the moderation by secondary control on the buffering role of job support on the job demands-outcomes relationship vary by age?

Building on the notion that job control may be a form of primary control in the workplace and that job support may be a form of secondary control, it is reasonable to anticipate that certain levels of general primary and secondary control may be required in order for workers to utilize the different job resources to buffer the impact of job demands. Specifically:

> *Hypothesis 3A-1:* I expect that job control will only buffer the job demands-outcomes relationship at high levels of primary control.

> *Hypothesis 3A-2*: I expect that job support will only buffer the job demands - outcomes relationship at high levels of secondary control.

For age, building on the Life-Span Theory of Control, as the use of primary control increases until midlife and then decreases into older adulthood, the impact of primary control on the utilization of job control as a buffer of job demands may also first increase and then decrease with age. Similarly, as the use of secondary control increases

with age, the impact of secondary control on the utilization of job support as a buffer of job demands may increase with age. Hence:

Hypothesis 3B-1: I expect the influence of primary control on the buffering role of job control to first increase and then decrease with age.

Hypothesis 3B-2: I expect the importance of secondary control on the buffering role of job support to increase with age.

CHAPTER 3: RESEARCH DESIGN

Participants

This dissertation utilizes data from two waves of Midlife in the United States: A
National Study of Health & Well-Being (MIDUS) (Brim, Ryff, & Kessler, 2004). The
MIDUS is a nationally representative, longitudinal study conducted by the MacArthur
Midlife Research Network focusing on the role of behavioral, psychological, and social
factors in age-related differences in physical and mental health. The first wave of data
(MIDUS I) was collected in 1995-1996 and the second wave (MIDUS II) was collected
in 2004-2006. Data from both waves of the study are available through the Interuniversity
Consortium for Political and Social Research (ICPSR).

MIDUS I

The first wave of the MIDUS (1995-1996) sample included a general sample
(N=3487), a sample of siblings of the general sample (N=950), a twin sample (N=1914)
and an additional oversample of city dwellers (N=757) who lived in Atlanta, Boston,
Chicago, Phoenix, and San Francisco. In total, data were collected from 7,108 English-
speaking participants living in non-institutionalized households with working telephone
service. The participants ranged in age from 20 to 75 years. The sample targeted adults
aged 25 to 75; however, 15 cases between the ages of 20 and 24 were included. The mean
age was 46.38 years with a standard deviation of 13 years. The gender is roughly split in
this sample as approximately 48% were male. The majority of the sample was white
(90.7%), another 5.2% were black, .6% were Native American, .9% were Asian, 1.9%

were Native Hawaiian/Pacific Islander, and .7% responded other.[4] In terms of the

educational background of the sample, 9.6% did not finish high school, 28.9% had a high

school diploma or GED, 23% had some college, 7.6% had an associate's degree, 17.4%

had a bachelor's degree, 2.8% had some graduate school, and 10.1% had a graduate

degree.

Data Collection. Random-digit-dialing was used to collect the nationally

representative sample of non-institutionalized, English speaking adults ages 25 to 74,

referred to as the general sample. One individual per household was interviewed and

asked to provide the number of men and women who were English speaking in the

specified age range. Households with at least one member meeting those criteria were

considered eligible for participation in the study. Once a household was considered

eligible, probability sampling based on ten gender by age group categories was used to

recruit participants (see Brim et al. 1999a for a detailed description of the probability

sampling procedure). One participant per eligible household was selected to participate.

If that participant decided not to participate, no other participant was selected from a

given household. Of the participants in the general sample who reported having siblings,

529 respondents were randomly asked to provide contact information for their siblings,

yielding a sample of siblings with the same biological parents. The twin sample was

recruited by screening households for twins and then contacting a member of a twin pair

---

[4] The MIDUS I did not ask respondents to identify as Latino/Hispanic. Respondents were asked to identify
as Latino/Hispanic in the MIDUS II, however, I do not report these percentages since it was not asked at
both waves.

with a request to participate. If one twin agreed to participate, he/she was asked to provide contact information for his/her twin.

Recruited participants participated in a telephone interview that took approximately 30-45 minutes to complete. They were also asked to complete a mailed self-administered questionnaire which took approximately 2 hours to finish. Participants received a $20 check with the mailed survey. In order to increase participation in the mailed survey, a reminder postcard and reminder telephone calls were used. In the final reminder telephone call, participants were offered an additional $100 to return the survey. The response rate for the telephone interview was approximately 70%. Of those who participated in the phone interview, approximately 87% completed the mailed survey, yielding an overall response rate of 60.8%.

MIDUS II

Approximately 10 years after the MIDUS I, an attempt was made to contact all of the respondents from the first wave of the study to participate in a longitudinal follow-up, the MIDUS II (2004-2006). From the original sample of participants who were successfully contacted and agreed to participate in the second wave, the MIDUS II again included a general sample (N=2257, 65% of the MIDUS I participants), a sibling sample of those in the general sample (N=733, 77% of the MIDUS I participants), a twin sample (N=1484, 78% of the MIDUS I participants) and an additional over-sample of city residents (N=489, 65% of the MIDUS I participants). In total, data were collected from 4,963 of the original MIDUS I participants. Age for the MIDUS II ranged from 28 to 84 years with a mean age of 55.43 years and a standard deviation of 12.4 years. The gender

46

remained roughly split in that approximately 47% were male. The majority of the sample was white (93.0%), another 3.9% were black, .5% were Native American, .7% were Asian, 1.4% were Native Hawaiian/Pacific Islander, and .6% responded other. For education, 5% did not finish high school, 26.8% had a high school diploma or GED, 22.1% had some college, 7.9% had an associate's degree, 19.3% had a bachelor's degree, 3.1% had some graduate school, and 14.7% had a graduate degree.

Data Collection. The MIDUS researchers attempted to contact all 7,108 of the initial MIDUS I participants. Interviewers successfully reached 4,963 of those participants. As in the MIDUS I, participants completed a telephone interview and were then sent a mailed questionnaire. In order to increase retention in the MIDUS II, participants were given $60 for participation as opposed to the $20 incentive used in the MIDUS I. The overall retention rate in the MIDUS II adjusted for mortality was approximately 70%.

The Current Study

The sample for this dissertation focuses on participants in either or both Wave 1 or Wave 2 who were considered employed at the time that data were collected.[5] There were several variables in the data that could be used to assess employment status. In the MIDUS I, six variables were used to create a filter variable on employment status. In the phone interview, two questions were used, "Are you currently working for pay" and "Are you currently self-employed". In the self-administered questionnaire, there were an additional four items used, "Are you working full-time now", "Are you working part-

---

[5] The approach for dealing with the longitudinal design of the sample is discussed in the analytic strategy section below.

time now", "Are you self-employed now", and "Are you currently doing any work for pay? This includes self-employment as well as being employed by someone else, and any job for pay from which you are temporarily on leave or laid off". If respondents answered yes to any question, they were coded as employed. To further define the filter variable, responses to the nineteen job characteristic items of interest in this study (described below) were considered. Respondents with missing information on all of the above discussed employment status items that had valid responses to at least one of the job characteristics items, were coded as employed. This was done because respondents were instructed to answer these questions pertaining to their current employment and so it may be assumed that respondents providing valid data on these items were employed at the time of the survey. There were seven cases meeting these criteria that were coded as employed. Respondents who had missing responses to all job characteristic items but who were coded as employed were excluded from the analytic sample. Since imputation was used for missing data (discussed below in the analytic strategy section), this was done to ensure that participants were not included in the sample who provided no valid information for the job characteristics of interest in the JDCS model. There were 1,064 cases meeting these criteria that were coded as not employed. This yielded a final sample of 4,564 respondents for the MIDUS I who were considered to be employed (64% of the MIDUS I sample).[6]

---

[6] For the percent of the full MIDUS I sample who were considered employed at the time of data collection, 68% of those ages 25-34, 74% of those ages 35-44, 76% of those ages 45-54, 58% of those ages 55-64, and 25% of those ages 65 and older were employed.

In the MIDUS II, three items were used to assess employment status. In the phone interview, two questions were used, "Are you currently working for pay" and "Are you currently self-employed". In the self-administered questionnaire, one item was used, "Are you currently doing any work for pay? This includes self-employment as well as being employed by someone else, and any job for pay from which you are temporarily on leave or laid off". As with the MIDUS I, if respondents answered yes to any question, they were coded as employed. Again, as with the MIDUS I, to further define the filter variable, responses to the nineteen job characteristic items were considered using the same process discussed above. For the cases not coded as employed based on the three initial items but that provided valid information on the job characteristic items, there were 225 cases coded as employed. For the cases coded as employed based on the three initial items but that did not provide valid information on the job characteristics items, there were 834 cases coded as not employed. This yielded a final sample of 2,714 participants for the MIDUS II who were considered to be employed (55% of the MIDUS II sample), with 2,339 of those cases employed at both waves.[7]

Measures

Outcome Variables

Mental Health. Mental health was measured as psychological functioning using six items. Participants were asked during the past 30 days how much of the time they felt a certain way on a five-point scale ranging from "all the time" to "never" (Mroczek &

---

[7] For the percent of the full MIDUS II sample who were considered employed at the time of data collection, 62% of those ages 35-44, 68% of those ages 45-54, 60% of those ages 55-64, 36% of those ages 65-74, and 15% of those ages 75 and older were employed.

Kolarz, 1998). Sample items included "During the past 30 days, how much of the time did you feel so sad nothing could cheer you up" and "During the past 30 days, how much of the time did you feel worthless." Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .60 or higher. Thus, responses were averaged to create an overall psychological functioning score with higher scores indicating a greater level of psychological functioning. The Cronbach's alpha for time 1 and time 2 was .86 and .83, respectively. In order to address concerns with normality, psychological functioning was bottom coded at 2.

Job Satisfaction. Participants were asked to rate their current work situation on an eleven-point scale ranging from 0 "worst" to 10 "best".

Predictor Variables

Job Demands. Job demands were measured using five items. Participants were asked how often they must deal with certain job demands on a five-point scale ranging from "never" to "all the time" (Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981). Sample items included "How often you have too many demands made on you" and "How often you have enough time to get everything done" (reverse coded). Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .50 or higher. Thus, responses were averaged to create an overall job demands score with higher scores indicating a greater level of job demands. The Cronbach's alpha for time 1 and time 2 was .75, and .73, respectively.

Job Control. Job control was measured as decision authority using six items. Participants were asked how often they experience different aspects of job control on a

50

five-point scale ranging from "never" to "all the time" (Karasek et al., 1981). A sample item for decision authority included, "How often do you have a say in decisions about your work." Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .50 or higher. Thus, responses were averaged to create an overall job control score with higher scores indicating a greater level of job control. The Cronbach's alpha for time 1 was.86; for time 2, it was.87. In order to address concerns with normality, job control was bottom coded at 2.

Job Support. Job support was measured in two ways. First, coworker support was measured using two items. Second, supervisor support was measured using three items. Participants were asked how often they experience different aspects of job support on a five-point scale ranging from "never" to "all the time" (Karasek et al., 1981). A sample item for coworker support included, "How often do you get help and support from your coworkers". A sample item for supervisor support included, "How often do you get help and support from your immediate supervisor." Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .55 or higher. Thus, responses for the two scales were averaged to create an overall job support score with higher scores indicating a greater level of job support. The Cronbach's alpha for time 1 was .83; for time 2, it was .82. In several cases, participants responded that questions about supervisors were not appropriate or that questions about coworkers were not appropriate. In these cases, only the appropriate items were used to create the overall score. For cases where neither coworker or supervisor questions were appropriate, the dummy variable adjustment method was used. To do this, a variable was created that

was coded as one if there was no information for job support and zero if there was information for job support. Then the continuous job support score was set to the mean for the cases where no job support information was included. Both of these variables were then included in the model resulting in a dummy variable predicting how much a person without job support differs from one with job support and a continuous variable predicting how much the level of job support impacts the outcome variables when a person has job support.[8]

Primary Control. Primary control was measured using five items assessing persistence in goal striving, which has been used previously to assess primary control (Honda & Jacobson, 2005; Neiss et al., 2005; Windsor, 2009; Wrosch et al., 2000). Participants were asked how much they experience aspects of primary control on a four-point scale ranging from "a lot" to "not at all" (Wrosch et al., 2000). Sample items include "Even when I feel I have too much to do, I find a way to get it all done" and "When I encounter problems, I don't give up until I solve them." Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .60 or higher. Thus, responses were averaged to create an overall primary control score with higher scores indicating greater levels of primary control. The Cronbach's alpha for time 1 and time 2 were .77 and .78 respectively. In order to address concerns with normality, primary control was bottom coded at 2.

---

[8] Job demands, job control, and job support were all measured using respondents' perceptions of the different job characteristics as opposed to objective measures of them. It is therefore possible that one person with objectively high job demands may perceive them to be low, while a person with objectivity low job demands may perceive them to be high. While this is a limitation of my measures, it is likely that the perception of the job characteristics as opposed to the actual level of the job characteristics is what is predictive of the outcomes.

Secondary Control. Secondary control was measured as positive reappraisals using four items. This measure has been used previously to assess secondary control (Honda & Jacobson, 2005; Neiss et al., 2005; Windsor, 2009; Wrosch et al., 2000). Participants were asked how much they experience different aspects of secondary control on a four-point scale ranging from "a lot" to "not at all" (Wrosch et al., 2000). A sample item for positive reappraisals included, "I can find something positive, even in the worst situations". Results from factor analyses revealed a strong single factor solution for these items with all of the items loading at .50 or higher. Thus, responses were averaged to create a positive reappraisals score with higher scores indicating a greater level of secondary control. The Cronbach's alpha for time 1 was .78 and for time 2, it was .79. In order to address concerns with normality, secondary control was bottom coded at 2.

Age. Age was measured continuously by subtracting the participation date from the participant's birth date. For the main analyses, age was coded in tens of years to ease the interpretation of the regression coefficients. Age in my sample ranged from 20 to 74 years for the MIDUS I, with an average age of 44 years, and from 30 to 83 years for the MIDUS II, with an average age of 52 years. In order to ease the interpretation of the interactions involving age, when plotting interactions, age 30 is used for younger workers, age 45 is used for midlife workers, and age 60 is used for older workers.

Control Variables. The analyses controlled for several variables that have been found to be important predictors of the outcome variables, including demographic variables (e.g. marital status, gender, education, race, income) and work characteristics (e.g. work experience, occupational group, work hours, and supervisor status). Marital

status was coded 1 for married or cohabiting and 0 for not married or cohabiting. Gender was coded 1 for female and 0 for male. Education was assessed with a series of dummies including high school graduate or lower, some college, and bachelor's degree or higher. Bachelor's degree or higher was used as the reference group. Race was coded 1 for white and 0 for non-white. Income was measured continuously as the square root of total household annual income from all sources adjusted to the year 2000 dollars and top coded at $200,000. Work experience was measured as the number of years in the workforce based on the question, "starting from the year you first worked for six months or more, and continuing up to the present, how many years were you employed at least six months out of the year? Count all years when you worked part-time or full-time at least half the year and were not a full-time student." Occupational group was measured using a series of nine categories: 1. executive, administrative and managerial (Reference group), 2. Professional specialty, 3. Technician and related support, 4. Sales occupation, 5. Administrative support including clerical, 6. Service occupation, 7. Farming, forestry, and fishing, 8. Precision production, crafts and repair, and 9. Operator, laborer, and military. Work hours were measured continuously and top coded at 80 hours per week. The square root of this variable was used in analyses. Supervisor status was coded 1 for has supervisor responsibility and 0 for no supervisory responsibilities. Measures of gender and race were taken from the first wave of the MIDUS. The other control variables were treated as time varying since they may vary across the ten year period between data waves.[9]

---

[9] The MIDUS II did not include a question about change in employer status over the 10 year period and so I

Descriptive characteristics for the samples from the MIDUS I and the MIDUS II

are presented in Table 1. Correlations among the outcome variables and the predictor

variables are presented in Table 2. A full list of the items in each scale can be found in

Appendix A.

---

am unable to include this as a control in this project.

Table 1: Sample Descriptives (N=7278)

	MIDUS I (N=4564) M(SD)	MIDUS II (N=2714) M(SD)	Full Sample M(SD)
Demographics			
Age	44.14(11.16)	52.30(13.43)	47.18(9.15)
Female	.48(.50)	.52(.65)	.49(.40)
White	.91(.29)	.94(.31)	.92(.22)
High School Diploma or GED	.33(.47)	.28(.58)	.31(.37)
Some College	.31(.46)	.29(.59)	.30(.36)
Bachelor's Degree or Higher	.36(.48)	.44(.64)	.39(.39)
Married or Cohabitating	.73(.44)	.77(.55)	.74(.35)
Household Income	68152.92(46071.70)	77040.50(60423.53)	71467.14(36788.86)
Outcome Variables			
Mental Health	2.50(.53)	2.52(.64)	2.51(.41)

Job Satisfaction	8.40(2.00)	8.45(2.58)	8.42(1.58)
Predictor Variables			3.63(.74)
Job Demands	3.04(.66)	2.95(.85)	3.01(.52)
Job Control	3.74(.75)	3.72(.98)	3.73(.60)
Job Support	3.64(.74)	3.61(.73)	
Primary Control	4.25(.53)	4.21(.69)	4.24(.42)
Secondary Control	4.17(.59)	4.08(.76)	4.14(.46)
Work Characteristics			
Supervisor	.46(.50)	.43(.66)	.45(.40)
Work Experience	23.34(11.25)	30.58(14.44)	26.04(9.30)
Work Hours	41.80(13.85)	38.23(19.07)	40.47(11.29)
Executive, Admin, Manager	.21(.41)	.23(.56)	.22(.33)
Professional Specialty	.19(.39)	.23(.56)	.20(.32)
Tech and Related Support	.04(.20)	.04(.26)	.04(.16)
Sales	.10(.30)	.10(.40)	.10(.24)

Admin Support	.15(.36)	.14(.48)	.15(.29)
Service	.10(.30)	.10(.42)	.10(.25)
Farming, Forestry, Fishing	.02(.14)	.02(.22)	.02(.12)
Production, Repair	.10(.31)	.08(.37)	.09(.24)
Operator, Laborer, Military	.10(.30)	.07(.35)	.09(.23)

Note: Imputed Data Used.

Table 2: Correlations (N=7278)

	1	2	3	4	5	6	7
Outcome Variables							
1. Mental Health	-						
2. Job Satisfaction	.29*	-					
Predictor Variables							
3. Job Demands	-.18*	-.21*	-				
4. Job Control	.14*	.29*	.11*	-			
5. Job Support	.14*	.35*	-.18*	.19*	-		

58

6. Primary Control	.23*	.19*	.02	.25*	.14*	-	
7. Secondary Control	.23*	.20*	-.01	.21*	.18*	.58*	-
8. Age	.13*	.13*	-.19*	.01	.03*	.06*	.01

Note: *p<.05; Imputed Data Used.

Analytic Strategy

   Missing Data

   For several of the analyses, the number of responses decreased because of

participants' failure to respond to all variables in the analysis which would result in a loss

of cases when using listwise deletion. Overall, using listwise deletion would result in a

loss of approximately 12% of the sample at each wave. Missing responses on the

variables of interest in wave 1 ranged from a high of 71 cases for race to a low of no

missing cases for several variables, with 4,020 cases having complete data. At wave 2,

the number of missing cases ranged from a high of 34 cases for the job control item

regarding having control over time for tasks at work to a low of no missing cases for

several variables, with 2,409 cases having complete data. When cases have missing data,

at wave 1 the average number of missing variables was 3 and at wave 2, the average was

2. To avoid the loss of data, the multivariate imputation by chained equations (MICE)

method (van Buuren, Boshuizen, & Knook, 1999) of multiple multivariate data

imputation was used. In this approach, imputations are drawn from the posterior

predictive density to produce *m* complete data sets (see van Buuren, et al., 1999 for more

detail). A series of conditional distributions are generated using models appropriate to the

distributional assumptions of each variable being imputed (e.g., linear, Poisson, logistic,

etc.). Data were imputed in separate models by wave and then the two waves were

combined after imputation. In total, 20 imputed datasets were created. Analyses were

performed on each of the datasets and the results were pooled into a single set of results

using Rubin's rules (Rubin, 1987). It is advised that values imputed for the dependent

variable during the process of multiple imputation be restored to missing before

proceeding with analyses (von Hippel, 2007). Therefore, cases included in these analyses

were those that have complete data for the respective dependent variables leading to a

total of 7,247 observations (4,550 for MIDUS I and 2,697 for MIDUS II) for mental

health and 7,201 observations (4,533 for MIDUS I and 2,668 for MIDUS II) for job

satisfaction. This is approximately 99% of the sample that was employed at the time of

the survey.

Weighting

The MIDUS I attempted to gather a general sample that was nationally

representative using random digit dialing. In order to match this sample to the U.S.

Population at the time of the survey, proportional weights were designed using the

Current Population Survey. For the MIDUS II, a similar weighting procedure was

designed for respondents from the general sample who participated in the second wave of

the survey. However, the current sample used in this dissertation includes only

respondents who were employed at the time of data collection, and so weights designed

based on the U.S. Population may not be appropriate. In order to address this concern, I

created proportional weights for the MIDUS I and MIDUS II based on the U.S.

Workforce at the time of the surveys. The proportional weights that I created also seemed

to be inappropriate since the MIDUS I and MIDUS II samples were not gathered to be

representative U.S. Workforce. As a result, the findings presented here use unweighted

data, but the main analyses discussed below were estimated using both weighted and

unweighted data. The findings from the weighted data were largely consistent with the

unweighted data. For information on the specific weights and any differences in the findings, see Appendix B.

Main Analyses

This study utilized longitudinal panel data with observations for individuals over two time periods. In this study, there were 4,939 individuals, 2,339 of whom had two observations, resulting in a total of 7,278 observations. Ordinary least squares regression is not an appropriate analytic strategy for this type of sample because of the non-independence of observations resulting from the use of data at multiple waves. Instead, a more appropriate model is one that allows for heterogeneity across time. One possible technique to accommodate this are random effects models, which "allow for heterogeneity across panel units but confines that heterogeneity to the intercept terms of the relationship…allowing only the constant to differ over i [individuals]" (Baum, 2006, p. 219). The basic equation for this model is as follows:

$$Y_{it} = \alpha_0 + BX_{it} + u_i + e_{it}$$

where Y_{it} is the value for the outcome variable for individual i at wave t, α_0 is the intercept for individual i at wave t, B is the coefficient for the relationship between variable X_{it} and the outcome variable, X_{it} is the predictor variable for individual i at wave t, u_i is the residual for individual i that is constant over time, and e_{it} is the residual for individual i at wave t. In random effects models, u_i is assumed to be normally distributed and is uncorrelated with BX_{it}. In these models, the variation in the outcome is separated into two levels, variability at the individual level (level-2) and variability across time (level-1). This procedure helps to increase the total sample size for analyses and

since the data were collected at a 10 year interval, findings based on age have a reduced

risk of being due to cohort effects.[10]

Separate models were estimated for each of the outcome variables. Random

effects linear regression was used for both mental health and job satisfaction. The main

models were built to follow the order of the research questions and hypotheses listed in

Chapter 2, which tests the relationship between job demands and the outcomes first,

followed by the relationships in the JDCS, and then followed by the possible buffering of

relationships in the JDCS by primary and secondary control. Within each research

question, there were several steps. In the first step, the main effects of the relevant

predictors (i.e., job demands, job control, primary control, age, etc.) were assessed, in the

second steps, the relevant interactions (i.e., between job demands and job control,

between job demands, job control, and primary control, etc.) were assessed independent

of age, and in the third step, the relationships were assessed for variation by age. In order

to assess possible non-linearity in the age relationships, both age and age squared terms

were included in the models, as well as the associated interactions for both age and age

squared. All variables in the model were mean centered. For the first research question,

---

[10] This use of random effects models do not fully take advantage of the longitudinal nature of the data in the way that multi-level modeling using mixed effects linear regression would, which allows for variation at multiple levels to be explained. I have two main reasons for the approach I have chosen at this time. First, there is no research either cross-sectional or longitudinal which examines the role of primary and secondary control and age in the JDCS model and for reasons of simplicity, I will first be examining my research questions without focusing on change within individuals over time in these complex relationships. Instead, my focus is on differences across ages. However, it is still important to use both waves of data to help disentangle age differences from cohort differences. As the data were collected at 10 year intervals, the group of older workers contains adults from two cohorts. Second, there are only two waves of data which is not ideal for measuring change within individuals overtime, especially because the expected patterns in this study are not linear. More than two waves of data are required to assess non-linear change within individuals. A third wave of data collection for the MIDUS is being planned and I hope to assess change overtime when three waves of data are available.

there were no relevant interactions except for those with age and so there were only two steps for this question, one for the main effects, and one to assess how the relationship between job demands and the outcomes varies by age. Accordingly, the first model examined the relationship between job demands and the outcomes.

$$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + u_i + e_{it}$$

The second model examined how the above model varies by age.

$$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ demands * age)B_4 +$$
$$(job\ demands * age^2)B_5 + u_i + e_{it}$$

In the third model, the main effects were examined for job control and job support.

$$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ control)B_4 +$$
$$(job\ support)B_5 + u_i + e_{it}$$

In the fourth model, the two-way interactions between job control and job demands, and job support and job demands proposed in the JDCS were examined.

$$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ control)B_4 +$$
$$(job\ support)B_5 + (job\ demands * job\ control)B_6 + (job\ demands *$$
$$job\ support)B_7 + u_i + e_{it}$$

The fifth model examined how the two-way interactions proposed in the JDCS vary by age.

$$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ demands * age)B_4 +$$
$$(job\ demands * age^2)B_5 + (job\ control)B_6 + (job\ support)B_7 + (job\ demands *$$
$$job\ control)B_8 + (job\ demands * job\ support)B_9 + (job\ control * age)B_{10} +$$

$(job\ support * age)B_{11} + (job\ control * age^2)B_{12} + (job\ support * age^2)B_{13} +$

$(job\ demands * job\ control * age)B_{14} + (job\ demands * job\ support * age)B_{15} +$

$(job\ demands * job\ control * age^2)B_{16} + (job\ demands * job\ support *$

$age^2)B_{17} + u_i + e_{it}$

In the sixth model, the main effects were examined for primary control and secondary control.

$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ control)B_4 +$

$(job\ support)B_5 + (primary\ control)B_6 + (secondary\ control)B_7 + u_i + e_{it}$

In the seventh model, the three-way interactions between job demands, job control, and primary control, and between job demands, job support, and secondary control, along with the additional two-way interactions between job demands and primary control, job demands and secondary control, job control and primary control, and job support and secondary control were examined.

$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ control)B_4 +$

$(job\ support)B_5 + (job\ demands * job\ control)B_6 + (job\ demands *$

$job\ support)B_7 + (primary\ control)B_8 + (secondary\ control)B_9 +$

$(job\ demands * primary\ control)B_{10} + (job\ control * primary\ control)B_{11} +$

$(job\ demands * job\ control * primary\ control)B_{12} + (job\ demands *$

$secondary\ control)B_{13} + (job\ support * secondary\ control)B_{14} +$

$(job\ demands * job\ support * secondary\ control)B_{15} + u_i + e_{it}$

The eighth model examined how the above interactions, between job demands, job control, and primary control and between job demands, job support, and secondary control vary by age.

$Y = \alpha + (job\ demands)B_1 + (age)B_2 + (age^2)B_3 + (job\ demands * age)B_4 + (job\ demands * age^2)B_5 + (job\ control)B_6 + (job\ support)B_7 + (job\ demands * job\ control)B_8 + (job\ demands * job\ support)B_9 + (job\ control * age)B_{10} + (job\ support * age)B_{11} + (job\ control * age^2)B_{12} + (job\ support * age^2)B_{13} + (job\ demands * job\ control * age)B_{14} + (job\ demands * job\ support * age)B_{15} + (job\ demands * job\ control * age^2)B_{16} + (job\ demands * job\ support * age^2)B_{17} + (primary\ control)B_{18} + (secondary\ control)B_{19} + (job\ demands * primary\ control)B_{20} + (job\ control * primary\ control)B_{21} + (job\ demands * job\ control * primary\ control)B_{22} + (job\ demands * secondary\ control)B_{23} + (job\ support * secondary\ control)B_{24} + (job\ demands * job\ support * secondary\ control)B_{25} + (primary\ control * age)B_{26} + (secondary\ control * age)B_{27} + (job\ demands * primary\ control * age)B_{28} + (job\ control * primary\ control * age)B_{29} + (job\ demands * job\ control * primary\ control * age)B_{30} + (job\ demands * secondary\ control * age)B_{31} + (job\ support * secondary\ control * age)B_{32} + (job\ demands * job\ support * secondary\ control * age)B_{33} + (primary\ control * age^2)B_{34} + (secondary\ control * age^2)B_{35} + (job\ demands * primary\ control * age^2)B_{36} + (job\ control * primary\ control * age^2)B_{37} + (job\ demands * job\ control * primary\ control * age^2)B_{38} + (job\ demands * secondary\ control * age^2)B_{39} +$

$$(job\ support * secondary\ control * age^2)B_{40} + (job\ demands * job\ support *$$

$$secondary\ control * age^2)B_{41} + u_i + e_{it}$$

CHAPTER 4: RESULTS

Descriptive Analyses

Before proceeding with the main analyses, the bivariate relationships between the

main predictor and outcome variables with age were examined to assess how these

variables vary with age.

Figure 3: Job Characteristics by Age
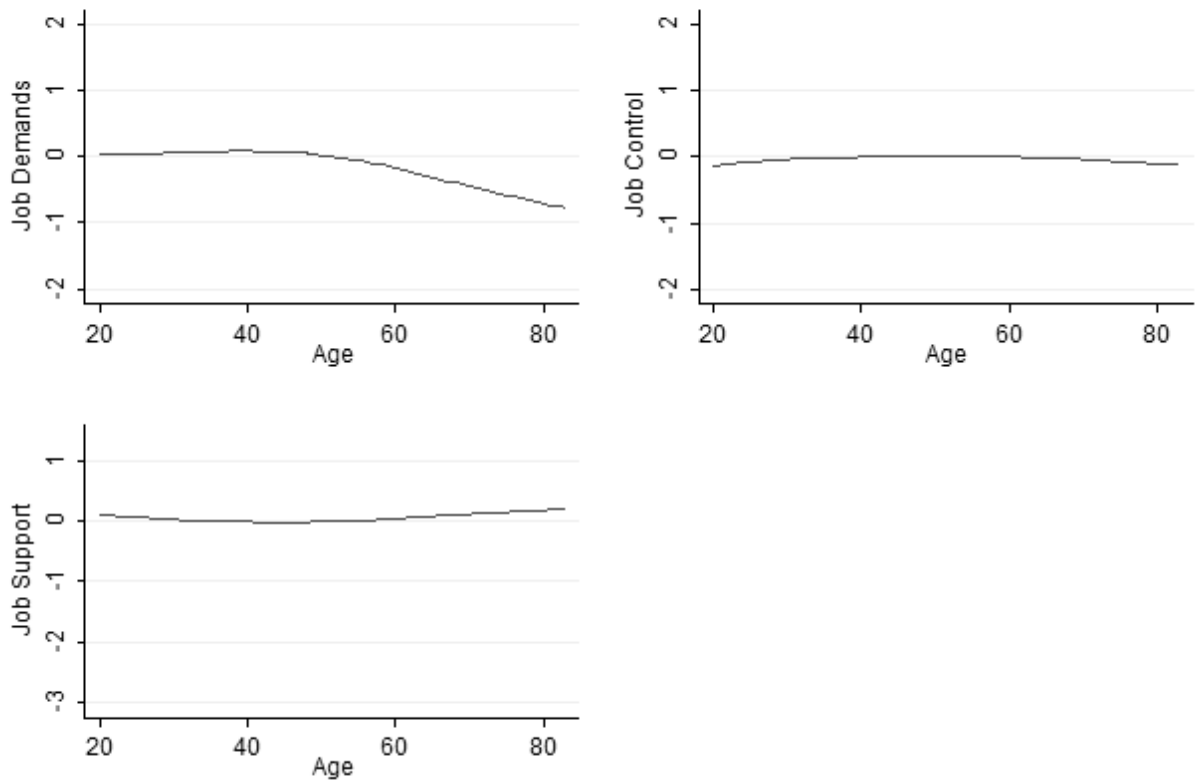
As can be seen in Figure 3, job demands remained roughly stable until around age 50 at

which point they began decreasing suggesting that the lowest levels of job demands are

for older workers. Job control and job support both appeared to remain roughly stable

with age, although there was a small, but significant correlation between job support and age [$r(7278) = .03$, p<.05].

Figure 4: Personal Control by Age
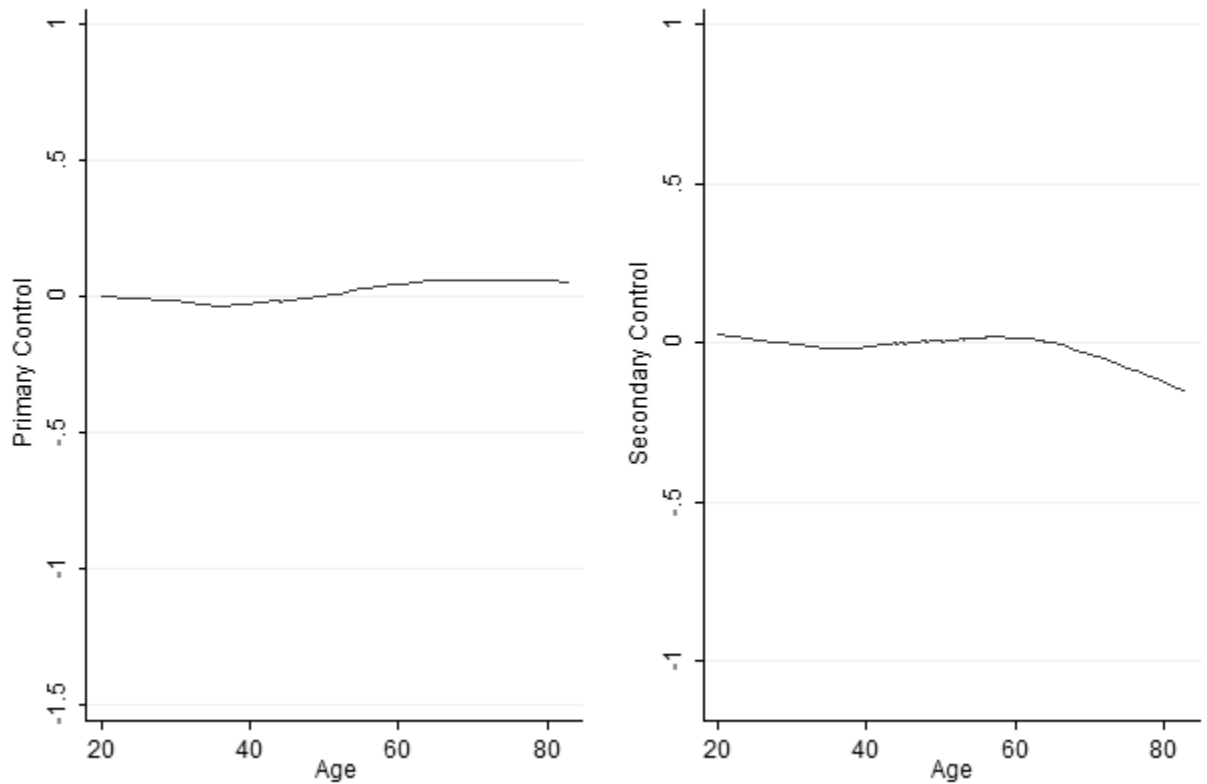
As can be seen in Figure 4, contrary to the propositions of the Life-Span Theory of Control, primary control did not increase until around midlife and then begin decreasing; instead it appeared to decrease until around age 40 and then increase until around age 60. Similarly, secondary control appeared to decrease in later life as opposed to increase as the Life-Span Theory of Control hypothesizes.

Figure 5: Outcome Variables by Age
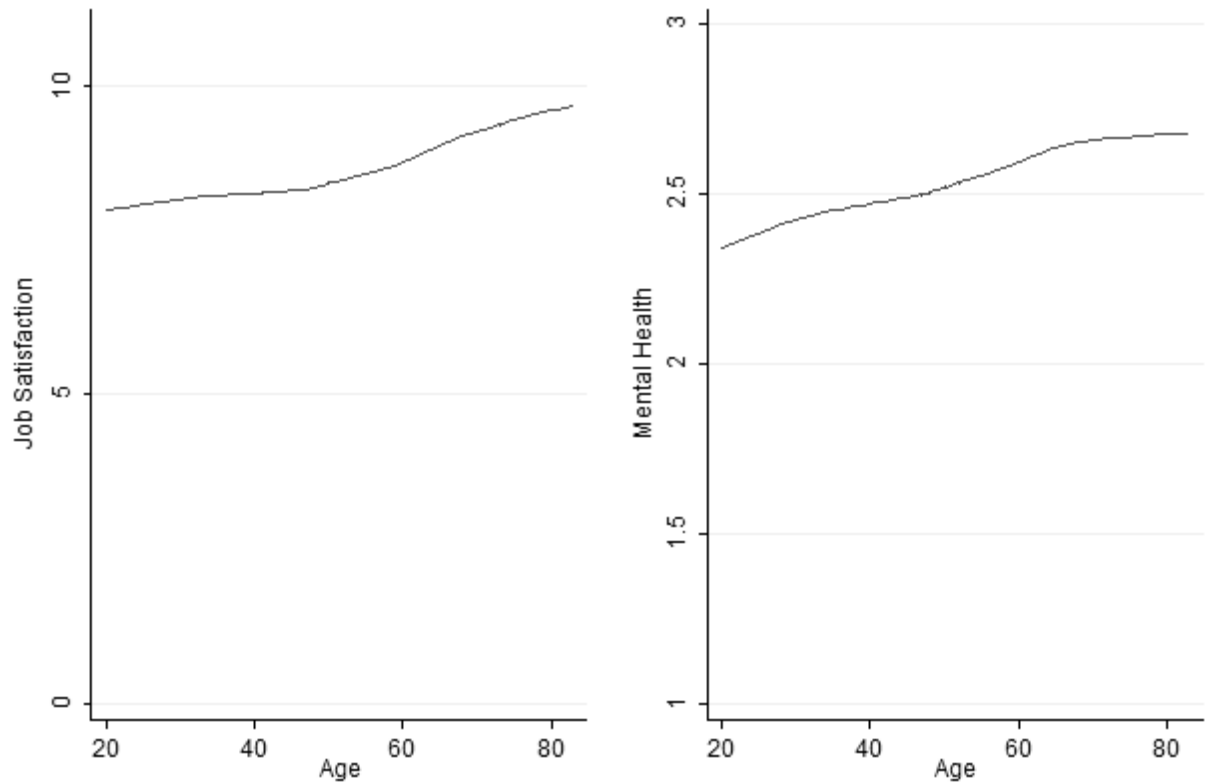
In Figure 5, both job satisfaction and mental health appeared to generally increase with age.

Main Analyses

Research Question 1: Examining the Relationship between Job Demands and the Outcomes.

Results for the first set of models assessing the relationship between job demands and the outcomes (*research question 1A*) and how those relationships vary with age (*research question 1B*) are presented in Table 3.

Table 3: Random Effects Linear Regression for Job Demands Predicting Job Satisfaction

and Mental Health

	Job Satisfaction (N=7201)		Mental Health (N=7247)	
	Model 1	Model 2	Model 1	Model 2
	Coef(SE)	*Coef(SE)*	*Coef(SE)*	*Coef(SE)*
Intercept	6.61(.22)***	6.59(.22)***	2.06(.06)***	2.07(.06)****
Predictor Variables				
Age[a]	.07(.03)*	.07(.03)*	.01(.01)	.01(.01)
Age^2	.08(.01)***	.09(.02)***	.01(.00)*	.01(.00)*
Job Demands	-.76(.04)***	-.84(.05)***	-.15(.01)***	-.15(.01)***
Interaction Variables				
Age by Job Demands		-.08(.03)*		.01(.01)
Age^2 by Job Demands		.06(.02)**		.00(.01)
Control Variables				
Professional Specialty[b]	.07(.08)	.06(.08)	.00(.02)	.00(.02)
Tech and Related Support[b]	-.10(.13)	-.10(.13)	.00(.03)	.00(.03)
Sales[b]	-.21(.10)*	-.21(.10)*	-.02(.02)	-.02(.02)
Admin Support[b]	-.13(.09)	-.13(.09)	.03(.02)	.03(.02)
Service[b]	-.22(.10)*	-.22(.10)*	-.08(.03)**	-.08(.03)**
Farming, Forestry, Fishing[b]	-.16(.21)	-.16(.20)	-.04(.05)	-.04(.05)
Production, Repair[b]	-.19(.10)	-.20(.10)	.01(.03)	.01(.03)
Operator, Laborer, Military[b]	-.43(.11)***	-.43(.11)***	-.04(.03)	-.04(.03)

Some College[c]	-.06(.06)	-.06(.06)	.03(.02)*	.03(.02)*
Bachelor's Degree or Higher[c]	-.01(.07)	-.01(.07)	.07(.02)***	.07(.02)***
Married or Cohabitating[d]	.16(.06)**	.16(.06)**	.09(.02)***	.09(.02)***
Female[e]	.33(.06)***	.33(.06)***	-.01(.02)	-.01(.02)
White[f]	.11(.09)	.11(.09)	.01(.02)	.01(.02)
Supervisor[g]	.37(.05)***	.37(.05)***	.04(.01)***	.04(.01)***
Household Income[h]	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***
Work Experience	.01(.00)*	.01(.00)*	.00(.00)***	.00(.00)***
Work Hours[i]	.07(.02)**	.07(.02)**	.02(.01)***	.02(.01)***

Note: *$p<.05$, **$p<.01$, ***$p<.001$; [a]Age and Age Squared coded in 10s of years; [b]Reference=Executive, Admin, Manager; [c]Reference=High School or GED; [d]Referenc=Not Married or Cohabitating; [e]Reference=Male; [f]Reference=Non-White; [g]Reference=Not a Supervisor; [h]Square Root of Income; [i]Square Root of Hours.

In model 1, as expected in *hypothesis 1A*, there was a significant negative relationship between job demands and both job satisfaction (B = -0.76, SE = 0.04, $p<0.001$) and mental health (B = -0.15, SE = 0.01, $p<0.001$), suggesting that as job demands increase, both job satisfaction and mental health decrease. Additionally, the relationship between age and both outcomes was found to be nonlinear. Specifically, a J-shaped relationship was found for both relationships. As can be seen in Figure 6a, the relationship between age and job satisfaction (Age: B = 0.07, SE = 0.03, $p<0.05$; Age^2: B = 0.08, SE = 0.01, $p<0.001$) was decreasing until around age 45, at which point it began increasing. Similarly, in Figure 6b, the relationship between age and mental health (Age:

72

$B = 0.01$, $SE = 0.01$, $p>0.05$; Age^2: $B = 0.01$, $SE = 0.00$, $p<0.05$) was decreasing until around age 40, at which point it began decreasing.

Figure 6a: Nonlinear Relationship between Age and Job Satisfaction
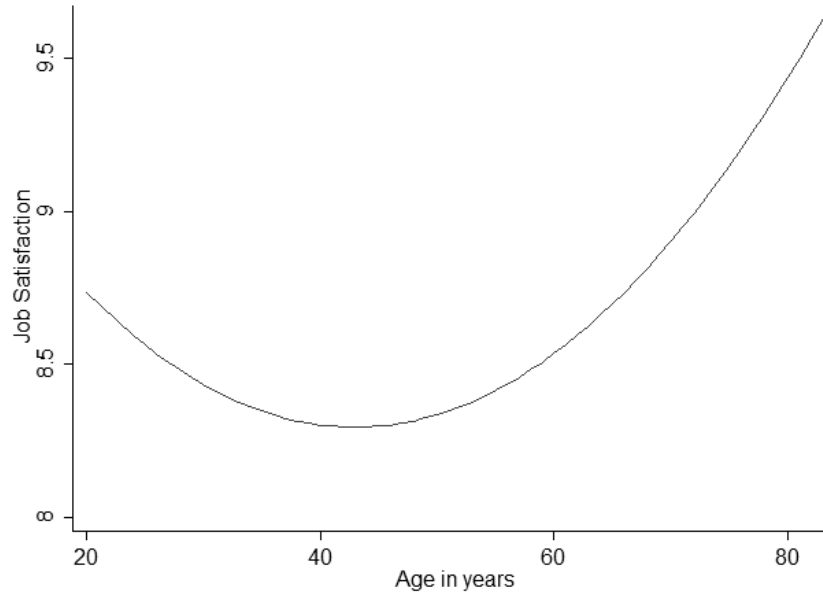
Figure 6b: Nonlinear Relationship between Age and Mental Health
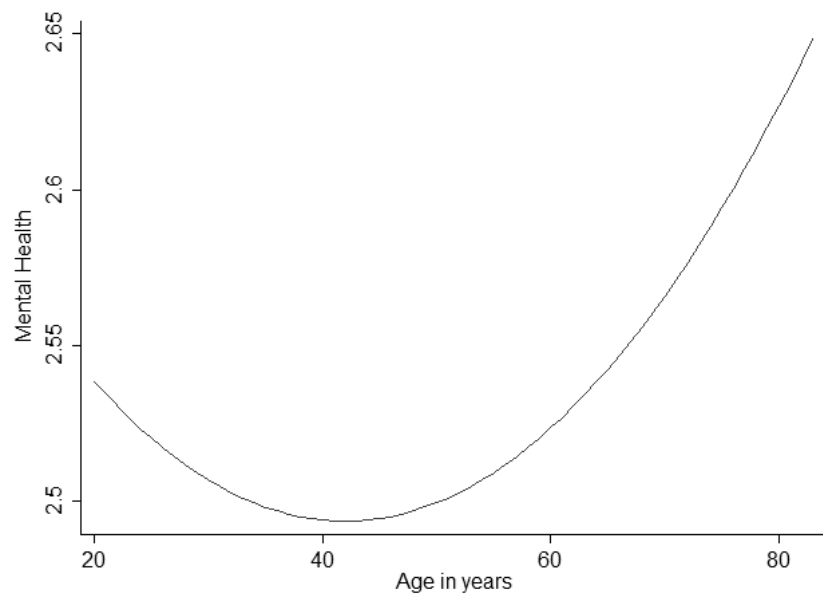
In model 2, the relationship between job demands and the outcomes was found to vary by age for job satisfaction (Job Demands by Age: $B = -0.08$, $SE = 0.03$, $p<0.05$; Job Demands by Age^2: $B = 0.06$, $SE = 0.02$, $p<0.01$) but not for mental health. As can be seen in Figure 7, in contrast to *hypothesis 1B,* that the relationship between job demands and job satisfaction would become less negative as age increases, the negative relationship between job demands and job satisfaction was weakest for the 30 year old workers and became stronger for the 45 and 60 year old workers. Importantly, the relationship appeared to stabilize around midlife suggesting that the relationship is not more negative for older workers than midlife workers; instead it is just the least negative for younger workers.

Figure 7: Variation in the Job Demands-Job Satisfaction Relationship by Age

Research Question 2: Examining the JDCS Relationships.

Results for the second research question, assessing the relationships proposed in the JDCS (*research question 2A)* and how those relationships vary with age (*research question 2B)* are presented in Table 4.

Table 4: Random Effects Linear Regression for the JDCS Relationships Predicting Job Satisfaction and Mental Health

	Job Satisfaction (N=7201)			Mental Health (N=7247)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coef(SE)	Coef(SE)	Coef(SE)	Coef(SE)	Coef(SE)	Coef(SE)
Intercept	7.05(.21)***	7.10(.21)***	7.08(.21)***	2.12(.06)***	2.13(.06)***	2.13(.06)***
Predictor Variables						
Age[a]	.08(.03)**	.08(.03)**	.08(.03)*	.01(.01)	.01(.01)	.01(.01)
Age^2	.07(.01)***	.07(.01)***	.07(.01)***	.01(.00)*	.01(.00)*	.01(.00)*
Job Demands	-.60(.04)***	-.59(.04)***	-.63(.05)***	-.14(.01)***	-.14(.01)***	-.13(.01)***
Job Control	.61(.03)***	.64(.03)***	.65(.04)***	.06(.01)***	.06(.01)***	.06(.01)***
Job Support	.73(.03)***	.71(.03)***	.74(.04)***	.06(.01)***	.06(.01)***	.07(.01)***
No Supervisor[b]	-.07(.08)	-.09(.08)	-.08(.08)	-.06(.02)**	-.06(.02)**	-.06(.02)**
Interaction Variables						
Job Demands by Job Control		.22(.04)***	.27(.05)***		.02(.01)	.02(.01)
Job Demands by Job Support		.11(.04)**	.10(.06)		.03(.01)**	.06(.01)***
Job Control by Age			.00(.03)			-.01(.01)

Job Support by Age			.02(.03)			.01(.01)
Job Control by Age^2			-.01(.02)			.00(.01)
Job Support by Age^2			-.03(.02)			-.01(.01)
Job Demands by Age			-.04(.03)			.01(.01)
Job Demands by Age^2			.02(.02)			-.01(.01)
Job Demands by Job Control by Age			.04(.03)			.00(.01)
Job Demands by Job Support by Age			-.04(.04)			.01(.01)
Job Demands by Job Control by Age^2			-.03(.02)			-.01(.01)
Job Demands by Job Support by Age^2			.01(.03)			-.02(.01)*
Control Variables						
Professional Specialty[c]	.13(.07)	.14(.07)*	.14(.07)*	.00(.02)	.00(.02)	.00(.02)
Tech and Related Support[c]	.09(.12)	.13(.12)	.13(.12)	.01(.03)	.01(.03)	.01(.03)
Sales[c]	-.12(.09)	-.11(.09)	-.11(.09)	-.01(.02)	-.01(.02)	-.01(.02)
Admin Support[c]	.05(.08)	.06(.08)	.06(.08)	.04(.02)	.04(.02)	.04(.02)
Service[c]	-.07(.09)	-.06(.09)	-.06(.09)	-.06(.03)*	-.06(.03)*	-.06(.03)*
Farming, Forestry, Fishing[c]	-.13(.20)	-.12(.19)	-.12(.19)	-.02(.05)	-.02(.05)	-.02(.05)
Production, Repair[c]	-.13(.10)	-.12(.10)	-.12(.10)	.01(.02)	.02(.02)	.02(.02)

Operator, Laborer, Military[c]	-.01(.10)	-.03(.10)	-.04(.10)	-.01(.03)	-.02(.03)	-.01(.03)
Some College[d]	-.05(.06)	-.05(.06)	-.04(.60)	.03(.02)*	.03(.02)*	.04(.02)*
Bachelor's Degree or Higher[d]	-.02(.07)	-.02(.07)	-.02(.07)	.07(.02)***	.07(.02)***	.07(.02)***
Married or Cohabitating[e]	.08(.06)	.08(.06)	.08(.06)	.09(.02)***	.09(.02)***	.08(.02)***
Female[f]	.25(.05)***	.25(.05)***	.25(.05)***	-.02(.02)	-.02(.02)	-.02(.02)
White[g]	.11(.08)	.11(.08)	.10(.08)	.01(.02)	.01(.02)	.01(.02)
Supervisor[h]	.12(.05)*	.11(.05)*	.11(.05)*	.02(.01)	.02(.01)	.02(.01)
Household Income[i]	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***
Work Experience	.01(.00)*	.01(.00)*	.01(.00)*	.00(.00)***	.00(.00)***	.00(.00)***
Work Hours[j]	.04(.02)	.03(.02)	.03(.02)	.02(.01)**	.02(.01)**	.02(.01)**

Note: *$p<.05$, **$p<.01$, ***$p<.001$; [a]Age and Age Squared coded in 10s of years; [b]Reference=Has a Supervisor; [c]Reference=Executive, Admin, Manager; [d]Reference=High School or GED; [e]Referenc=Not Married or Cohabitating; [f]Reference=Male; [g]Reference=Non-White; [h]Reference=Not a Supervisor; [i]Square Root of Income; [j]Square Root of Hours.

In the first model, the main effects of job demands, job control, and job support were examined. In line with the strain hypothesis[11] there was a negative relationship between job demands and both job satisfaction ($B = -0.60$, $SE = 0.04$, $p<0.001$) and mental health ($B = -0.14$, $SE = 0.01$, $p<0.001$), and positive relationships between job control and job support with both job satisfaction (Job Control: $B = 0.61$, $SE = 0.03$, $p<0.001$; Job Support: $B = 0.738$, $SE = 0.03$, $p<0.001$) and mental health (Job Control: $B = 0.06$, $SE = 0.01$, $p<0.001$; Job Support: $B = 0.06$, $SE = 0.01$, $p<0.001$), suggesting that while higher levels of job demands are associated with lower job satisfaction and mental health, in contrast, higher levels of job control and job support are associated with greater job satisfaction and mental health.

In the second model, the buffer hypothesis of the JDCS was examined. As expected in *hypotheses 2A-1* and *2A-2*, for job satisfaction, both job control ($B = 0.22$, $SE = 0.04$, $p<0.001$) and job support ($B = 0.11$, $SE = 0.04$, $p<0.01$) were found to buffer the impact of job demands. As can be seen in Figures 8 and 9, the negative relationship between job demands and job satisfaction weakened as job control and job support increased, respectively, such that job satisfaction was greater for workers with high levels of job demands coupled with high levels of job control/job support compared to workers with high levels of job demands coupled with low levels of job control/job support.

Figure 8: Job Control as a Moderator of the Job Demands-Job Satisfaction Relationship

---

[11] Although the main hypothesis deriving from the JDCS being tested in this dissertation is the buffer hypothesis, the design of the analyses allows for the testing of the strain hypothesis as well.
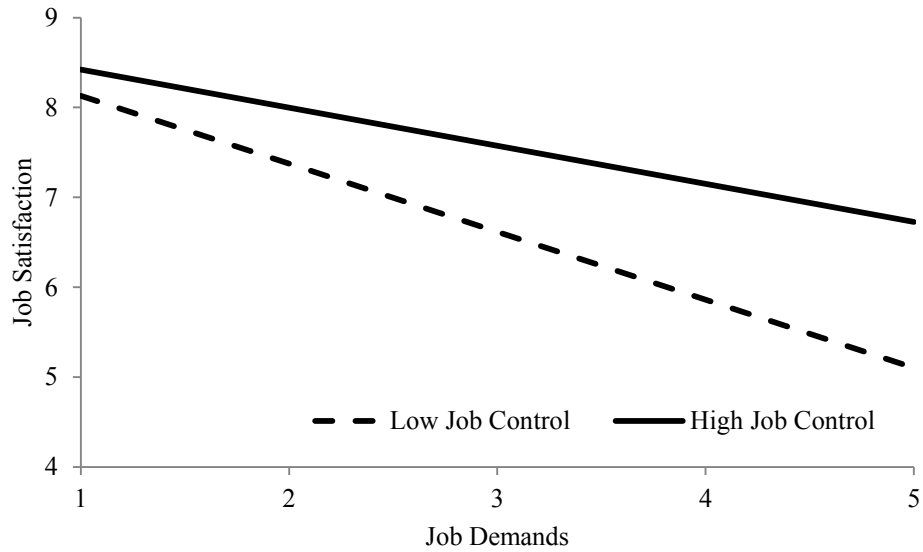
Figure 9: Job Support as a Moderator of the Job Demands-Job Satisfaction Relationship
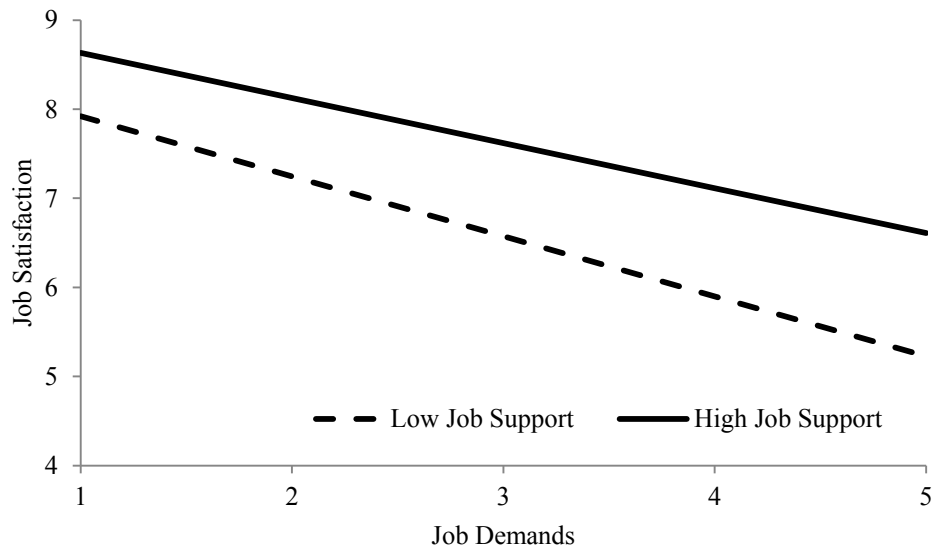
However for mental health, only *hypothesis 2A-2* was supported, as just job support ($B =$ 0.03, $SE = 0.01$, $p<0.01$) buffered the impact of job demands. As can be seen in Figure 10, the relationship between job demands and mental health was less negative as job support increased.

Figure 10: Job Support as a Moderator of the Job Demands-Mental Health Relationship

In contrast to *hypothesis 2B-1*, that job control would buffer the job demands-outcome relationship more at younger ages and *hypothesis 2B-2*, that job support would be a greater buffer at older ages, in the third model, none of the JDCS relationships varied by age for job satisfaction. However, for mental health, *hypothesis 2B-2* was partially supported with job support buffering the relationship to a greater extent at older ages (Job Demands by Job Support by Age: $B = -0.08$, $SE = 0.03$, $p<0.05$; Job Demands by Job Support by Age^2: $B = 0.06$, $SE = 0.02$, $p<0.01$). As can be seen in Figure 11, for the younger workers, job support did not buffer the job demands-mental health relationship, whereas for the midlife and older workers, the negative relationship decreased as job support increased. This suggests that job support is a greater buffer of the job demands-mental health relationship at midlife and older ages.

Figure 11: Variation by Age in Job Support as a Moderator of the Job Demands-Mental Health Relationship

81

Age 30

Age 45

Age 60

Low Job Support
High Job Support
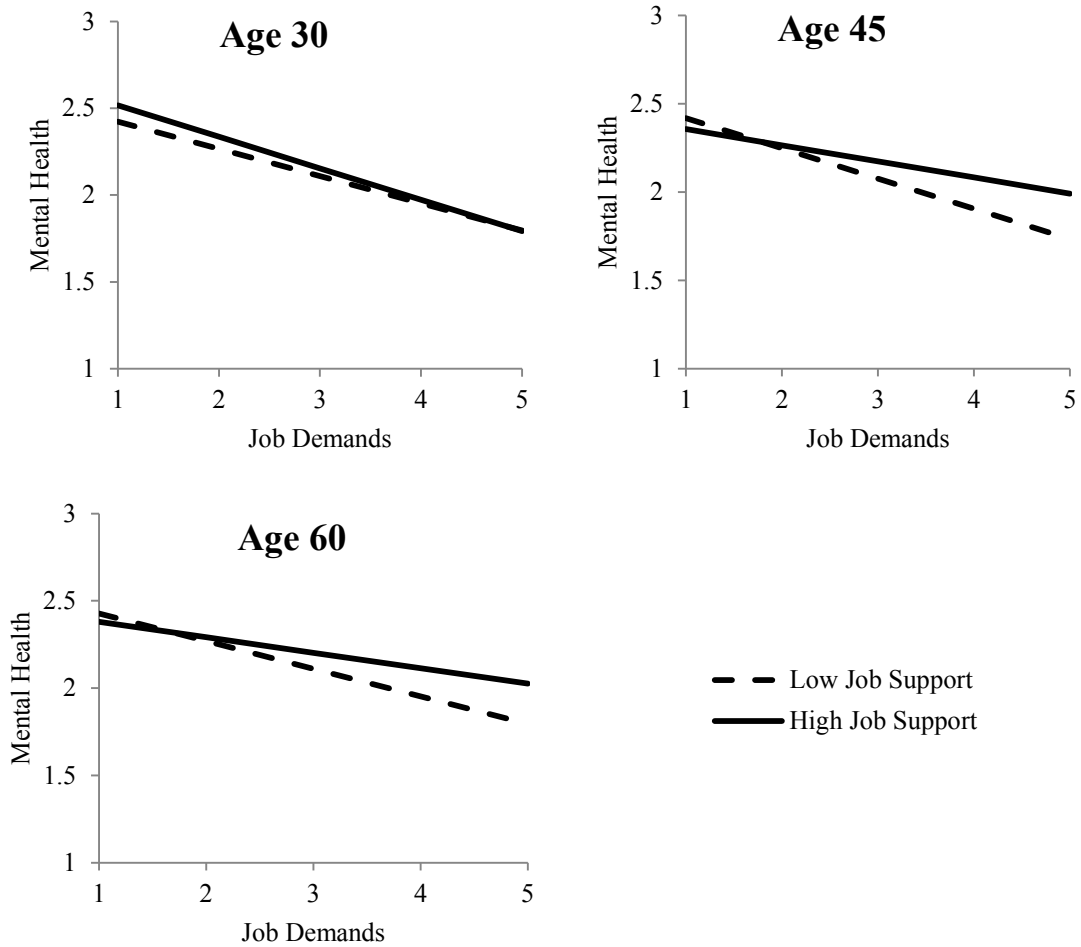
Research Question 3: Examining whether the JDCS Relationships vary by Primary and Secondary Control.

Results for the final set of models, assessing the third research question which examines the moderating role of primary and secondary control on the relationships proposed in the JDCS (*research question 3A)* and how those relationships vary with age (*research question 3B)* are presented in Table 5.

Table 5: Random Effects Linear Regression for the JDCS Relationships and Primary and Secondary Control Predicting Job Satisfaction and Mental Health

	Job Satisfaction (N=7201)			Mental Health (N=7247)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coef(SE)	*Coef(SE)*	*Coef(SE)*	*Coef(SE)*	*Coef(SE)*	*Coef(SE)*
Intercept	7.06(.21)***	7.12(.21)***	7.08(.21)***	2.12(.05)***	2.13(.05)***	2.13(.05)***
Predictor Variables						
Age[a]	.08(.03)**	.08(.03)*	.07(.03)*	.01(.01)	.01(.01)	.01(.01)
Age^2	.07(.01)***	.07(.01)***	.007(.02)***	.01(.00)*	.01(.00)*	.01(.00)**
Job Demands	-.60(.04)***	-.59(.04)***	-.60(.05)***	-.14(.01)***	-.14(.01)***	-.13(.01)***
Job Control	.55(.03)***	.57(.03)***	.58(.04)***	.03(.01)***	.03(.01)**	.02(.01)*
Job Support	.70(.03)***	.68(.03)***	.70(.04)***	.04(.01)***	.04(.01)***	.05(.01)***
No Supervisor[b]	-.06(.08)	-.09(.08)	-.09(.08)	-.05(.02)**	-.06(.02)**	-.05(.02)*
Primary Control	.20(.05)***	.18(.05)***	.20(.06)**	.11(.01)***	.10(.01)***	.10(.02)***
Secondary Control	.26(.04)***	.26(.05)***	.28(.06)***	.13(.01)***	.12(.01)***	.13(.02)***
Interaction Variables						
Job Demands by Job Control		.20(.04)***	.23(.05)***		.00(.01)	.01(.01)
Job Demands by Job Support		.10(.04)*	.10(.06)		.04(.01)***	.06(.01)***
Job Demands by Primary Control		-.12(.08)	-.07(.10)		.02(.02)	.00(.03)

83

Job Demands by Secondary Control	.18(.07)**	.21(.90)*	.03(.02)	.06(.02)*
Job Control by Primary Control	.05(.07)	.19(.09)*	.00(.02)	.04(.02)
Job Support by Primary Control	-.05(.07)	.02(.09)	-.01(.02)	-.01(.02)
Job Control by Secondary Control	.07(.06)	.02(.08)	-.04(.02)**	-.06(.02)***
Job Support by Secondary Control	-.11(.06)	-.19(.08)*	.00(.02)	.00(.02)
Job Demands by Job Control by Primary Control	-.02(.09)	-.23(.12)*	.03(.02)	-.01(.03)
Job Demands by Job Support by Primary Control	-.17(.09)	-.09(.13)	-.06(.02)**	-.04(.03)
Job Demands by Job Control by Secondary Control	.08(.08)	.13(.11)	-.01(.02)	.02(.30)
Job Demands by Job Support by Secondary Control	.06(.08)	-.13(.11)	-.01(.02)	-.02(.03)
Job Demands by Age		-.04(.03)		.01(.01)
Job Demands by Age^2		.01(.02)		-.01(.01)
Job Control by Age		.01(.03)		-.01(.01)
Job Support by Age		.02(.03)		.01(.01)
Job Control by Age^2		.00(.02)		.00(.01)
Job Support by Age^2		-.01(.02)		-.01(.01)*
Primary Control by Age		.02(.05)		-.01(.01)
Secondary Control by Age		.01(.04)		.01(.01)
Primary Control by Age^2		-.02(.03)		.00(.01)

84

Secondary Control by Age^2	-.02(.03)	-.01(.01)
Job Demands by Job Control by Age	.04(.04)	.00(.01)
Job Demands by Job Control by Age^2	-.02(.03)	-.01(.01)
Job Demands by Job Support by Age	-.03(.04)	.02(.01)
Job Demands by Job Support by Age^2	.01(.03)	-.02(.01)*
Job Demands by Primary Control by Age	-.01(.06)	.00(.02)
Job Demands by Secondary Control by Age	.01(.06)	-.01(.02)
Job Demands by Primary Control by Age^2	-.02(.05)	.01(.01)
Job Demands by Secondary Control by Age^2	-.03(.04)	-.02(.01)*
Job Control by Primary Control by Age	-.05(.06)	.01(.02)
Job Support by Primary Control by Age	-.02(.07)	.00(.02)
Job Control by Secondary Control by Age	-.01(.06)	-.01(.01)
Job Support by Secondary Control by Age	.03(.06)	-.02(.02)
Job Control by Primary Control by Age^2	-.10(.05)*	-.03(.01)**
Job Support by Primary Control by Age^2	-.06(.05)	-.01(.01)
Job Control by Secondary Control by Age^2	.04(.04)	.01(.01)
Job Support by Secondary Control by Age^2	.07(.05)	.01(.01)
Job Demands by Job Control by Primary Control by Age	-.06(.08)	-.05(.02)*

85

Job Demands by Job Support by Primary Control by Age			.20(.09)*			.00(.02)
Job Demands by Job Control by Secondary Control by Age			.02(.07)			.01(.02)
Job Demands by Job Support by Secondary Control by Age			-.17(.08)*			.06(.02)**
Job Demands by Job Control by Primary Control by Age^2			.08(.05)			.02(.01)
Job Demands by Job Support by Primary Control by Age^2			-.05(.07)			-.01(.02)
Job Demands by Job Control by Secondary Control by Age^2			-.02(.05)			-.02(.01)
Job Demands by Job Support by Secondary Control by Age^2			.14(.06)*			.00(.02)

Control Variables

Professional Specialty[c]	.15(.07)*	.16(.07)*	.16(.07)*	.01(.02)	.00(.02)	.00(.02)
Tech and Related Support[c]	.10(.12)	.13(.12)	.14(.12)	.01(.03)	.02(.03)	.01(.03)
Sales[c]	-.11(.09)	-.10(.09)	-.11(.09)	.00(.02)	-.01(.02)	-.01(.02)
Admin Support[c]	.08(.08)	.09(.08)	.09(.08)	.05(.02)*	.05(.02)*	.05(.02)*
Service[c]	-.07(.09)	-.06(.09)	-.06(.09)	-.06(.02)**	-.07(.02)**	-.06(.02)**
Farming, Forestry, Fishing[c]	-.10(.20)	-.09(.19)	-.07(.19)	-.01(.05)	-.01(.05)	-.01(.05)
Production, Repair[c]	-.13(.10)	-.11(.09)	-.11(.09)	.02(.02)	.02(.02)	.02(.02)
Operator, Laborer, Military[c]	-.02(.10)	-.04(.10)	-.04(.10)	-.02(.03)	-.02(.03)	-.02(.03)
Some College[d]	-.06(.06)	-.05(.06)	-.04(.06)	.03(.02)*	.03(.02)*	.03(.02)*
Bachelor's Degree or Higher[d]	-.03(.07)	-.03(.07)	-.03(.07)	.06(.02)***	.06(.02)***	.06(.02)***

Married or Cohabitating[e]	.08(.05)	.09(.05)	.09(.05)	.09(.01)***	.09(.01)***	.09(.01)***
Female[f]	.21(.05)***	.21(.05)***	.21(.05)***	-.04(.01)*	-.04(.01)*	-.04(.01)*
White[g]	.17(.08)*	.17(.08)*	.16(.08)	.05(.02)	.05(.02)	.05(.02)*
Supervisor[h]	.12(.05)*	.10(.05)*	.10(.05)*	.02(.01)	.01(.01)	.01(.01)
Household Income[i]	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***	.00(.00)***
Work Experience	.01(.00)	.01(.00)*	.01(.00)*	.00(.00)***	.00(.00)***	.00(.00)***
Work Hours[j]	.03(.02)	.02(.02)	.03(.02)	.01(.01)*	.01(.01)*	.01(.01)*

Note: *$p<.05$, **$p<.01$, ***$p<.001$; [a]Age and Age Squared coded in 10s of years; [b]Reference=Has a Supervisor; [c]Reference=Executive, Admin, Manager; [d]Reference=High School or GED; [e]Referenc=Not Married or Cohabitating; [f]Reference=Male; [g]Reference=Non-White; [h]Reference=Not a Supervisor; [i]Square Root of Income; [j]Square Root of Hours.

In model 1, the additional main effects of primary and secondary control were added to the model. For both job satisfaction and mental health, there were positive relationships between primary (Job Satisfaction: $B = 0.20$, $SE = 0.05$, $p<0.001$; Mental Health: $B = 0.11$, $SE = 0.01$, $p<0.001$) and secondary control (Job Satisfaction: $B = 0.26$, $SE = 0.04$, $p<0.001$; Mental Health: $B = 0.13$, $SE = 0.01$, $p<0.001$) with the outcomes, such that as primary or secondary control increased so do job satisfaction/mental health.

In model 2, in contrast to *hypothesis 3A-1,* the buffering role of job control on the job demands-job satisfaction relationship was not found to vary based on primary control. In addition, the buffering role of job support also did not vary based on secondary control as was expected in *hypothesis 3A-2.* However, although not specifically hypothesized about, in addition to job control and job support, secondary control ($B = 0.18$, $SE = 0.07$, $p<0.01$) was found to buffer the job demands-job satisfaction relationship. As can be seen in Figure 12, the negative relationship between job demands and job satisfaction weakened as secondary control increased.

Figure 12: Secondary Control as a Moderator of the Job Demands-Job Satisfaction Relationship

Job Satisfaction (y-axis, values 4 to 9)
Job Demands (x-axis, values 1 to 5)

- - - Low Secondary Control   ——— High Secondary Control
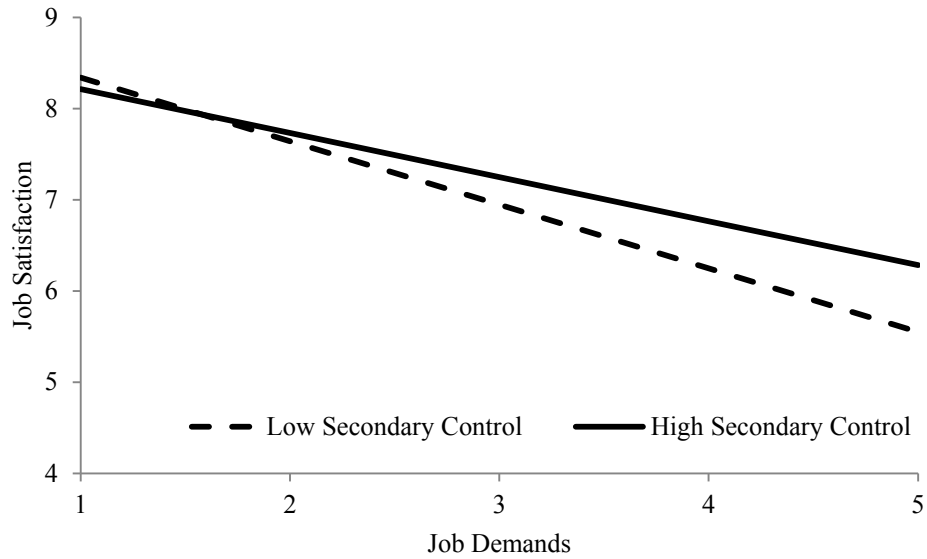
For mental health, *hypothesis 3A-1* and *3A-2,* that job control would only buffer the job demands-outcomes relationship at high levels of primary control and that job support would only buffer the job demands-outcomes relationships at high levels of secondary control were also not supported, but two additional interactions were found. First, secondary control (B = -0.04, SE = 0.02, $p<0.01$) was found to moderate the relationship between job control and mental health, such that when secondary control was low, there was a positive relationship between job control and mental health but when secondary control was high, there was no relationship between job control and mental health (see Figure 13). This suggests that job control plays a greater role in mental health when secondary control is lacking.

<div align="center">Figure 13: Secondary Control as a Moderator of the Job Control-Mental Health Relationship</div>

Second, the buffering role of job support on the job demands-mental health relationship was found to vary with primary control ($B = -0.06$, $SE = 0.02$, $p<0.01$). Specifically, when primary control was low, the relationship between job demands and mental health was less negative when job support was high, however when primary control was high, the relationship did not vary based on the level of job support (see Figure 14). This suggests that job support only buffers the job demands-mental health relationship at low levels of primary control.

Figure 14: Variation by Primary Control in Job Support as a Moderator of the Job Demands-Mental Health Relationship
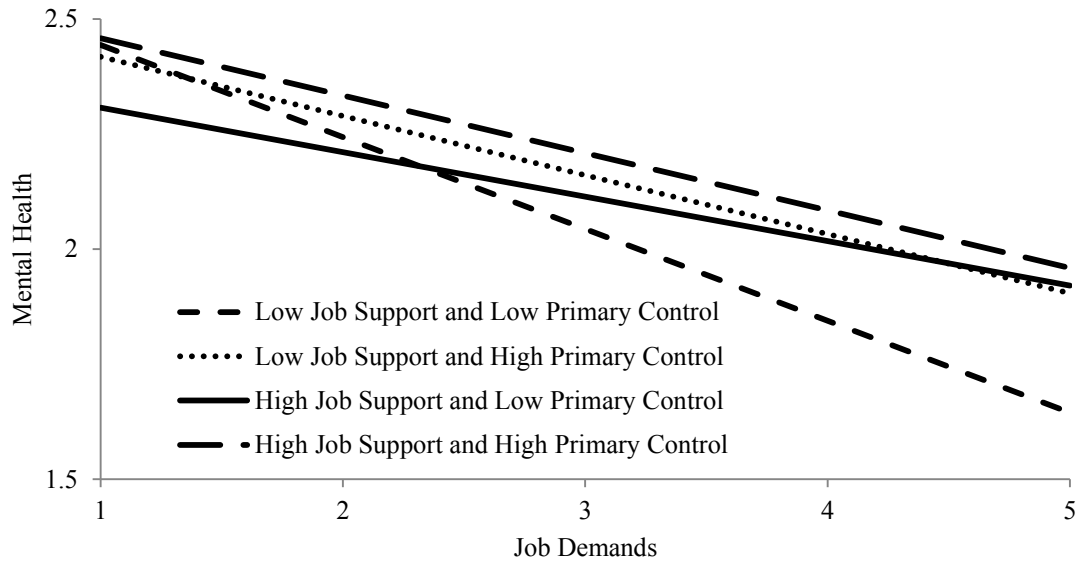
Model 3 examined how the moderational role of primary and secondary control varies with age. Before going through the findings for the main hypotheses in this model, I note several interesting interactions among the predictors that were not directly testing the main hypotheses. Additionally, several interactions that were non-significant in the previous model emerged as significant when the age and control interactions were included. Since these interactions were not significant in the main step in which they were assessed and only emerged when age, primary control, and secondary control were included in the model, they are presented separately in Appendix C and should be interpreted cautiously.

First, the moderation of the job demands-mental health relationship by secondary control varied with age (Job Demands by Secondary Control by Age: $B = -0.01$, $SE = 0.02$, $p>0.05$; Job Demands by Secondary Control by Age^2: $B = -0.02$, $SE = 0.01$,

p<0.05). As can be seen in Figure 15, secondary control only moderated the relationship in midlife adults, but not at younger and older ages.

Figure 15: Variation by Age in Secondary Control as a Moderator of the Job Demands-Mental Health Relationship

Age 30 — Mental Health vs Job Demands

Age 45 — Mental Health vs Job Demands

Age 60 — Mental Health vs Job Demands

– – Low Secondary Control
—— High Secondary Control
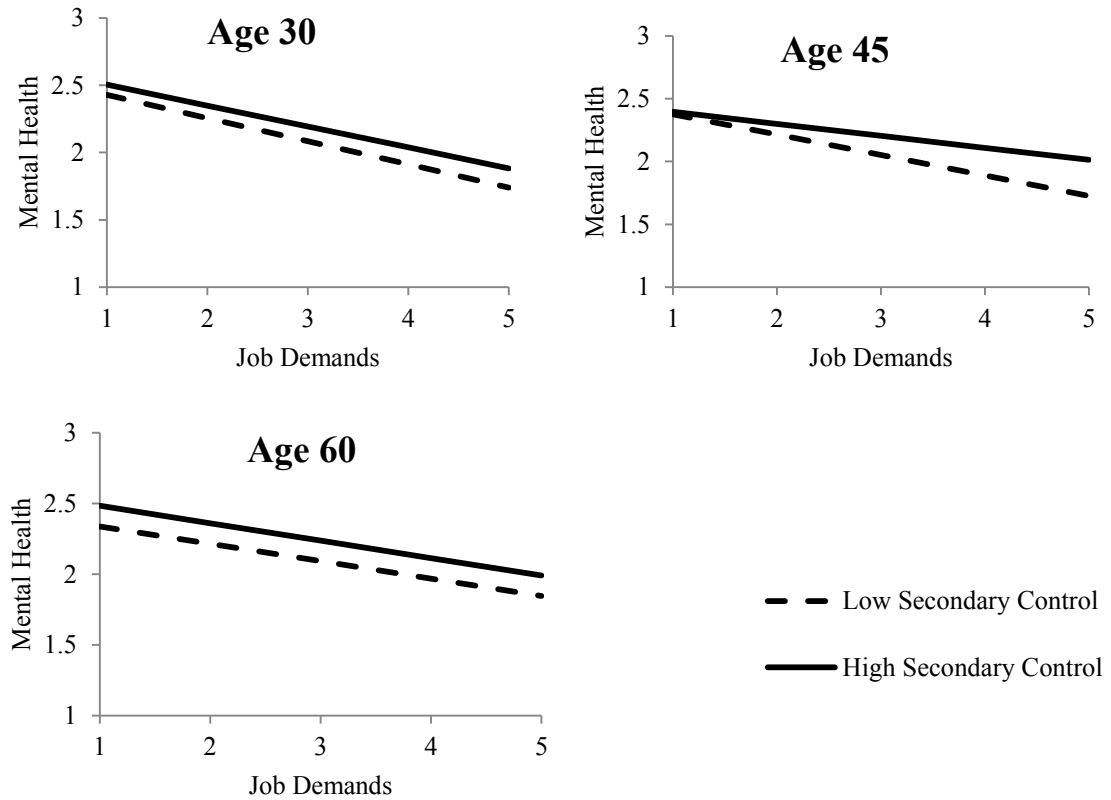
Second, the moderation of the job control-outcomes relationship by primary control varied with age for both job satisfaction (Job Control by Primary Control by Age: $B = -0.05$, $SE = 0.06$, $p=0.40$; Job Control by Primary Control by Age^2: $B = -0.10$, $SE = 0.05$, $p<0.05$) and mental health (Job Control by Primary Control by Age: $B = 0.01$, $SE = 0.02$, $p>0.05$; Job Control by Primary Control by Age^2: $B = -0.03$, $SE = 0.01$, $p<0.01$). For job satisfaction, the job control-outcome relationship was moderated by primary

control only in midlife adults, where the positive relationship strengthened as primary

control increased (see Figure 16a).

Figure 16a: Variation by Age in Primary Control as a Moderator of the Job Control-Job
Satisfaction Relationship
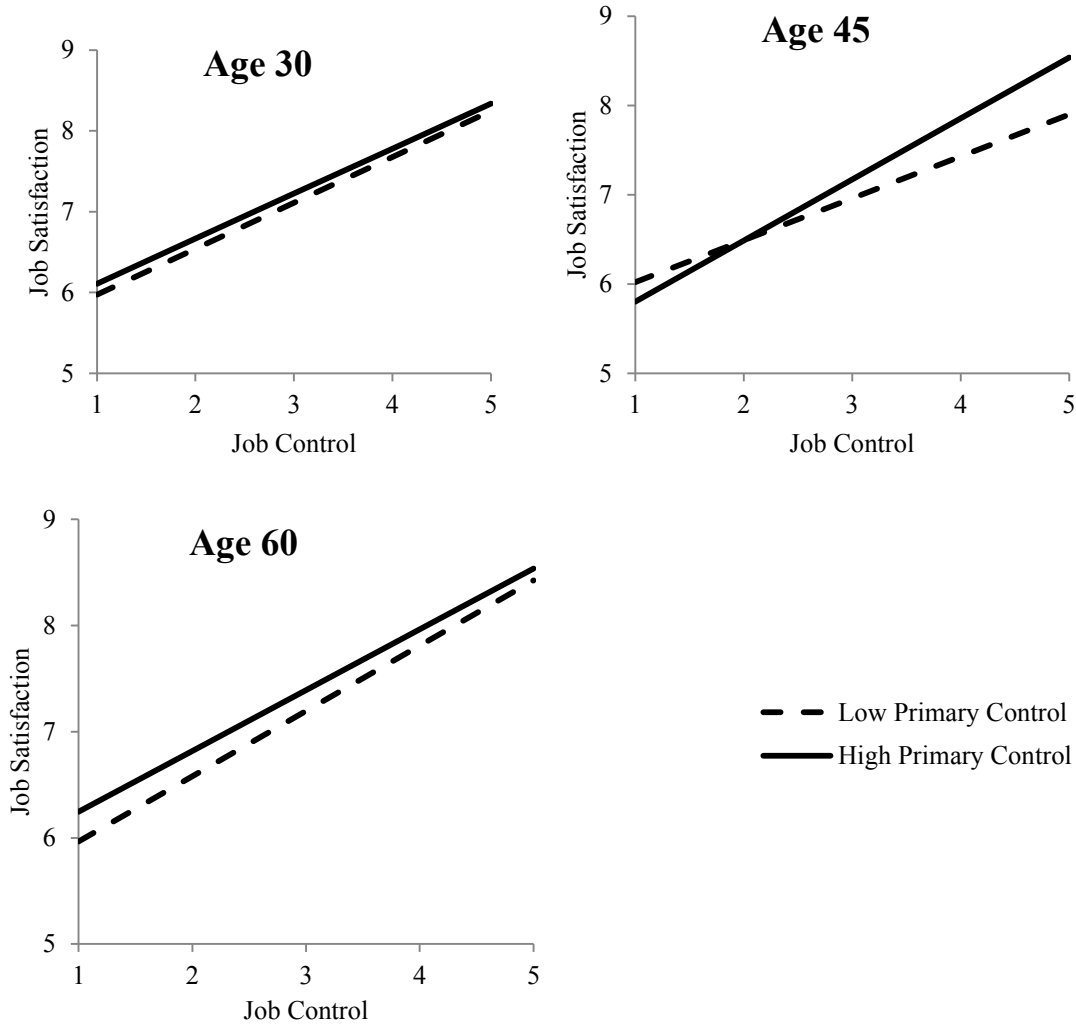
Third, for mental health, the relationship was moderated in younger and midlife

adults, but in different ways. For younger adults, the positive relationship was stronger

when primary control was lower, whereas for midlife adults, the positive relationship was

weaker when primary control was lower (see Figure 16b). Overall, for both job

satisfaction and mental health, the relationship between job control and job satisfaction

varied very little based on primary control at older ages.

Figure 16b: Variation by Age in Primary Control as a Moderator of the Job Control-
Mental Health Relationship
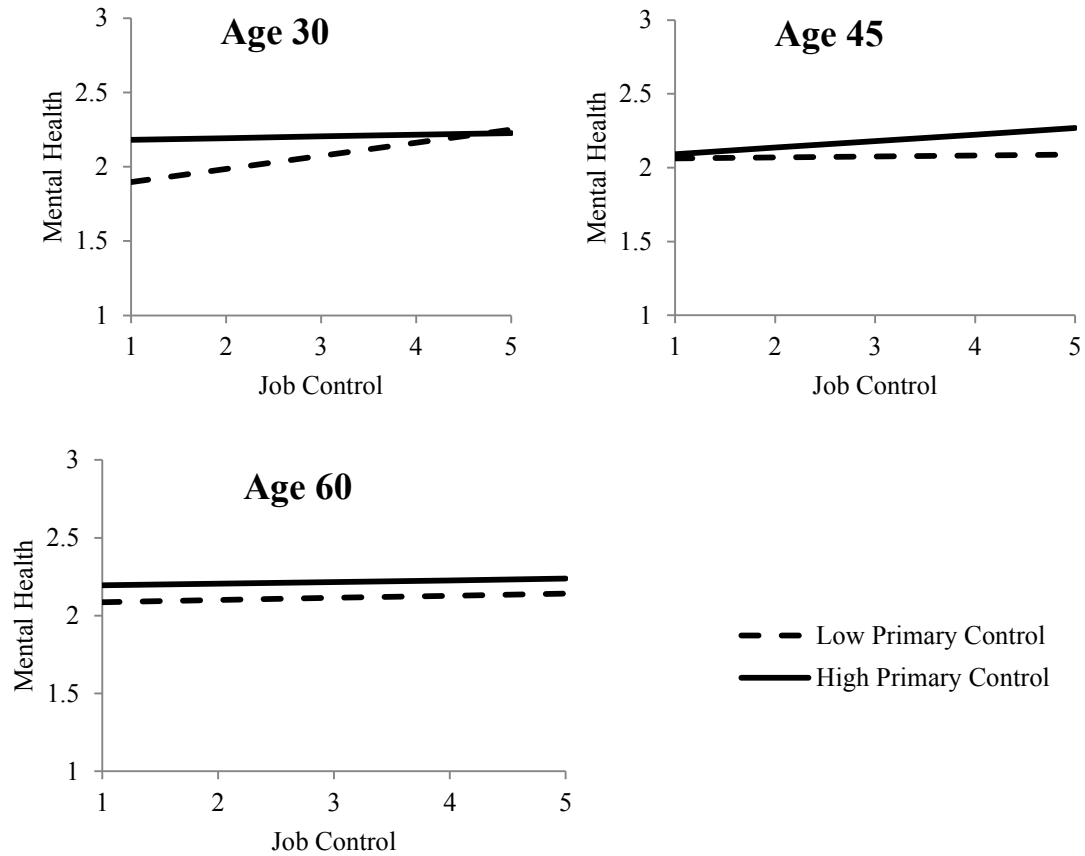
For the main hypotheses in this model, *hypothesis 3B-1* proposed that the

influence of primary control on the buffering role of job control in the job demands-

outcomes relationship was expected to vary with age such that the influence of primary

control would first increase and then decrease with age. In the job satisfaction model, this

was not supported, but in the mental health model there was variation with age, although

not exactly in the expected directions (Job Demands by Job Control by Primary Control

by Age: $B = -0.05$, $SE = 0.02$, $p<0.05$; Job Demands by Job Control by Primary Control

by Age^2: $B = 0.02$, $SE = 0.01$, $p>0.05$). As can be seen in Figure 17, at age 30, when job control was low, the relationship between job demands and mental health was less negative when primary control was lower, whereas when job control was high, the relationship was less negative when primary control was higher. This suggests that in younger adults, job control only buffers the job demands-mental health relationship when primary control is higher but exacerbates the negative relationship when primary control is lower. In contrast to the younger adults, for the midlife adults (age 45) and the older adults (age 60), the relationship between job demands and mental health did not vary much based on either job control or primary control. These results were partially in line with the hypothesis, as expected the influence of primary control on the buffering role of job control was greater for younger adults than older adults, however, the influence of primary control did not peak at midlife, instead it decreased after younger adulthood.

Figure 17: Variation by Age in Primary Control as a Moderator of the buffering role of Job Control on the Job Demands-Mental Health Relationship

Age 30

Mental Health

3
2.5
2
1.5
1

Job Demands
1   2   3   4   5

Age 45

Mental Health

3
2.5
2
1.5
1

Job Demands
1   2   3   4   5

Age 60

Mental Health

3
2.5
2
1.5
1

Job Demands
1   2   3   4   5

– – Low Job Control and Low Primary Control

••••• Low Job Control and High Primary Control

—— High Job Control and Low Primary Control

— • High Job Control and High Primary Control
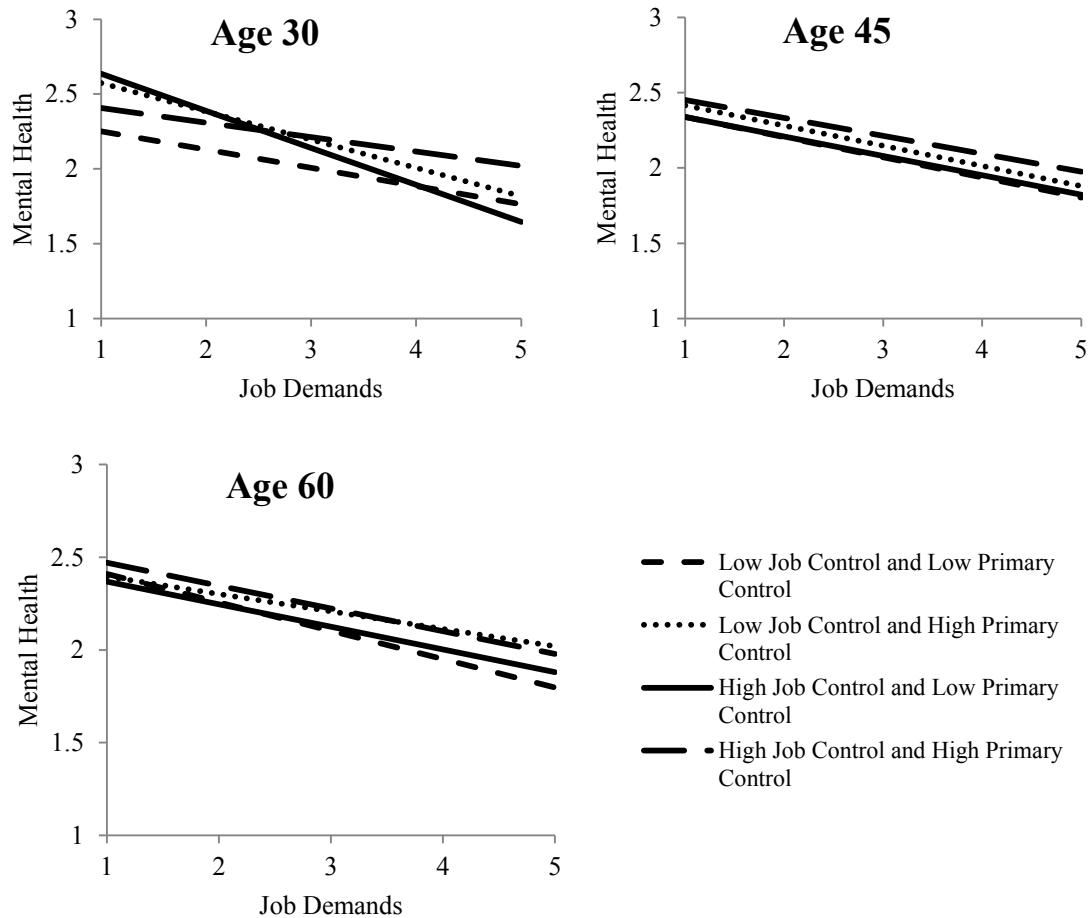
Additionally, as proposed in *hypothesis 3B-2,* the importance of secondary control on the buffering role of job support in the job demands-outcomes relationship was expected to increase with age. In both the job satisfaction (Job Demands by Job Support by Secondary Control by Age: $B = -0.17$, $SE = 0.08$, $p<0.05$; Job Demands by Job Support by Secondary Control by Age^2: $B = 0.14$, $SE = 0.06$, $p<0.05$) and mental health (Job Demands by Job Support by Secondary Control by Age: $B = 0.06$, $SE = 0.02$, $p<0.01$; Job Demands by Job Support by Secondary Control by Age^2: $B = 0.00$, $SE = 0.02$, $p>0.05$) models, there was variation by age in the importance of secondary control on the buffering role of job support. For job satisfaction, at younger ages, when

96

secondary control was low, the relationship between job demands and job satisfaction was less negative when job support was also lower, but the reverse was true when secondary control was high, with the relationship being less negative when job support was higher, suggesting that at younger ages, job support only buffers the job demands-job satisfaction relationship for people with higher levels of secondary control (see Figure 18). In midlife and older adulthood, the role of secondary control was a bit different. When secondary control was low, the relationship between job demands and job satisfaction was less negative when job support was higher, whereas when secondary control was high, the relationship did not vary with job support, suggesting that as age increases, job support becomes less important as a buffer, only buffering the relationship when secondary control is lower, and instead secondary control alone appears to be a more important buffer the job demands-job satisfaction relationship. This does not directly support the hypothesis, as the role of job support as a buffer of the job demands-outcome relationship was expected to be greatest for older adults with higher levels of secondary control.

Figure 18: Variation by Age in Secondary Control as a Moderator of the buffering role of Job Support on the Job Demands-Job Satisfaction Relationship

Age 30

Age 45

Age 60

Low Job Support and Low
Secondary Control

Low Job Support and High
Secondary Control

High Job Support and Low
Secondary Control

High Job Support and High
Secondary Control
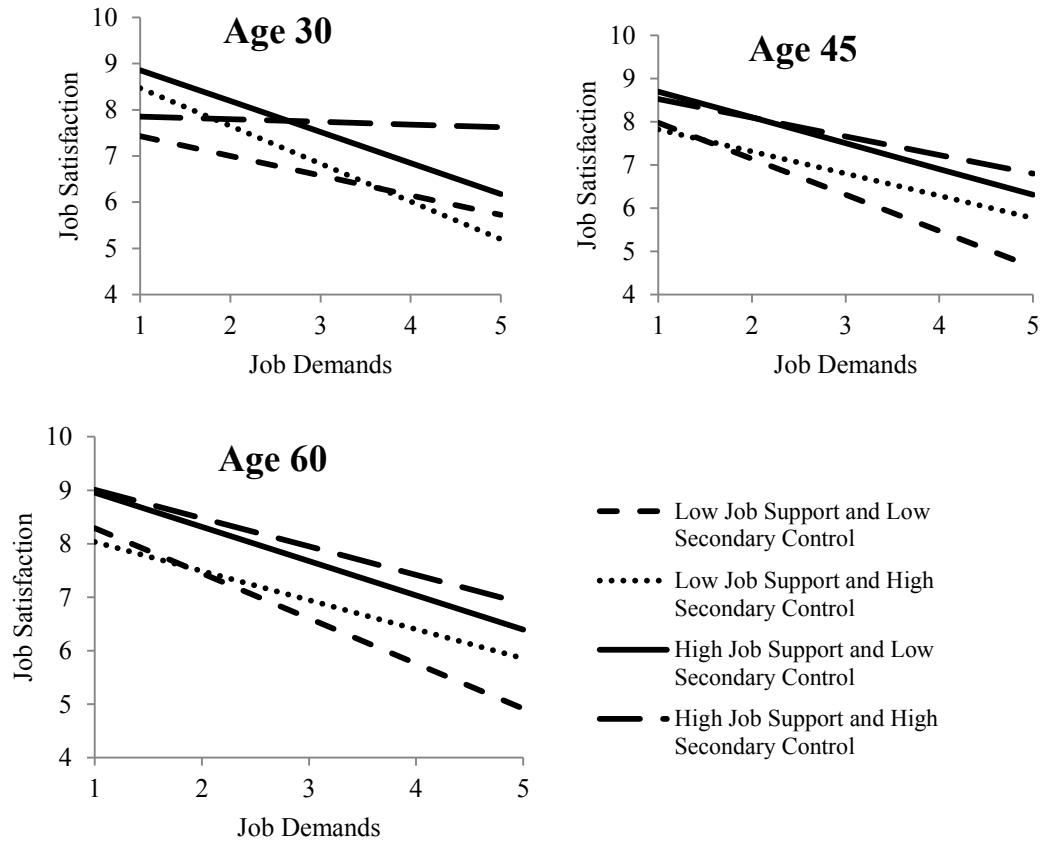
Hypothesis 3B-2 was however supported for the outcome of mental health. At age 30, when job support was low, the relationship between job demands and mental health was less negative when secondary control was higher, but when job support was high, the relationship was less negative when secondary control was lower (see Figure 19). This reversed though as age increased. By age 60, when job support was low, the relationship was less negative when secondary control was lower, while the relationship was less negative when secondary control was higher when job support was also high, suggesting that as hypothesized, job support buffers the job demands-mental health relationship when secondary control is highest and that this occurs more so as age increases.

Figure 19: Variation by Age in Secondary Control as a Moderator of the buffering role of Job Support on the Job Demands-Mental Health Relationship
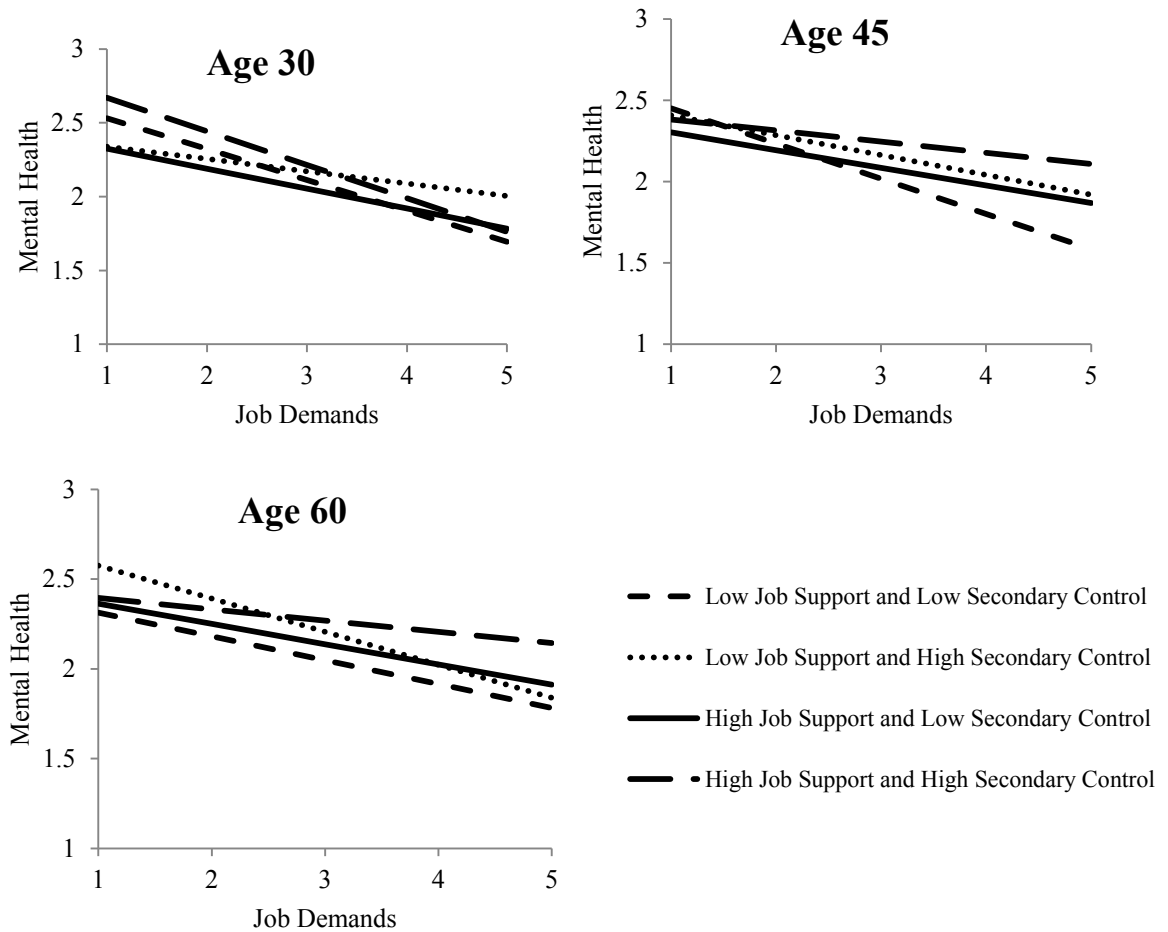
An additional unexpected relationship was found. Specifically, the importance of primary control on the buffering role of job support for the job demands-job satisfaction relationship was found to vary by age (Job Demands by Job Support by Primary Control by Age: $B = 0.20$, $SE = 0.09$, $p<0.05$; Job Demands by Job Support by Primary Control by Age^2: $B = -0.05$, $SE = 0.07$, $p>0.05$). Although not directly hypothesized about, at younger ages, job support was only found to buffer the job demands-job satisfaction relationship at lower levels of primary control and instead the negative relationship increased at higher levels of primary control (see Figure 20). As age increased though,

the buffering role of job support decreased when primary control was lower. In contrast,

at older ages, the relationship was buffered by job support only when primary control was
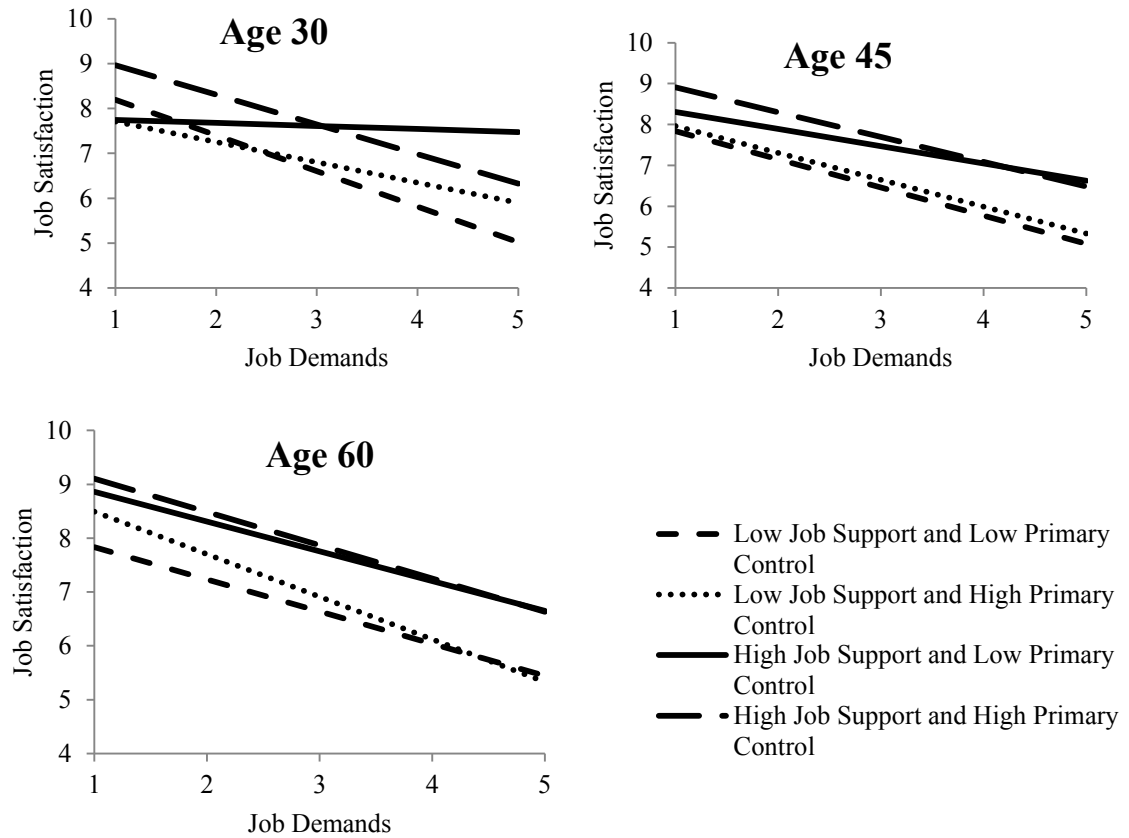
higher.

Figure 20: Variation by Age in Primary Control as a Moderator of the buffering role of Job Support on the Job Demands-Job Satisfaction Relationship

Chapter 5: Discussion

As the workforce in the United States, as well as other developed economies, continues to age, exploring what factors contribute to the quality of employment and worker well-being for workers of diverse ages has become a concern for organizations and researchers (Baltes & Finkelstein, 2011; Tishman, Van Looy, & Bruyere, 2012; Truxillo, 2009). One aspect of this involves understanding how workers of different ages utilize different job resources and personal resources to cope with their job demands. The general goal of this dissertation was to integrate the Job Demands-Control-Support Model (Johnson & Hall, 1988; Karasek, 1979, Karasek & Theorell, 1990) and the Life-Span Theory of Control (Heckhausen & Schulz, 1995) in order to address the broad research questions: 1) What factors moderate the relationship between job demands and outcomes of well-being? and 2) Do these factors vary based on employee age? A summary of the main research questions and hypotheses are presented in Table 6 along with the respective findings.

Table 6: Summary of Research Questions, Hypotheses and Main Findings

Research Questions	Hypotheses	Findings for Job Satisfaction	Findings for Mental Health
1A: Is there a relationship between job demands and the outcomes?	I expect there to be a negative relationship between job demands and the outcomes.	**There was a negative relationship between job demands and job satisfaction.**	**There was a negative relationship between job demands and mental health.**
1B: Do the relationships between job demands and the outcomes vary by age?	I expect the negative relationship between job demands and the outcomes will decrease with age.	The negative relationship between job demands and job satisfaction first increased and then remained stable with age.	The negative relationship between job demands and mental health did not vary with age.
2A-1: Does job control buffer the relationships between job demands and outcomes?	I expect job control to serve as a buffer with the relationship between job demands and the outcomes being less negative at higher levels of job control.	**Job control buffered the relationship between job demands and job satisfaction such that the relationship became less negative as job control increased.**	The relationship between job demands and mental health did not vary with job control.
2A-2: Does job support buffer the relationships between job demands and outcomes?	I expect job support to serve as a buffer with the relationship between job demands and the outcomes being less negative at higher levels of job support.	**Job support buffered the relationship between job demands and job satisfaction such that the relationship became less negative as job support increased.**	**Job support buffered the relationship between job demands and mental health such that the relationship became less negative as job support increased.**
2B-1: Does the buffering role of job control on the job demands-outcomes relationship vary by age?	I expect job control to buffer the job demands-outcomes relationship more at younger ages than at older ages.	The buffering role of job control on the job demands-job satisfaction relationship did not vary with age.	The buffering role of job control on the job demands-mental health relationship did not vary with age.
2B-2: Does the buffering role of job support on the job demands-outcomes relationship vary by age?	I expect job support to buffer the job demands-outcomes relationship more at older ages than at younger ages.	The buffering role of job support on the job demands-job satisfaction relationship did not vary with age.	*The buffering role of job support on the job demands-mental health relationship increased with age until midlife and then it became stable.*

3A-1: Does primary control individually moderate the buffering capacity of job control on the job demands-outcomes relationship?	I expect that job control will only buffer the job demands-outcomes relationship at high levels of primary control.	<u>The buffering role of job control on the job demands-job satisfaction relationship did not vary with primary control</u>	<u>The buffering role of job control on the job demands-mental health relationship did not vary with primary control</u>
3A-2: Does secondary control individually moderate the buffering capacity of job support on the job demands-outcomes relationship?	I expect that job support will only buffer the job demands-outcomes relationship at high levels of secondary control.	<u>The buffering role of job support on the job demands-job satisfaction relationship did not vary with secondary control</u>	<u>The buffering role of job support on the job demands-mental health relationship did not vary with secondary control</u>
3B-1: Does the moderation by primary control on the buffering capacity of job control on the job demands-outcomes relationship vary by age?	I expect the influence of primary control on the buffering role of job control to first increase and then decrease with age.	<u>The influence of primary control on the buffering role of job control did not vary with age.</u>	*The influence of primary control on the buffering role of job control decreased with age, such that at younger ages, job control only buffered the job demands-mental health relationship when primary control was high, however this trend peaked in younger adulthood as opposed to midlife, with job control and primary control not buffering the job demands-mental health relationship at older ages.*
3B-2: Does the moderation by secondary control on the buffering capacity of job support on the job demands-outcomes relationship vary by age?	I expect the influence of secondary control on the buffering role of job support to increase with age.	*At younger ages, job support only buffered the job demands-job satisfaction relationship when secondary control was high. As age increases, the job demands-job satisfaction relationship was no longer buffered by job support; instead it was buffered by secondary control with the relationship becoming less negative as secondary control increases.*	**The influence of secondary control on the buffering role of job support increased with age, such that as age increased, job support only buffered the job demands-mental health relationship at higher levels of secondary control.**

Note: Findings presented in **bold** represent supported hypotheses; Findings presented in <u>underline</u> represent not supported hypotheses; Findings in *italics* represent partially supported hypotheses.

Associations between Job Demands and Worker Outcomes

My first research question examined the relationship between job demands and the outcomes of job satisfaction and mental health. In line with my hypothesis, there were negative relationships between both job demands and job satisfaction, and job demands and mental health. These findings suggest that a higher level of job demands is associated with lower job satisfaction and mental health. Notably, job demands were not just related to worse work-related outcomes, job demands were also associated with worse general well-being outcomes, as previous research has consistently shown (Calnan et al., 2004; de Lange et al., 2004; Ettner & Grzywacz, 2001; Larsson & Setterlind, 1990; Mikkelsen et al., 2005; Neidhammer & Chea, 2003; Pal & Saksvik, 2008).

However, when examining the relationships between job demands and the outcomes for variation by age, the relationship only varied for the outcome of job satisfaction and the variation was not consistent with my hypothesis. It was expected that the negative relationship between job demands and the outcomes would decrease with age, but instead the least negative relationship was at the youngest ages and the relationship became more negative until midlife at which point it stabilized and remained the same for the oldest ages. This finding is somewhat in line with those of de Lange et al. (2006), who found that job demands have a less positive relationship with negative employee outcomes, in this case emotional exhaustion, in younger workers compared to midlife and older workers, with the relationship in younger workers actually being negative, meaning that an increase in job demands was related to lower emotional exhaustion. For mental health, the negative relationship with job demands did not vary

104

with age, suggesting that regardless of age, greater job demands are associated with worse mental health. This finding is similar to that reported by Shultz et al. (2010). Overall, while the findings do not imply that older workers suffer less from job demands than younger workers as I expected, the findings do suggest that older workers are not actually suffering more from job demands than workers of other ages, including midlife workers.

Job Control and Job Support as Moderators of the Job Demands-Outcomes Relationships

The second research question in this dissertation focused on the Job Demands-Control-Support Model. In this model, it is proposed that high levels of job demands can be detrimental to workers' health and well-being, but job control and job support are thought to be able to help to alleviate the negative effects (Johnson & Hall, 1988; Karasek, 1979, Karasek & Theorell, 1990). Two hypotheses derived from this model have been proposed. First, the strain hypothesis examines the main effects of job demands, job control, and job support assuming that job demands will be negatively related to well-being, while job control and job support will be positively related to well-being. In line with this hypothesis, for both job satisfaction and mental health, there were negative relationships between job demands and the outcomes, and positive relationships for both job control and job support.

The second hypothesis deriving from the JDCS, the buffer hypothesis, which is the main focus of this dissertation, puts forth that job control and job support buffer the impact of job demands on workers' outcomes such that a high level of job demands will

105

be less damaging when job control and/or job support are higher (van der Doef & Maas, 1999). In support of the hypothesis, both job control and job support buffered the relationship between job demands and job satisfaction, respectively. For mental health, the hypothesis was not supported for job control, but the hypothesis was supported for job support buffering the relationship. Perhaps, only job support served as a buffer for job control because only job support may extend as a resource beyond work. Job control is likely very important at work, but it may have little impact on workers once they have left work, whereas social support at work may transition to social support outside of work, which is known to have a strong relationship with mental health (Kessler & McLeod, 1985). Thus, the buffering role of job support may be found for both work specific and general well-being outcomes, while job control may be found only for work specific outcomes.

I also examined possible variation by age in the JDCS. For job control, I hypothesized that the buffering role of this resource on the job demands-outcomes relationship would be stronger for younger workers than older workers, with the role being the greatest in midlife. This hypothesis was not supported for either job satisfaction or mental health. Although job control was a buffer in the job satisfaction model, this did not vary by age, suggesting that job control is an equally important resource as a buffer of job control for workers of all ages. As was mentioned above, for mental health, job control did not buffer the relationship with job demands, and this did not vary with age.

In contrast to my hypothesis for job control, I expected that the buffering role of job support would increase with age, with the role being the greatest in older workers.

106

For job satisfaction, the buffering role of job support did not vary with age, suggesting

that as with job control, job support is an important resource in helping to cope with job

demands for workers of all ages. For mental health, the buffering role of job support on

the relationship did vary. My hypothesis was partially supported in that the buffering role

of job support increased with age until midlife at which point it stabilized. This suggests

that as workers move beyond younger adulthood, job support becomes a greater resource

for coping with job demands and their impact on mental health. It is possible that social

relationships at work become stronger with age, reaching their peak in midlife, and thus

their role as a coping mechanism also reaches the peak in midlife.

The overall lack of findings for the JDCS varying by age, with the exception of

the buffering role of job support with the outcome of mental health, could be reflective of

many things. First, it is possible that the model does not operate differently for workers

of different ages, especially with regards to job control. Along these lines, in general, I

found the JDCS to be applicable to workers regardless of age. There is very little

previous research supporting my contentions that the model would vary with age (for

exception, see de Lange et al, 2006; Shultz et al.,2010) and so it is possible that the model

does not in fact vary with age. Second, it is possible that the model would only vary for

more facet specific aspects of job control, such as control over schedules, control over

pace work, or control over method of completing work, and job support, such as

instrumental support or informational support. Third, it is possible that the model only

varies by age for workers with certain individual characteristics, such as workers with

107

higher self-efficacy. I address this possibility next in relation to the influence of primary and secondary control.

The Influence of Primary and Secondary Control on Job Control and Job Support as Moderators of the Job Demands-Outcomes Relationships

My final research question sought to integrate the Life-Span Theory of Control with the JDCS in order to assess whether primary and secondary control may influence the buffering role of job control and job support on the job demands-outcome relationship. The Life-Span Theory of control proposes that, when faced with a challenge, individuals must use strategies to overcome it. The specific strategies include primary control, which involves control exerted towards the external world, and secondary control, which involves control directed towards the internal world (Heckhausen & Schulz, 1995). Moreover, as people age, they must use primary and secondary control differently based on relevant development changes. Accordingly, the use of primary control strategies is thought to increase with age until midlife at which point it peaks and begins decreasing. In contrast, secondary control strategies must be used when primary control strategies fail, and thus, their use increases with age into older adulthood (Schulz & Heckhausen, 1996). These age patterns were not confirmed in the current study. Instead, primary control remained mostly consistent across the life-span, with slightly lower levels from age 20 to 40, and then slightly higher levels from age 40 to 60. Secondary control levels remained mostly consistent from age 20 to 40. Beyond age 40, secondary control levels were lower. The age patterns I found were contrary to the theory. These findings may have been the result of using cross-sectional rather than

longitudinal data. The theory focuses on changes in primary and secondary control within individuals over time as opposed to differences in primary and secondary control for individuals in different age groups. It is possible that within the individuals in my study, if they were followed across their life-span, they would have exhibited the expected patterns in primary and secondary control.

Building on the Life-Span Theory of Control, I expected primary and secondary control to influence the extent to which workers could utilize job control and job support as buffers of the job demands-outcomes relationship. Specifically, for job control, which I believe is related to primary control in the workplace, I hypothesized that job control would only buffer the job demands-outcomes relationship at high levels of primary control. Furthermore, for job support, which I believe is related to secondary control in the workplace, I hypothesized that job support would only buffer the relationship at high levels of secondary control. My hypotheses were not confirmed for either job satisfaction or mental health, with the buffering role of job control and job support showing no variation based on primary and secondary control, respectively. It is possible that my failure to find support for these hypotheses was because these analyses did not consider the role of age, which is critical to the Life-Span Theory of Control. The lack of support may have been due to primary and secondary control only influencing the buffering role of job control and job support at certain ages. My next set of hypotheses examined this possibility.

For the role of age, again building on the Life-Span Theory of Control, I expected that the influence of primary control on the buffering role of job control would first be

greater with age for midlife workers compared to younger workers, and then the influence would be weaker with age after midlife. I found partial support for this with respect to mental health, but no support in terms of job satisfaction. Specifically for mental health, at younger ages, as expected, job control only buffered the job demands-outcome relationship at high levels of primary control, but the influence of primary control on the buffering role of job control was weaker for workers in midlife, and then even weaker for workers at the oldest ages, with the job demands-mental health relationship varying very little with either job control or primary control. Instead of the influence of primary control peaking in midlife as hypothesized, it appeared to peak in younger adulthood. Importantly though, as hypothesized, there was little influence of primary control in later life, and although my hypothesis that the buffering role of job control would decrease with age was not directly supported, as discussed above, these results suggest that job control also impacted the job demands-mental health relationship very little in older adulthood. Regarding the lack of findings for job satisfaction, the results suggest that the ability of employees to utilize job control as a buffering mechanism is not dependent on age or primary control.

For secondary control, I hypothesized that the influence of secondary control on the buffering role of job support would be greater for workers at older ages. In both the outcomes of job satisfaction and mental health, the influence of secondary control on the buffering role of job support on the job demands-outcomes relationship varied with age. For job satisfaction, I found that the influence of secondary control on the buffering role of job support was weaker at older ages. Only at the youngest age, did job support buffer

110

the relationship when secondary control was high. At higher ages, job support did not buffer the relationship, instead only secondary control did. It is possible that as an alternative for secondary control influencing the ability of workers to utilize job support as a buffer, that as age increases, secondary control itself is what actually buffers the impact of job demands on job satisfaction, and job support is not actually necessary. Secondary control allows individuals to positively reappraise situations so that difficulties completing challenges are not detrimental for well-being. So as adults age, they do not require job resources at all to buffer the impact of job demands on job satisfaction, they just need to be able to favorably interpret their challenges at work. For mental health though, the hypothesis was supported. At older ages, job support only buffered the relationship at higher levels of secondary control. This suggests that for the more general well-being outcome, as age increases, secondary control is a factor in the ability of workers to utilize job support as a buffer of the impact of job demands.

Additional Findings

There were several additional findings, not directly based on hypotheses that provide insight into the integration of the Life-Span Theory of Control with the JDCS. First, in addition to job control and job support buffering the job demands-outcomes relationship, secondary control also served as a buffer of the relationship for both job satisfaction and mental health, suggesting that at high levels of job demands, the outcomes are more positive when secondary control is higher compared to when secondary control is lower. It is possible that adults with a better ability to rationalize challenges at work using positive reappraisals suffer less from those challenges.

111

Interestingly, for mental health, secondary control as a buffer varied with age, only buffering the relationship in midlife adults, but not at younger and older ages. Potentially, in midlife, when life demands, like raising children, may be at their highest levels, job demands may become more difficult to negotiate, and thus being able to positively reappraise failures in completing job demands becomes more necessary.

Second, while my hypotheses focused on the influence of primary and secondary control on the buffering role of job control and job support on the job demands-outcomes relationship, there were additional findings related to primary and secondary control influencing the job control and job support relationships with the outcomes. For job satisfaction, the relationship with job control varied by primary control, with the relationship being more positive as primary control increased. The findings suggest that when job control is higher, job satisfaction is greater when primary control is also higher. This is somewhat in line with my thinking about primary control influencing the ability of workers to utilize job control, although in this case, job control is directly related to the outcome. Further analyses showed that there was variation in this finding by age and that the job control-job satisfaction relationship only varied by primary control for midlife adults. According to the Life-Span Theory of Control, the use of primary control is greatest in midlife, and these findings seem to reflect that. A similar pattern was found with the relationship between job control and mental health, where this relationship varied by primary control differently with age. At younger ages, the relationship was actually less positive when primary control was higher, but in midlife the relationship was more positive when primary control was higher, and primary control did not impact

112

the relationship at older ages. Again this suggests that the influence of primary control on the ability to utilize job control is greatest at midlife.

Third, the relationship between job support and job satisfaction varied by secondary control, with the relationship becoming less positive as secondary control increased. The findings showed that when job support was low, job satisfaction was greater when secondary control was higher, but when job support was high, there was little difference in job satisfaction scores based on the level of secondary control. It is possible that workers need to justify why they have low job support (poor work relationships) using positive reappraisals in order to remain satisfied with their jobs. Variation with secondary control modified the relationship between job control and mental health. Similar to the finding for job satisfaction, when job control was low, mental health scores were higher when secondary control was also higher. Just as workers may need to justify why they have low job support, they may also need to use positive reappraisals to justify why they have low job control, possibly because they are in low prestige positions, in order to maintain their mental health.

The final additional findings were regarding the influence of primary control on the buffering role of job support on the job demands-outcome relationship. In relation to mental health, job support only buffered the impact of job demands at low levels of primary control. It is possible that workers only need to use job support as a buffer of job demands when they do not have the necessary personal resources, specifically the ability to persist until job demands are completed. In terms of job satisfaction, this finding varied by age. Up until midlife, job support only buffered the impact of job demands at low

113

levels of primary control, but at older ages, job support only buffered the impact of job demands at high levels of primary control. This may reflect that at older ages, being able to persist in achieving one's goals may be closely tied to social support. At work, older workers' ability to maintain a high level of job satisfaction despite high levels of job demands may require the support of their supervisors and peers, as well as a strong belief that their goals are achievable.

Implications

The findings of this dissertation make important contributions to the literature, informing both workplace theory and developmental theory. First, this study is one of very few to examine how the association between job demands and worker well-being, both job-specific well-being and more general well-being, may vary based on employee age. There are many assumptions made about whether older workers are physically and cognitively able to deal with a high level of job demands. There is reason to expect that older workers may become more stressed under conditions of high job demands than their younger counterparts as a result of decreases in processing speed, memory, and motor functioning (Ilmarinen, 2001; Salthouse, 2004), however, previous research has not supported this assumption (Shultz et al., 2010). There is also reason to expect the reverse of this assumption to be true, that older workers are actually better able to deal with a high level of job demands than their younger counterparts. As workers age, they gain experience and knowledge which may help them to better negotiate their job demands.

The results of the current study suggest that while older workers are not specifically better able to handle job demands than younger workers, they are also not less able to handle a high level of job demands than workers who are younger. In this study, the youngest workers did have a less negative relationship between job demands and job satisfaction than did midlife and older workers, but older workers and midlife workers had similar relationships for job satisfaction, and the relationship with mental health did not vary with age. It is possible that at the youngest ages, workers are more likely to take on a high level of job demands without suffering their impact in the interest of moving up in their careers. Alternatively, this study used a measure of perceived job demands, so it is also conceivable that what younger workers perceive as a high level of job demands is perceived as a low level by older workers and therefore the relationship between job demands and job satisfaction was less negative at the youngest ages because the actual level of job demands never got that high. Overall, the findings here can help to dispel myths about older workers being particularly susceptible to suffering from a high level of job demands. Organizations should not be hesitant to recruit and retain older workers for fear that they will be unable to deal with the workload without cracking under the pressure.

Second, these findings have implications for one of the most commonly applied and cited theories in the workplace literature, the Job Demands-Control-Support Model. There have been mixed findings with regards to this model. Several studies have failed to find interactions between job control/job support and job demands (van der Doef & Maas, 1999). In this study, which uses a large, national

sample at two time points, the model was generally supported. For job satisfaction, both job control and job support buffered the job demands-outcome relationship, and for mental health, job support acted as a buffer. One of the reasons for this model's popularity is that is translates easily into job design interventions. The main premise of the model is that job demands will not have as great an impact on well-being if workers have high levels of job control and job support to help compensate. Accordingly, jobs with a high level of demands can be designed to optimize employee well-being by increasing levels of job control and job support. The findings of this study suggest that an intervention of this type may be helpful for employees of all ages. An increase in job control would allow employees more freedom in deciding what to work on, when to work on it, and how to accomplish it. An increase in job support would provide employees with constructive relationships at work with both coworkers and supervisors. It is likely that simply reducing job demands is not an option and thus increasing job control and job support may be a more appealing way for employers to help their employees maintain a high level of well-being.

In addition to job control and job support being important resources for dealing with job demands, in this study, secondary control was also found to be an important personal resource. Being able to put a positive spin on one's challenges was another factor in employees maintaining their well-being despite a high level of job demands. This suggests that managers and supervisors may aim to improve workers' ability to positively reappraise situations through interventions focused on

getting employees to think positively about their work situations. In addition, interventions can help employees to identify their areas of strength and to capitalize on those strengths.

No studies to date have examined how the JDCS, including both job control and job support as buffers, varies with age. A major contribution of this study is examining this possibility. Employers have traditionally assumed that what benefits one employee must benefit all employees, but there are reasons, discussed in the first and second chapters, pointing to the possibility that this is not the case. These analyses provide some evidence that the JDCS functions in a different way for employees of different ages. While the model did not seem to operate differently across the life-span in terms of job satisfaction, it did operate differently in terms of the more general well-being outcome of mental health. Thus, results suggest that the "universal" design approach to human resource management may need to be reconsidered in order to meet the needs of workers of diverse ages. Specifically, job support may be a more useful resource for coping with job demands for midlife and older workers. This is not to suggest that job support makes no difference in younger workers, but as far buffering against the impact of job demands on mental health, job support may be more beneficial at later ages. The additional buffer of secondary control was also found to vary by age for mental health. The findings suggest that secondary control plays a greater role as a buffer for adults in middle adulthood compared to younger or older adults. Accordingly, interventions aimed at helping

employees to focus on the positive aspects of work may be particularly important in midlife.

One of the greatest contributions of this dissertation involves the integration of the JDCS with the Life-Span Theory of Control in order to better understand how developmental change may have implications for workplace theory. As was mentioned above, there has been little research addressing variation by age in the JDCS, but taking this a step further, I utilize the Life-Span Theory of Control as a guiding theory for how specifically development interacts with the proposed buffering job resources. Previous research has demonstrated that perceived control, including self-efficacy and locus of control, are important considerations in applying the JDCS as the model has been found to only apply to individuals with high levels of self-efficacy and internal locus of control (Daniels & Guppy, 1994; Rodríguez et al., 2001; Salanova et al., 2002; Schaubroeck & Merritt, 1997). The Life-Span Theory of Control presents a theory of developmental change in two aspects of perceived control, primary control and secondary control. Integrating this theory with the JDCS, the findings of the current study provide recommendations for the conditions under which job control and job support are likely to have their greatest influence and at what ages. Importantly, the results suggest that the processes through which job control and job support help to lessen the impact of job demands are not as simplistic as the JDCS assumes. Instead, I found complex interactions with age and the two types of perceived control that have implications for the applicability of the JDCS.

Regarding the role of job control, for preserving mental health, my results suggest that this resource may be especially helpful for coping with high job demands at younger ages, among workers with higher levels of primary control. Going back to the "universal" design approach to human resource management, this finding implies that not all employees will actually benefit to the same extent from increasing job control. Organizations may want to focus efforts on giving employees the confidence necessary to utilize job control, along with increasing job control. For example, managers need to encourage their younger workers, who may lack the same confidence seen in midlife and older workers with more experience, to persist with their tasks even if everything does not go perfectly and to provide younger workers with the ability to control how they accomplish their tasks.

For the role of job support, the implications differ slightly when considering job specific well-being versus general well-being. At younger ages, job support was found to be an important resource for dealing with the impact of job demands on job specific well-being when secondary control was higher. In order to maintain a high level of satisfaction at work, it is possible that younger workers need to possess the personal skills to positively appraise their work situations in order to benefit from job support as a buffer of job demands. In contrast, at older ages, job support was found to be an important resource for maintaining a high level of general well-being when secondary control was higher. Interventions may be designed to help employees recognize that high quality social relationships at work are a critical part of enjoying their jobs and these relationships can be important resources when employees are

119

feeling overwhelmed by their job demands. Team building exercises that foster high quality relationships among coworkers may be an important step in this process. Open door policies among managers and supervisors which encourage employees to seek support from the person/people they report to may also be a step in this process. Some employees may feel extremely burdened by their job demands and having an outlet at work to vent those feelings contributes to well-being.

Finally, the findings presented here have broad implications for researchers, employers, and policy makers concerned with the aging of the workforce. As the workforce continues to age, resulting in not only a greater number of older workers but also a more age diverse workforce overall, in order to help employees better manage their work demands, policies, practices, and programs in the workplace should consider individual employees' needs and preferences and how these may change across the life-span. The "one-size fits all" approach to human resource management should be reconsidered. Moreover, there has been a lot of discussion about the forecasted labor shortage that will result from the retiring of the baby boomers. Understanding what aspects of work, such as job control and job support, and what factors influence the utilization of these aspects, in order to get the most positive employee outcomes for workers of different ages may be key to recruiting, engaging, and retaining talent.

Limitations

The research presented here has several important strengths including using two waves of data, assessing age continuously, and integrating a developmental theory with a workplace theory in order to better understand variation in work

experiences with age, however, like all research, there were a few limitations in the current study that need to be recognized. First, although there were many statistically significant findings, I utilized a large sample and so many of these findings may be smaller in terms of practical significance. When considering the interventions discussed above, while my results point to the interventions being most successful in specific subgroups of workers, realistically, employers must design interventions to be applied at a higher level since it is often not feasible to intervene in small subgroups. For this reason, the best practice for employers may be to offer interventions to all employees.

One of the greatest limitations of this study was that the data were analyzed cross-sectionally. Although the data were collected at two time points, approximately ten years apart, my specific research questions required that I be able to address possible nonlinearity in the relationships with age. In order to do this longitudinally, the data would need to include at least three time points. As a result, I included both waves of data collection in my sample, but I did not examine variation within individuals over time, instead I focused on variation across individuals. Therefore, I am unable to make strong causal inferences, such as assessing whether an increase in job demands actually causes a decrease in mental health. I discuss my findings in relation to age differences but due to the cross-sectional nature of the data, it is possible that my findings are reflective of cohort differences. The use of data from two time points helped to reduce this possibility, however future studies should examine the research questions for variation within individuals over time.

A third limitation of this study relates to the generalizability of these findings. The MIDUS study was designed to be nationally representative of the U.S. population. The current study only utilized a sub-sample of the MIDUS though and so the findings may not be generalizable. Additionally, it would have been more appropriate for this study to be representative of the U.S. workforce, as this study focuses primarily on workplace variables. To address these concerns, I attempted to weight the data based on the U.S. population and the U.S. workforce which revealed similar findings to those presented here, but future research should aim to replicate these findings in a sample which is designed to be more representative. Furthermore, it is unclear how culture may impact my findings. It is possible that job support plays a great role as a buffer of job demands in collectivist cultures compared to individualist cultures. Alternatively, the use of primary and secondary control strategies may be dependent on cultural norms. Thus, future research should consider cross-national and cross-cultural variation in the integration of the JDCS with the Life-Span Theory of Control, as well as racial differences.

A fourth limitation is with the operationalization of the job characteristics constructs. The measures of job demands, job control, and job support were all subjective as opposed to objective measures. Perceptions of job characteristics may be very different than actual objective job characteristics. For example, perceptions of job demands are likely to be dependent on personal dispositions with some people, such as those low in conscientiousness, being predisposed to interpret the same job demands as being more burdensome than for other people, such as those

122

high in conscientiousness. Moreover, it is possible that certain individuals would be likely to perceive low levels of job control and job support regardless of the actual levels and so interventions aimed at increasing job control and job support may be less successful in these cases. In the current study, the outcomes of interest were related to well-being and so potentially, perceptions of the job characteristics may be more important determinants of the outcomes than objective measures. Regardless, future research should address possible differences in the findings for objective versus subjective measures of the job characteristics.

Another limitation to note is the measurement of primary and secondary control. There are not well established measures for either of these constructs. I only assessed one type of primary control, i.e. persistence in goal striving, and one type of secondary control, i.e. positive reappraisals. Primary and secondary control are defined more broadly than the specific measures I used and so it is possible that the findings will vary for different aspects of primary and secondary control, respectively. In addition, I was unable to replicate the proposed age patterns for variation in the use of primary and secondary control across the life-span. This may have been due to assessing differences cross-sectionally, or it may suggest that my measures did not fully capture these aspects of perceived control. Future studies should test aspects of primary control beyond just persistence in goal striving and aspects of secondary control beyond positive reappraisals to evaluate whether the findings remain consistent.

A final limitation is that this study only examined two outcomes of well-being, job satisfaction and mental health, and thus it is unclear how the relationships assessed here may vary for other outcomes. For example, my findings were not always consistent for the two outcomes examined here. It is possible that job control may be a more important buffer of job demands for productivity and performance outcomes only for younger workers with high levels of secondary control. Similarly, job support may be a more important buffer at older ages for physical health outcomes. Future research should seek to extend these findings to other outcomes such as productivity, performance, work engagement, physical health, and work-to-family spillover.

Further Directions

Beyond the future research discussed above, there are several other topics stemming from this dissertation that may be pursued. First, this study limited its focus to the job resources discussed in the JDCS. There are many other job resources, such as job security, opportunities for learning and development, job flexibility, and task significance which may interact with job demands in similar ways to job control and job support, to help alleviate the impact of job demands which have yet to be explored in the context of possible developmental change. Moreover, mediational processes, whereby job demands exert their influence on worker outcomes through their relationship with work-family conflict, for example, have not been studied using a developmental framework.

Another area of research may delve into whether the relationships assessed in this study are specific to white collar versus blue collar workers or to specific industries. Many blue collar jobs are thought to be lower in prestige and to lack the opportunity for job control. This raises questions as to whether job control is a suitable resource in those types of positions to lessen the impact of job demands or if there are other resources which are more appropriate. Building on this notion, it is possible that the other resources which may serve as buffers are dependent on employee age and levels of perceived control. For industry grouping, there are certain industries where the average age of employees is known to be higher, such as the nursing field. It would be interesting to explore how the relationships assessed in this study may operate differently in older versus younger industries.

Within the study I used, there are several additional variables that future research could examine. First, the role of self-efficacy, which has been examined with the JDCS but has not been considered as a factor influencing how the model functions across the life-span may be pursued. Similarly, the big five personality traits which are included in the MIDUS have also not been examined. Regarding job support, it is possible that social support outside of work, such as spousal support or friendship networks may serve as buffers of the impact of job demands, both of which may be explored in the future.

Finally, future research may aim to extend the findings of this study to areas of research beyond the workplace. I focused specifically on job demands and the resources used to buffer their impact, but there are various other life demands, such

125

as caregiving demands and intimate relationship demands. It is likely that just as employees may suffer from a high level of job demands, demands in other areas of life may have a similar impact and they also have the potential to influence each other. Studies could seek to address the factors that buffer against other types of life demands and how they interact with primary and secondary control across the life-span. Similar processes where primary and secondary control influence the ability to utilize the possible buffers of life demands at different ages may be found.

Conclusions

Although many employers and policy makers are aware of the aging of the workforce in the United States, there has not been a great response on the part of researchers to apply developmental theories to the commonly applied workplace theories in order to gain a greater understanding of how aging impacts the work experience and what implications this has for organizations. As increasing numbers of workers over the age of 65 choose to delay retirement and remain in the workforce past the traditional working years, the aging of the workforce will continue to be a concern. It was the goal of this dissertation to take a first step in incorporating aspects of the Life-Span Theory of Control with the Job Demands-Control-Support Model in order to better understand the factors that contribute to well-being both in and out of work for workers of different ages. While more research is needed in this area, the findings presented here demonstrate the complex processes taking place at work which relate to well-being and how these processes are varied for workers of different ages. In conclusion, in order for employers

126

to provide a high quality of employment to workers of all ages, they must consider how

work experiences differ across the life-span.

Chapter 6: References

Abraham, J. D., & Hansson, R. O. (1995). Successful aging at work: An applied study of selection, optimization, and compensation through impression management. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 50B*(2), P94-P103. doi:10.1093/geronb/50B.2.P94

Alfredsson, L., Karasek, R., & Theorell, T. (1982). Myocardial infarction risk and psychosocial work environment: An analysis of the male Swedish working force. *Social Science & Medicine, 16*(4), 463-467. doi:10.1016/0277-9536(82)90054-5

Alfredsson, L., & Theorell, T. (1983). Job characteristics of occupations and myocardial infarction risk: Effect of possible confounding factors. *Social Science & Medicine, 17*(20), 1497-1503. doi:10.1016/0277-9536(83)90094-1

Amick, B. C., & Celentano, D. D. (1991). Structural determinants of the psychosocial work environment: Introducing technology in the work stress framework. *Ergonomics, 34*(5), 625-646. doi:10.1080/00140139108967341

Appley, M., & Trumbull, R. (Eds.). (1967). *Psychological stress: Issues in research*. New York, NY: Appleton-Century-Crofts.

Avolio, B. J., Waldman, D. A., & McDaniel, M. A. (1990). Age and work performance in nonmanagerial jobs: The effects of experience and occupational type. *The Academy of Management Journal, 33*(2), pp. 407-422.

Baker, E., Israel, B. A., & Schurman, S. (1996). The integrated model: Implications for worksite health promotion and occupational health and safety practice. *Health Education & Behavior, 23*(2), 175-190. doi:10.1177/109019819602300204

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology, 10*(2), 170-180. doi:10.1037/1076-8998.10.2.170

Baltes, B. B., & Dickson, M. W. (2001). Using life-span models in industrial-organizational psychology: The theory of selective optimization with compensation. *Applied Developmental Science, 5*(1), 51-62. doi:10.1207/S1532480XADS0501_5

Baltes, B. B., & Finkelstein, L. M. (2011). Contemporary empirical advancements in the study of aging in the workplace. *Journal of Organizational Behavior, 32*(2), 151-154. doi:10.1002/job.727

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*(9), 1175-1184. doi:10.1037/0003-066X.44.9.1175

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY, US: W H Freeman/Times Books/ Henry Holt & Co.

Barnett, R. C., & Brennan, R. T. (1997). Change in job conditions, change in psychological distress, and gender: A longitudinal study of dual-earner

couples. *Journal of Organizational Behavior, 18*(3), 253-274.

doi:10.1002/(SICI)1099-1379(199705)18:3<253::AID-JOB800>3.0.CO;2-7

Baum, C. (2006). *An introduction to modern econometrics using Stata*. College Station, TX: Stata Press.

Beehr, T. A., & Newman, J. E. (1978). Job stress, employee health, and organizational effectiveness: A facet analysis, model and literature review. *Personnel Psychology, 31*(4), 665-699. doi:10.1111/j.1744-6570.1978.tb02118.x

Bernal, D., Snyder, D., & McDaniel, M. (1998). The age and job satisfaction relationship: Does its shape and strength still evade us? *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 53B*(5), P287-P293. doi:10.1093/geronb/53B.5.P287

Boerner, K., & Jopp, D. (2007). Improvement/maintenance and reorientation as central features of coping with major life change and loss: Contributions of three life-span theories. *Human Development, 50*(4), 171-195. doi:10.1159/000103358

Bourbonnais, R., Brisson, C., Moisan, J., & Vézina, M. (1996). Job strain and psychological distress in white-collar workers. *Scandinavian Journal of Work, Environment & Health, 22*(2), 139-145.

Brim, O. G., Baltes, P. B., Bumpass, L. L., Cleary, P. D., Featherman, D. L., Hazzard, W. R., . . . Shweder, R. A. (1999a). *National survey of midlife development in the United States (MIDUS), 1995-1996: Technical report.* Ann Arbor, MI: ICPSR.

Brim, O. G., Baltes, P. B., Bumpass, L. L., Cleary, P. D., Featherman, D. L., Hazzard, W. R., . . . Shweder, R. A. (1999b). *National survey of midlife development in the*

United States (MIDUS), 1995-1996: Scales reference document. Ann Arbor, MI: ICPSR.

Brim, O. G., Baltes, P. B., Bumpass, L. L., Cleary, P. D., Featherman, D. L., Hazzard, W. R., . . . Shweder, R. A. (1999c). *National survey of midlife development in the United States (MIDUS), 1995-1996: Methodology.* Ann Arbor, MI: ICPSR.

Brim, O. G., Ryff, C. D., & Kessler, R. C. (Eds.). (2004). *How healthy are we?: A national study of well-being at midlife* Chicago, IL, US: University of Chicago Press.

Brunborg, G. S. (2008). Core self-evaluations: A predictor variable for job stress. *European Psychologist, 13*(2), 96-102. doi:10.1027/1016-9040.13.2.96

Burger, J. M. (1989). Negative reactions to increases in perceived personal control. *Journal of Personality and Social Psychology, 56*(2), 246-256.

Cahill, J., & Landsbergis, P. A. (1996). Job strain among post office mailhandlers. *International Journal of Health Services, 26*(4), 731-750.

Calnan, M., Wadsworth, E., May, M., Smith, A., & Wainwright, D. (2004). Job strain, effort - reward imbalance, and stress at work: Competing or complementary models? *Scandinavian Journal of Public Health, 32*(2), 84-93. doi:10.1080/14034940310001668

Carayon, P. (1993). Job design and job stress in office workers. *Ergonomics, 36*(5), 463-477. doi:10.1080/00140139308967905

Chay, Y. W. (1993). Social support, individual differences and well-being: A study of small business entrepreneurs and employees. *Journal of Occupational and*

Organizational Psychology, 66(4), 285-302. doi:10.1111/j.2044-
8325.1993.tb00540.x

Chipperfield, J. G., Perry, R. P., Bailis, D. S., Ruthig, J. C., & Chuchmach loring, P.
(2007). Gender differences in use of primary and secondary control strategies in
older adults with major health problems. *Psychology & Health,22*(1), 83-105.
doi:10.1080/14768320500537563

Chipperfield, J. G., Perry, R. P., & Menec, V. H. (1999). Primary and secondary control-
enhancing strategies. *Journal of Aging and Health, 11*(4), 517-539.
doi:10.1177/089826439901100403

Clark, A., Oswald, A., & Warr, P. (1996). Is job satisfaction U-shaped in age? *Journal of
Occupational and Organizational Psychology, 69*(1), 57-81. doi:10.1111/j.2044-
8325.1996.tb00600.x

Clegg, C., Wall, T., & Kemp, N. (1987). Women on the assembly line: A comparison of
main and interactive explanations of job satisfaction, absence and mental
health. *Journal of Occupational Psychology, 60*(4), 273-287. doi:10.1111/j.2044-
8325.1987.tb00260.x

Cobb, S. (1976). Presidential address-1976. social support as a moderator of life
stress. *Psychosomatic Medicine, 38*(5), 300-314.

Cohen, A. (1998). An examination of the relationship between work commitment and
work outcomes among hospital nurses. *Scandinavian Journal of
Management, 14*(1-2), 1-17. doi:10.1016/S0956-5221(97)00033-X

Cohen, S., Gottlieb, B. H., & Underwood, L. G. (2000). Social relationships and health.
In S. Cohen, L. G. Underwood & B. H. Gottlieb (Eds.), (pp. 3-25). New York,
NY, US: Oxford University Press.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering
hypothesis. *Psychological Bulletin, 98*(2), 310-357. doi:10.1037/0033-
2909.98.2.310

Cox, T., & Griffiths, A. (1996). Assessment of psychosocial hazards at work. In M. J.
Schabracq, J. A. M. Winnubst & C. L. Cooper (Eds.), *Handbook of work and
health psychology* (pp. 127-143). Chichester, UK: Wiley.

Czaja, S. J., & Sharit, J. (1998). Age differences in attitudes toward computers. *The
Journals of Gerontology Series B: Psychological Sciences and Social
Sciences, 53B*(5), P329-P340. doi:10.1093/geronb/53B.5.P329

Daniels, K., & Guppy, A. (1994). Occupational stress, social support, job control, and
psychological well-being. *Human Relations, 47*(12), 1523-1544.
doi:10.1177/001872679404701205

Davies, D. R., & Sparrow, P. R. (1985). Age and work behaviour. In N. Charness
(Ed.), *Aging and human performance* (pp. 293-332). Chichester, UK: John Wiley
& Sons.

de Croon, E. M., Sluiter, J. K., Blonk, R. W. B., Broersen, J. P. J., & Frings-Dresen, M.
(2004). Stressful work, psychological job strain, and turnover: A 2-year
prospective cohort study of truck drivers. *Journal of Applied Psychology, 89*(3),
442-454. doi:10.1037/0021-9010.89.3.442

de Lange, A. H., Taris, T. W., Jansen, P., Smulders, P., Houtman, I., & Kompier, M. A. J. (2006). Age as factor in the relation between work and mental health: Results of the longitudinal TAS survey. In S. McIntyre, & J. Houdmont (Eds.), *Occupational health psychology: European perspectives on research, education and practice* (pp. 21-45). Castelo da Maia: ISMAI Publishers.

de Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2004). The relationships between work characteristics and mental health: Examining normal, reversed and reciprocal relationships in a 4-wave study. *Work & Stress, 18*(2), 149-166. doi:10.1080/02678370412331270860

de Rijk, A. E., Blanc, P. M. L., Schaufeli, W. B., & de Jonge, J. (1998). Active coping and need for control as moderators of the job demand-control model: Effects on burnout. *Journal of Occupational and Organizational Psychology, 71*(1), 1-18. doi:10.1111/j.2044-8325.1998.tb00658.x

Dwyer, D. J., & Ganster, D. C. (1991). The effects of job demands and control on employee attendance and satisfaction. *Journal of Organizational Behavior, 12*(7), 595-608. doi:10.1002/job.4030120704

Ebner, N. C., Freund, A. M., & Baltes, P. B. (2006). Developmental changes in personal goal orientation from young to late adulthood: From striving for gains to maintenance and prevention of losses. *Psychology and Aging,21*(4), 664-678. doi:10.1037/0882-7974.21.4.664

Elovainio, M., & Kivimäki, M. (1996). Occupational stresses, goal clarity, control, and strain among nurses in the Finnish health care system. *Research in Nursing &*

Health, 19(6), 517-524. doi:10.1002/(SICI)1098-240X(199612)19:6<517::AID-
NUR7>3.0.CO;2-R

Elsass, P. M., & Veiga, J. F. (1997). Job control and job strain: A test of three
models. *Journal of Occupational Health Psychology, 2*(3), 195-211.
doi:10.1037/1076-8998.2.3.195

Ettner, S. L., & Grzywacz, J. G. (2001). Workers' perceptions of how jobs affect health:
A social ecological perspective. *Journal of Occupational Health
Psychology, 6*(2), 101-113. doi:10.1037/1076-8998.6.2.101

Families and Work Institute. (2008). *National study of the changing workforce 2008:
Technical information.* New York, NY: Families and Work Institute.

Fletcher, B. (1988). The epidemiology of occupational stress. In C. L. Cooper, & R.
Payne (Eds.), *Causes, coping and consequences of stress at work* (pp. 3-50). New
York, NY: John Wiley & Sons, Ltd.

Fletcher, B., & Jones, F. (1993). A refutation of Karasek's demand-discretion model of
occupational stress with a range of dependent measures. *Journal of
Organizational Behavior, 14*(4), 319-330. doi:10.1002/job.4030140404

Fox, M. L., Dwyer, D. J., & Ganster, D. C. (1993). Effects of stressful job demands and
control on physiological and attitudinal outcomes in a hospital setting. *The
Academy of Management Journal, 36*(2), pp. 289-318.

Frese, M. (1989). Theoretical models of control and health. In S. L. Sauter, J. J. Hurrel &
C. L. Cooper (Eds.), *Job control and worker health* (pp. 107-108). Chichester,
UK: Wiley.

Frese, M., & Zapf, D. (1994). Action as the core of work psychology: A German approach. In H. C. Triandis, M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., pp. 271-340). Palo Alto, CA, US: Consulting Psychologists Press.

Freund, A. M. (2006). Age-differential motivational consequences of optimization versus compensation focus in younger and older adults. *Psychology and Aging, 21*(2), 240-252. doi:10.1037/0882-7974.21.2.240

Freund, A. M., & Baltes, P. B. (1998). Selection, optimization, and compensation as strategies of life management: Correlations with subjective indicators of successful aging. *Psychology and Aging, 13*(4), 531-543. doi:10.1037/0882-7974.13.4.531

Freund, A. M., & Baltes, P. B. (2007). Toward a theory of successful aging: Selection, optimization, and compensation. In R. Fernández-Ballesteros (Ed.), *Geropsychology: European perspectives for an aging world.* (pp. 239-254). Ashland, OH, US: Hogrefe & Huber Publishers.

Ganster, D. C. (1989). *Measurement of worker control.* No. Final report for Contract 88-79187). Washington, DC: National Institute for Occupational Safety and Health.

Ganster, D. G., & Fusilier, M. R. (1989). Control in the workplace. In C. L. Cooper, & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (pp. 235-280). Chichester, UK: Wiley.

Ganster, D. C., Fox, M. L., & Dwyer, D. J. (2001). Explaining employees' health care costs: A prospective examination of stressful job demands, personal control, and physiological reactivity. *Journal of Applied Psychology, 86*(5), 954-964.

Geller, P. A., & Hobfoll, S. E. (1994). Gender differences in job stress, tedium and social support in the workplace. *Journal of Social and Personal Relationships, 11*(4), 555-572. doi:10.1177/0265407594114004

Gupta, N., & Beehr, T. A. (1979). Job stress and employee behaviors. *Organizational Behavior and Human Performance, 23*(3), 373-387. doi:10.1016/0030-5073(79)90004-7

Heckhausen, J. (1997). Developmental regulation across adulthood: Primary and secondary control of age-related challenges. *Developmental Psychology, 33*(1), 176-187. doi:10.1037/0012-1649.33.1.176

Heckhausen, J., & Schulz, R. (1993). Optimisation by selection and compensation: Balancing primary and secondary control in life span development. *International Journal of Behavioral Development, 16*(2), 287-303. doi:10.1177/016502549301600210

Heckhausen, J., & Schulz, R. (1995). A life-span theory of control. *Psychological Review, 102*(2), 284-304. doi:10.1037/0033-295X.102.2.284

Heckhausen, J., Wrosch, C., & Schulz, R. (2010). A motivational theory of life-span development. *Psychological Review, 117*(1), 32-60. doi:10.1037/a0017668

Hedge, J. W., Borman, W. C., & Lammlein, S. E. (2006). *The aging workforce: Realities, myths, and implications for organizations*. Washington, DC, US: American Psychological Association. doi:10.1037/11325-000

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist, 44*(3), 513-524. doi:10.1037/0003-066X.44.3.513

Hobfoll, S. E., & Shirom, A. (2001). *Conservation of resources theory: Applications to stress and management in the workplace*. New York, NY, US: Marcel Dekker.

Hochwarter, W. A., Ferris, G. R., Perrewé, P. L., Witt, L. A., & Kiewitz, C. (2001). A note on the nonlinearity of the age–job-satisfaction relationship. *Journal of Applied Social Psychology, 31*(6), 1223-1237. doi:10.1111/j.1559-1816.2001.tb02671.x

Hoel, H., Sparks, K., & Cooper, C. L. (2001). *The cost of Violence/Stress at work and the benefits of a violence/stress-free working environment.* Geneva: International Labour Organization (ILO). Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_118190.pdf

Honda, K., & Jacobson, J. S. (2005). Use of complementary and alternative medicine among united states adults: The influences of personality, coping strategies, and social support. *Preventive Medicine,40*(1), 46-53. doi:10.1016/j.ypmed.2004.05.001

Horn, J. L., & Hofer, S. (1992). Major abilities and development in the adult period. In R. J. Sternberg, & C. A. Berg (Eds.), *Intellectual development* (pp. 44-99). Cambridge, England: Cambridge University Press.

Horn, J., L. (1970). Organization of data on life-span development of human abilities. In L. R. Goulet, & P. B. Baltes (Eds.), *Life-span developmental psychology: Research and theory* (pp. 423-466). New York, NY: Academic Press.

Horn, J. L., & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology, 57*(5), 253-270. doi:10.1037/h0023816

Horn, J. L., & Cattell, R. B. (1967). Age differences in fluid and crystallized intelligence. *Acta Psychologica, 26*(0), 107-129. doi:10.1016/0001-6918(67)90011-X

House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley Publishing.

House, J. S. (1987). Social support and social structure. *Sociological Forum, 2*(1), 135-146. doi:10.1007/BF01107897

Houtman, I., & Kompier, M. (1995). Risk factors and occupational risk groups for work stress in the Netherlands. In S. L. Sauter, & L. R. Murphy (Eds.), *Organizational risk factors for job stress* (pp. 209-225). Washington, DC: American Psychological Association.

Hunter, J. E., & Hunter, R. F. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin, 96*(1), 72-98. doi:10.1037/0033-2909.96.1.72

Ilmarinen, J. E. (2001). Aging workers. *Occupational and Environmental Medicine, 58*(8), 546-546. doi:10.1136/oem.58.8.546

Ippolito, J., Adler, A. B., Thomas, J. L., Litz, B. T., & Hölzl, R. (2005). Extending and applying the demand-control model: The role of soldier's coping on a peacekeeping deployment. *Journal of Occupational Health Psychology,10*(4), 452-464. doi:10.1037/1076-8998.10.4.452

Jamal, M. (2007). Job stress and job performance controversy revisited: An empirical examination in two countries. *International Journal of Stress Management, 14*(2), 175-187. doi:10.1037/1072-5245.14.2.175

James, J. B., McKechnie, S., & Swanberg, J. (2011). Predicting employee engagement in an age-diverse retail workforce. *Journal of Organizational Behavior, 32*(2), 173-196. doi:10.1002/job.681

Johnson, J. (1989). Control, collectivity and the psychosocial work environment. In S. Sauter, J. Hurell & C. Cooper (Eds.), *Job control and worker health* (pp. 55-74). New York, NY: John Wiley & Sons, Ltd.

Johnson, J. V. (1989). Collective control: Strategies for survival in the workplace. *International Journal of Health Services, 19*(3), 469-480.

Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the

Swedish working population. *American Journal of Public Health, 78*(10), 1336-1342. doi:10.2105/AJPH.78.10.1336

Johnson, J. V., Hall, E. M., & Theorell, T. (1989). Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian Journal of Work, Environment & Health, 15*(4), 271-279.

Kahn, R., & Byosiere, P. (1990). Stress in organizations. In M. Dunnette, & L. Hough (Eds.), *Handbook of industrial & organizational psychology* (2nd ed., pp. 571-650). Palo Alto, CA: Consulting Psychologists Press, Inc.

Kanfer, R., & Ackerman, P. L. (2004). Aging, adult development, and work motivation. *The Academy of Management Review, 29*(3), 440-458. doi:10.5465/AMR.2004.13670969

Karasek, R. A. (1989). Control in the workplace and its health-related aspects. In S. L. Sauter, J. J. Hurrell & C. L. Cooper (Eds.), *Job control and worker health* (pp. 129-159). New York, NY: Wiley.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*(2), 285-308. doi:10.2307/2392498

Karasek, R., Baker, D., Marxer, F., Ahlbom, A., & Theorell, T. (1981). Job decision latitude, job demands, and cardiovascular disease: A prospective study of Swedish men. *American Journal of Public Health, 71*(7), 694-705. doi:10.2105/AJPH.71.7.694

141

Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York, NY: Basic Books.

Kessler, R. C., & McLeod, J. D. (1985). Social support and mental health in community samples. In S. Cohen S. L. Syme (Ed.),*Social support and health* (pp. 219-240). San Diego, CA, US: Academic Press.

Körner, A., Reitzle, M., & Silbereisen, R. K. (2011). Work-related demands and life satisfaction: The effects of engagement and disengagement among employed and long-term unemployed people. *Journal of Vocational Behavior,* doi:10.1016/j.jvb.2011.05.004

Kristensen, T. S. (1996). Job stress and cardiovascular disease: A theoretic critical review. *Journal of Occupational Health Psychology, 1*(3), 246-260.

Kristensen, T. S. (1995). The demand-control-support model: Methodological challenges for future research. *Stress Medicine, 11*(1), 17-26. doi:10.1002/smi.2460110104

Landbergis, P. A., Schnall, P. L., Deitz, D., Friedman, R., & Pickering, T. (1992). The patterning of psychological attributes and distress by 'job strain' and social support in a sample of working men. *Journal of Behavioral Medicine, 15*, 379-405.

Lang, F. R., & Heckhausen, J. (2001). Perceived control over development and subjective well-being: Differential benefits across adulthood. *Journal of Personality and Social Psychology, 81*(3), 509-523. doi:10.1037/0022-3514.81.3.509

Langer, E. J. (1983). *Psychology of control*. Beverly Hills, CA: Sage.

Larsson, G., & Setterlind, S. (1990). Work load/work control and health: Moderating

      effects of heredity, self-image, coping, and health behavior. *International Journal*

      of Health Sciences, 1, 79-88.

Lavallo, W. R. (2005). *Stress and health: Biological and psychological interactions* (2nd

      ed.). Thousand Oaks, CA: Sage.

Lyon, P., & Pollard, D. (1997). Perceptions of the older employee: Is anything really

      changing. *Personnel Review, 26*(4), 245-257. doi:10.1108/00483489710172051

MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of

      dichotomization of quantitative variables. *Psychological Methods, 7*(1), 19-40.

      doi:10.1037/1082-989X.7.1.19

Manning, M. R., Jackson, C. N., & Fusilier, M. R. (1996). Occupational stress, social

      support, and the costs of health care. *The Academy of Management*

      Journal, 39(3), pp. 738-750.

Marriage, K., & Cummins, R. A. (2004). Subjective quality of life and self-esteem in

      children: The role of primary and secondary control in coping with everyday

      stress. *Social Indicators Research, 66*(1), 107-122.

      doi:10.1023/B:SOCI.0000007493.32548.0c

Marshall, N. L., Barnett, R., C., Baruch, G. K., & Pleck, J. (1991). More than A job:

      Women and stress in caregiving occupations. In H. Z. Lopata, & J. A. Levy

      (Eds.), *Current research on occupations and professions* (pp. 61-81). Greenwich,

      CT: JAI Press Inc.

Mathieu, J. E., & Farr, J. L. (1991). Further evidence for the discriminant validity of

measures of organizational commitment, job involvement, and job

satisfaction. *Journal of Applied Psychology, 76*(1), 127-133.

McEvoy, G. M., & Cascio, W. F. (1989). Cumulative evidence of the relationship

between employee age and job performance. *Journal of Applied

Psychology, 74*(1), 11-17. doi:10.1037/0021-9010.74.1.11

McLaney, M. A., & Hurrell, J. J. (1988). Control, stress, and job satisfaction in Canadian

nurses. *Work & Stress, 2*(3), 217-224. doi:10.1080/02678378808259169

Meier, L. L., Semmer, N. K., Elfering, A., & Jacobshagen, N. (2008). The double

meaning of control: Three-way interactions between internal resources, job

control, and stressors at work. *Journal of Occupational Health Psychology, 13*(3),

244-258. doi:10.1037/1076-8998.13.3.244

Melamed, S., Kushnir, T., & Meir, E. I. (1991). Attenuating the impact of job demands:

Additive and interactive effects of perceived control and social support. *Journal

of Vocational Behavior, 39*(1), 40-53. doi:10.1016/0001-8791(91)90003-5

Mermin, G. B. T., Johnson, R. W. & Murphy, D. (2006). *Why do boomers plan to work

so long?* Retrieved from http://www.urban.org/publications/311386.html

Mikkelsen, A., Øgaard, T., & Landsbergis, P. (2005). The effects of new dimensions of

psychological job demands and job control on active learning and occupational

health. *Work & Stress, 19*(2), 153-175. doi:10.1080/02678370500167808

Mor Barak, M. E. (1995). The meaning of work for older adults seeking employment:

    The generativity factor. *International Journal of Aging & Human*

    Development, 41(4), 325-344.

Morling, B., & Evered, S. (2006). Secondary control reviewed and

    defined. *Psychological Bulletin, 132*(2), 269-296. doi:10.1037/0033-

    2909.132.2.269

Moyle, P. (1995). The role of negative affectivity in the stress process: Tests of

    alternative models. *Journal of Organizational Behavior, 16*(6), 647-668.

    doi:10.1002/job.4030160705

Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative

    affect: A developmental perspective on happiness. *Journal of Personality and*

    Social Psychology, 75(5), 1333-1349. doi: 10.1037/0022-3514.75.5.1333

Mullarkey, S., Jackson, P. R., Wall, T. D., Wilson, J. R., & Grey-Taylor, S. M. (1997).

    The impact of technology characteristics and job control on worker mental

    health. *Journal of Organizational Behavior, 18*(5), 471-489.

    doi:10.1002/(SICI)1099-1379(199709)18:5<471::AID-JOB810>3.0.CO;2-V

Muncer, S. (2001). Nurses' representations of the perceived causes of work-related stress:

    A network drawing approach. *Work and Stress, 15*(1), 40-52.

Munnell, A. H. (2004). *Population aging: It's not just the baby boom.* (Issue in Brief No.

    16). Chestnut Hill, MA: Center for Retirement Research at Boston College.

    Retrieved from

    http://crr.bc.edu/briefs/population_aging_its_not_just_the_baby_boom.html

Murphy, L. R. (2002). Job stress research at NIOSH: 1972–2002. In P. L. Perrewe, & D.

    C. Ganster (Eds.), *Historical and current perspectives on stress and health*

    (research in occupational stress and well-being, volume 2) (pp. 1-55). Cambridge,

    MA: Emerald Group Publishing Limited.

National Institute for Occupation Safety and Health (NIOSH). (1999). *Stress at work.* No.

    DHHS (NIOSH) Publication Number 99-101). Washington, DC: NIOSH.

    Retrieved from http://www.cdc.gov/niosh/docs/99-101/

Neidhammer, I., & Chea, M. (2003). Psychosocial factors at work and self-reported

    health: Comparative results of cross sectional and prospective analyses of the

    French GAZEL cohort. *Occupational Environmental Medicine,60*(7), 509-515.

    doi:10.1136/oem.60.7.509

Neiss, M. B., Stevenson, J., Sedikides, C., Kumashiro, M., Finkel, E. J., & Rusbult, C. E.

    (2005). Executive self, self-esteem, and negative affectivity: Relations at the

    phenotypic and genotypic level. *Journal of Personality and Social*

    Psychology, 89(4), 593-606. doi:10.1037/0022-3514.89.4.593

Ng, T. W. H., & Feldman, D. C. (2008). The relationship of age to ten dimensions of job

    performance. *Journal of Applied Psychology, 93*(2), 392-423. doi:10.1037/0021-

    9010.93.2.392

Ng, T. W. H., & Feldman, D. C. (2010). The relationships of age with job attitudes: A

    meta-analysis. *Personnel Psychology, 63*(3), 677-718. doi:10.1111/j.1744-

    6570.2010.01184.x

Ordin, D. L. (1992). Surveillance, monitoring and screening in occupational health. In J.

    M. Last, & R. B. Wallace (Eds.), *Public health and preventive medicine* (13th ed.,

    pp. 551-558). Norwalk, CT: Appleton & Lange.

Orpen, C. (1992). Social support as a moderator of the effect of work stress on personal

    strain among black employees in South Africa. *The Journal of Social*

    Psychology, 132(2), 269-270.

Pal, S., & Saksvik, P. Ø. (2008). Work-family conflict and psychosocial work

    environment stressors as predictors of job stress in a cross-cultural

    study. *International Journal of Stress Management, 15*(1), 22-42.

    doi:10.1037/1072-5245.15.1.22

Parker, D. F., & DeCotiis, T. A. (1983). Organizational determinants of job

    stress. *Organizational Behavior and Human Performance, 32*(2), 160-177.

    doi:10.1016/0030-5073(83)90145-9

Parker, L. E. (1993). When to fix it and when to leave: Relationships among perceived

    control, self-efficacy, dissent, and exit. *Journal of Applied Psychology, 78*(6),

    949-959.

Parker, S. K., Wall, T. D., & Cordery, J. L. (2001). Future work design research and

    practice: Towards an elaborated model of work design. *Journal of Occupational*

    and Organizational Psychology, 74(4), 413-440.

Parkes, K. R. (1991). Locus of control as moderator: An explanation for additive versus

    interactive findings in the demand-discretion model of work stress? *British*

    Journal of Psychology, 82(3), 291-312. doi:10.1111/j.2044-8295.1991.tb02401.x

Parkes, K. R., & Von Rabenau, C. (1993). Work characteristics and well-being among

    psychiatric health-care staff. *Journal of Community & Applied Social*

    Psychology, 3(4), 243-259. doi:10.1002/casp.2450030403

Pearlin, L. I., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981). The stress

    process. *Journal of Health and Social Behavior, 22*(4), pp. 337-356.

Rhodes, S. R. (1983). Age-related differences in work attitudes and behavior: A review

    and conceptual analysis. *Psychological Bulletin, 93*(2), 328-367.

    doi:10.1037/0033-2909.93.2.328

Roper ASW. (2004). *Baby boomers envision retirement II, key findings: Survey of baby*

    boomers' expectations for retirement. Washington, DC: AARP, Knowledge

    Management.

Rosen, B., & Jerdee, T. H. (1976). The nature of job-related age stereotypes. *Journal of*

    Applied Psychology, 61(2), 180-183. doi:10.1037/0021-9010.61.2.180

Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the

    self: A two-process model of perceived control. *Journal of Personality and Social*

    Psychology, 42(1), 5-37. doi:10.1037/0022-3514.42.1.5

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of

    reinforcement. *Psychological Monographs: General & Applied, 80*(1), 1-28.

Rotter, J. B. (1990). Internal versus external control of reinforcement: A case history of a

    variable. *American Psychologist, 45*(4), 489-493. doi:10.1037/0003-

    066X.45.4.489

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. New York, NY: Wiley.

Ryff, C. Almeida, D. Ayanian, J., Carr, D., Cleary, P. Coe, C., …Williams, D. (2007). *Midlife development in the United States (MIDUS II), 2004-2006: Documentation of Weights*. Ann Arbor, MI: ICPSR.

Salanova, M., Peiró, J. M., & Schaufeli, W. B. (2002). Self-efficacy specificity and burnout among information technology workers: An extension of the job demand-control model. *European Journal of Work and Organizational Psychology, 11*(1), 1-25. doi:10.1080/13594320143000735

Salthouse, T. A. (2004). What and when of cognitive aging. *Current Directions in Psychological Science, 13*(4), 140-144. doi:10.1111/j.0963-7214.2004.00293.x

Schabracq, M. J., Cooper, C., & Winnubst, J. (1996). Work and health psychology: Towards a theoretical framework. In M. Schabracq, J. Winnubst & C. L. Cooper (Eds.), *Handbook of work and health psychology* (pp. 3-29). New York, NY: John Wiley & Sons, Ltd.

Schaubroeck, J., & Merritt, D. E. (1997). Divergent effects of job control on coping with work stressors: The key role of self-efficacy. *Academy of Management Journal, 40*(3), 738-754. doi:10.2307/257061

Schaufeli, W. B., Bakker, A. B., & Rhenen, W. V. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behavior, 30*(7), 893-917. doi:10.1002/job.595

Schaufeli, W. B., Bakker, A. B., van der Heijden, F. M. M. A., & Prins, J. T. (2009). Workaholism among medical residents: It is the combination of working excessively and compulsively that counts. *International Journal of Stress Management, 16*(4), 249-272. doi:10.1037/a0017537

Schmidt, F. L., Hunter, J. E., Outerbridge, A. N., & Goff, S. (1988). Joint relation of experience and ability with job performance: Test of three hypotheses. *Journal of Applied Psychology, 73*(1), 46-57. doi:10.1037/0021-9010.73.1.46

Schroeder, D. H., & Salthouse, T. A. (2004). Age-related effects on cognition between 20 and 50 years of age. *Personality and Individual Differences, 36*(2), 393-404. doi:10.1016/S0191-8869(03)00104-1

Schulz, R., & Heckhausen, J. (1996). A life span model of successful aging. *American Psychologist, 51*(7), 702-714. doi:10.1037/0003-066X.51.7.702

Schulz, R., & Heckhausen, J. (1999). Aging, culture and control: Setting a new research agenda. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 54B*(3), P139-P145. doi:10.1093/geronb/54B.3.P139

Selye, H. (1976). *The stress of life* (second ed.). New York, NY: McGraw-Hill.

Shrestha, L. B. (2006). *Life expectancy in the United States.* (CRS Report for Congress No. RL32792). Washington, DC: Congressional Research Service, The Library of Congress. Retrieved from http://aging.senate.gov/crs/aging1.pdf

Shultz, K. S., Wang, M., Crimmins, E. M., & Fisher, G. G. (2010). Age differences in the demand-control model of work stress: An examination of data from 15 European

countries. *Journal of Applied Gerontology, 29*(1), 21-47.

doi:10.1177/0733464809334286

Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology, 71*(3), 549-570. doi:10.1037/0022-3514.71.3.549

Sluiter, J. K. (2006). High-demand jobs: Age-related diversity in work ability? *Applied Ergonomics, 37*(4), 429-440. doi:10.1016/j.apergo.2006.04.007

Spector, P. (1998). A control theory of the job stress process. In C. L. Cooper (Ed.), *Theories of organizational stress* (pp. 153-169). United Kingdom: Oxford University Press.

Spector, P. E. (2002). Employee control and occupational stress. *Current Directions in Psychological Science, 11*(4), 133-136. doi:10.1111/1467-8721.00185

Spector, P. E. (2009). The role of job control in employee health and well-being. In C. L. Cooper, J. C. Quick & M. J. Schabracq (Eds.), *International handbook of work and health psychology* (3rd ed., pp. 173-195). United Kingdom: Wiley-Blackwell.

Spirduso, W. W. (1995). *Physical dimensions of aging*. Champaign, IL: Human Kinetics.

Stansfeld, S. A., North, F. M., White, I., & Marmot, M. G. (1995). Work characteristics and psychiatric disorder in civil servants in London. *Journal of Epidemiology and Community Health (1979-), 49*(1), pp. 48-53.

Stansfeld, S. A., Fuhrer, R., Shipley, M. J., & Marmot, M. G. (2002). Psychological distress as a risk factor for coronary heart disease in the Whitehall II study. *International Journal of Epidemiology, 31*(1), 248-255. doi:10.1093/ije/31.1.248

Tishman, F. M., Van Looy, S., & Bruyere, S. M. (2012). *Employer strategies for responding to an aging workforce.* New Brunswick, NJ: NTAR Leadership Center. Retrieved from http://www.heldrich.rutgers.edu/sites/default/files/content/NTAR_Employer_Strat egies_Report.pdf

Theorell, T., & Karasek, R. A. (1996). Current issues relating to psychosocial job strain and cardiovascular disease research. *Journal of Occupational Health Psychology, 1*(1), 9-26. doi:10.1037/1076-8998.1.1.9

Thompson, S. C., Thomas, C., Rickabaugh, C. A., Tantamjarik, P., Otsuki, T., Pan, D., ... Sinar, E. (1998). Primary and secondary control over age-related changes in physical appearance. *Journal of Personality, 66*(4), 583-605. doi:10.1111/1467-6494.00025

Toossi, M. (2006). A new look at long-term labor force projections to 2050. *Monthly Labor Review, 129*(11), 19-39.

Toossi, M. (2007). Labor force projections to 2016: More workers in their golden years. *Monthly Labor Review, 130*(11), 33-52.

Truxillo, D. M. (2009). Age, work motivation, and the potential for age-based differential validity for personality measures. *Industrial and Organizational Psychology, 2*(1), 106-108. doi:10.1111/j.1754-9434.2008.01116.x

Tummers, G. E. R., Landeweerd, J. A., & Van Merode, G. G. (2002). Organization, work and work reactions: A study of the relationship between organizational aspects of

nursing and nurses' work characteristics and work reactions. *Scandinavian Journal of Caring Sciences, 16*(1), 52-58. doi:10.1046/j.1471-6712.2002.00050.x

U.S. Census Bureau. (2009). *Projected life expectancy at birth by sex, race, and Hispanic origin for the united states: 2010 to 2050.* (National Population Projections No. NP2009-T10-C). Washington, DC: U.S. Census Bureau, Population Division.

van Buuren, S., Boshuizen, H. C., & Knook, D. L. (1999). Multiple imputation of missing blood pressure covariates in survival analysis. *Statistics in Medicine, 18*(6), 681-694. doi:10.1002/(SICI)1097-0258(19990330)18:6<681::AID-SIM71>3.0.CO;2-R

van der Doef, M., & Maes, S. (1998). The job demand-control(-support) model and physical health outcomes: A review of the strain and buffer hypotheses. *Psychology & Health, 13*(5), 909-936.

van der Doef, M., & Maes, S. (1999). The job demand-control (-support) model and psychological well-being: A review of 20 years of empirical research. *Work & Stress, 13*(2), 87-114. doi:10.1080/026783799296084

van Veldhoven, M., Taris, T. W., de Jonge, J., & Broersen, S. (2005). The relationship between work characteristics and employee health and well-being: How much complexity do we really need? *International Journal of Stress Management, 12*(1), 3-28. doi:10.1037/1072-5245.12.1.3

van Yperen, N. W., & Hagedoorn, M. (2003). Do high job demands increase intrinsic motivation or fatigue or both? The role of job control and job social support. *The Academy of Management Journal, 46*(3), pp. 339-348.

153

Vincent, G. K., & Velko, V. A. (2010). *The next four decades, the older population in the United States: 2010 to 2050.* (Current Population Reports No. P25-1138). Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2010pubs/p25-1138.pdf

Viswesvaran, C., Sanchez, J. I., & Fisher, J. (1999). The role of social support in the process of work stress: A meta-analysis. *Journal of Vocational Behavior, 54*(2), 314-334. doi:10.1006/jvbe.1998.1661

Von Hippel, P. T. (2007). Regression with missing Ys: An improved strategy for analyzing multiply imputed data. *Sociological Methodology, 37*(1), 83-117. doi:10.1111/j.1467-9531.2007.00180.x

Wahl, H., Becker, S., Burmedi, D., & Schilling, O. (2004). The role of primary and secondary control in adaptation to age-related vision loss: A study of older adults with macular degeneration. *Psychology and Aging, 19*(1), 235-239. doi:10.1037/0882-7974.19.1.235

Waldman, D. A., & Avolio, B. J. (1986). A meta-analysis of age differences in job performance. *Journal of Applied Psychology, 71*(1), 33-38. doi:10.1037/0021-9010.71.1.33

Wall, T. D., Jackson, P. J., Mullarkey, S., & Parker, S. K. (1996). The demands-control model of job strain: A more specific test. *Journal of Occupational and Organizational Psychology, 69*(2), 153-166. doi:10.1111/j.2044-8325.1996.tb00607.x

Wallston, K., Wallston, B., Smith, S., & Dobbins, C. (1987). Perceived control and
health. *Current Psychology, 6*(1), 5-25. doi:10.1007/BF02686633

Warr, P. (1990). Decision latitude, job demands, and employee well-being. *Work &
Stress, 4*(4), 285-294. doi:10.1080/02678379008256991

Warr, P. (1997). Age, work and mental health. In K. W. Schaie, & W. Schooler
(Eds.), *The impact of work on older adults* (pp. 252-296). New York, NY:
Springer.

Warr, P. (2000). *Job performance and the ageing workforce*. Malden, MA, US:
Blackwell Publishing.

Wegman, D. H., & McGee, J. P. (Eds.). (2004). *Health and safety needs of older workers*.
Washington, DC: National Academies Press.

Windsor, T. D. (2009). Persistence in goal striving and positive reappraisal as
psychosocial resources for ageing well: A dyadic analysis. *Aging & Mental
Health, 13*(6), 874-884. doi:10.1080/13607860902918199

Wrosch, C., Heckhausen, J., & Lachman, M. E. (2000). Primary and secondary control
strategies for managing health and financial stress across adulthood. *Psychology
and Aging, 15*(3), 387-399. doi:10.1037/0882-7974.15.3.387

Xie, J. L. (1996). Karasek's model in the people's republic of china: Effects of job
demands, control, and individual differences. *The Academy of Management
Journal, 39*(6), pp. 1594-1618.

Xie, J. L., & Johns, G. (1995). Job scope and stress: Can job scope be too high? *The
Academy of Management Journal, 38*(5), 1288-1309. doi:10.2307/256858

155

Yeung, D., & Fung, H. (2009). Aging and work: How do SOC strategies contribute to job performance across adulthood? *Psychology and Aging, 24*(4), 927-940.

Appendix A: List of Items in each Measure

Psychological Functioning (Mental Health):

During the past 30 days, how much of the time did you feel…
1. so sad nothing could cheer you up
2. nervous
3. restless or fidgety
4. hopeless
5. that everything was an effort
6. worthless

Job Satisfaction:

Please think of the work situation you are in now, whether part-time or full-time, paid or unpaid, at home or at a job. Using a scale from 0 to 10 where 0 means "the worst possible work situation" and 10 means "the best possible work situation," how would you rate your work situation these days?

Job Demands:

How often do…
1. you have to work very intensively -- that is, you are very busy trying to get things done
2. different people or groups at work demand things from you that you think are hard to combine
3. you have too many demands made on you
4. you have enough time to get everything done (reversed)
5. you have a lot of interruption

Job Control:

How often do you…
1. have to initiate things -- such as coming up with your own ideas, or figuring out on your own what needs to be done
2. have a choice in deciding how you do your tasks at work
3. have a choice in deciding what tasks you do at work
4. have a say in decisions about your work
5. have a say in planning your work environment -- that is, how your workplace is arranged or how things are organized
6. control the amount of time you spend on tasks

Job Support:

157

How often…
1. do you get help and support from your coworkers
2. are your coworkers willing to listen to your work-related problems
3. do you get the information you need from your supervisor or superiors
4. do you get help and support from your immediate supervisor
5. is your immediate supervisor willing to listen to your work-related problems

Primary Control:

1. When things don't go according to my plans, my motto is, 'Where there's a will, there's a way'.
2. When faced with a bad situation, I do what I can do to change it for the better.
3. Even when I feel I have too much to do, I find a way to get it all done.
4. When I encounter problems, I don't give up until I solve them.
5. I rarely give up on something I am doing, even when things get tough.

Secondary Control:

1. I find I usually learn something meaningful from a difficult situation.
2. When I am faced with a bad situation, it helps to find a different way of looking at things.
3. Even when everything seems to be going wrong, I can usually find a bright side to the situation.
4. I can find something positive, even in the worst situations.

Appendix B: Weighting

The MIDUS I and MIDUS II datasets both provide proportional weights for the sample to the U.S. Population using the Current Population Survey Oct. 1995 and 2005 samples respectively based on age, gender, education, race, region, and marital status (included only for the MIDUS I) (see Brim et al, 1999c and Ryff et al., 2007 for more information about these weights). These weights were designed to be applied to the random digit dialing (RDD) sample. The main analyses were estimated using these weights in two ways. First both the weighted and unweighted samples were restricted to just respondents from the random digit dialing recruitment and all the analyses were compared. For job satisfaction, the findings were similar regarding significance levels for both the weighted and unweighted analyses. However, for mental health, in the weighted analyses, three interaction terms that were significant in the unweighted analyses, did not reach $p < .05$. They were job demands by job support ($p = .104$), job demands by job control by age ($p = .176$), and job demands by job support by age ($p = .088$). All other findings were consistent.

The population weights were applied in a second way as well. The full sample, which includes the RDD sample, the twin sample, the sibling sample and the city oversample was used. In the weighted analyses, for respondents not in the RDD sample, a value of one was given in the weighting procedure, while the appropriate weight was used for respondents in the full sample from the RDD sample. Again, the weighted and unweighted analyses were compared. For mental health, the findings were similar regarding significance levels. For job satisfaction, four interaction terms that were

significant in the unweighted analyses did not reach p<.05. They were job support by secondary control (p=.086), job demands by job control by primary control (p=.101), job demand by job support by primary control by age (p=.161), and job demands by job support by secondary control by age (p=.101).

The third weight was created by me. The sample in this dissertation includes only those currently employed and thus, weights based on the U.S. Population may not be appropriate. Instead, weighting on the basis of the U.S. Workforce (i.e. those currently employed) is more appropriate, as was done in the 2008 National Study of the Changing Workforce (NSCW), a nationally representative study of workers in the United States (Families and Work Institute, 2008). In order to create appropriate weights, the Oct. 1995 and 2005 CPS samples were used for the MIDUS I and MIDUS II samples, respectively. Proportional weights were created by me based on age using 10-year intervals, gender, and education, measured as high school graduation or lower, some college, and bachelor's degree or higher. These variables were similar to those used in the NSCW, which created weights by gender, education, race, and age (Families and Work Institute, 2008). As there were few or no cases of certain racial groups in specific cells, race was excluded as a weighting variable. Age was limited to those ages represented in the MIDUS data. For the MIDUS I, the age of the working sample ranged from 25-74, with an additional 11 cases age 20-24. Since there were such a low number of cases under 25, the weights for the 25-34 group were used for those 11 cases. In the MIDUS II, the age of the working sample ranged from 34 to 83, with an additional 7 cases ages 30-33. Again due to the low number of cases under 34, the weights for the 34-44 group were used for

those 7 cases. Appendix Table 1 displays the frequencies for the demographics used in

the proportional weights for the MIDUS and CPS data.

Appendix Table 1: Weighting Frequencies

|	MIDUS I (N=4564) %	CPS Oct. 1995 (N=57187) %	MIDUS II (N=2714) %	CPS Oct. 2005 (N=46738) %	MIDUS I Weighted %	MIDUS II Weighted %	Full Sample Weighted %
Age							
25-34 [a]	22.72	29.38			29.38		18.43
35-44 [b]	29.54	32.35	25.42	36.32	32.35	36.32	33.83
45-54	27.96	23.91	33.97	36.48	23.91	36.48	28.60
55-64	15.62	11.19	27.04	21.10	11.19	21.10	14.88
65-74	4.16	3.16	11.20	5.03	3.16	5.03	3.86
75-83			2.36	1.08		1.08	0.40
Gender							
Male	51.88	52.59	51.51	52.21	52.59	52.21	52.45
Female	48.12	47.41	48.49	47.79	47.41	47.79	47.55
Education							
High School Diploma or Lower	33.10	43.56	27.64	39.16	43.56	39.26	41.96
Some College	31.15	27.65	28.49	28.21	27.65	28.21	27.86
Bachelor's Degree or Higher	35.76	28.78	43.87	32.53	28.78	32.53	30.18

Note: [a] For MIDUS I contains 11 cases ages 20-24; [b] For MIDUS II contains 7 cases ages 30-33 and 41 cases age 34

Using the full sample, the unweighted analyses were compared to the weighted analyses using the workforce weight. For job satisfaction, four interaction terms that were significant in the unweighted analyses did not reach p<.05. They were job support by secondary control (p=.150), job demands by job control by primary control (p=.208), job demands by job support by primary control by age (p=.099), and job demands by job support by secondary control by age (p=.109) and age^2 (p=.091). For mental health, the only interaction that did not reach significance in the unweighted analyses was for job demands by job support by age^2 (p=.095).

In the final model, there were several additional interactions among the predictors included in previous models that emerged. These interactions were previously tested in the models and were not found to be significant. These interactions only reached significance when variables not relevent to the main interaction being tested were also included in the model. However, since these interactions became significant, I present them for reference, but the findings should be interpreted cautiously as they were not significant in the main models where they were tested. First, primary control ($B = 0.19$, $SE = 0.09$, $p<0.05$) was found to moderate the job control-job satisfaction relationship such that the relationship became stronger as primary control increased, suggesting that job control may be a greater resource for job satisfaction in workers with higher levels of primary control (see Figure A1).

Figure A1: Primary Control as a Moderator of the Job Control-Job Satisfaction Relationship
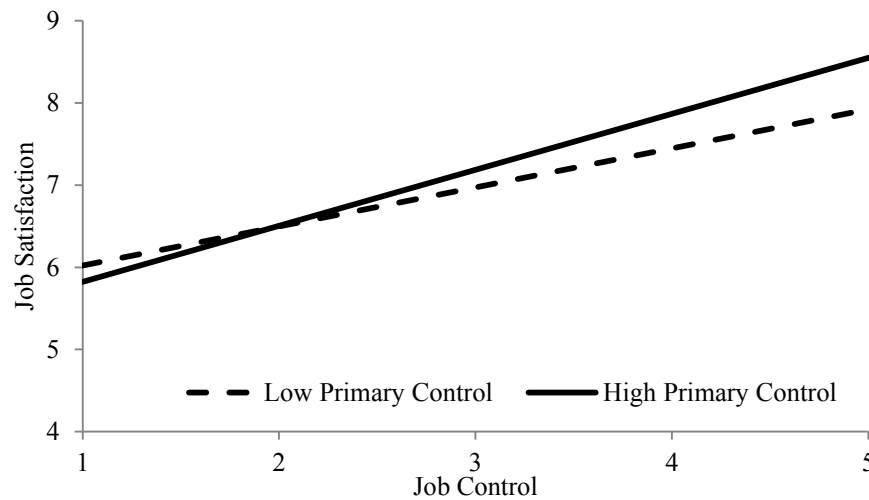
Second, for mental health, secondary control ($B = 0.06$, $SE = 0.02$, $p<0.05$) was found to buffer the job demands-mental health relationship. As can be seen in Figure A2, the

165

negative relationship between job demands and mental health weakened as secondary

control increased.

Figure A2: Secondary Control as a Moderator of the Job Demands-Mental Health
Relationship
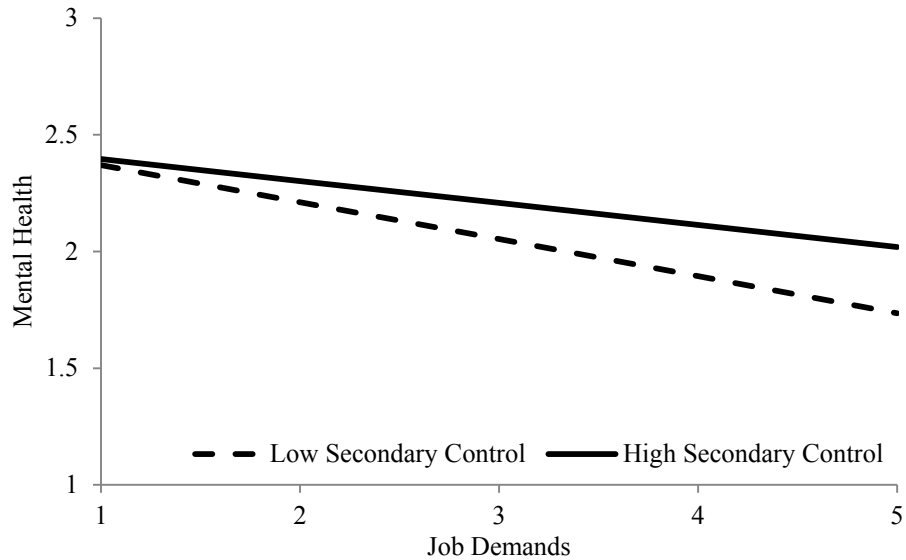
Third, secondary control ($B = -0.19$, $SE = 0.08$, $p<0.05$) moderated the relationship

between job support and job satisfaction. Surprisingly, the positive relationship between

job support and job satisfaction was stronger at low levels of secondary control,

suggesting that job support may be a more important resource for job satisfaction for

workers with low levels of secondary control (see Figure A3). However, at the highest

levels of job support, there was little difference in job satisfaction scores for those with

low compared to high levels of secondary control.

Figure A3: Secondary Control as a Moderator of the Job Support-Mental Health
Relationship
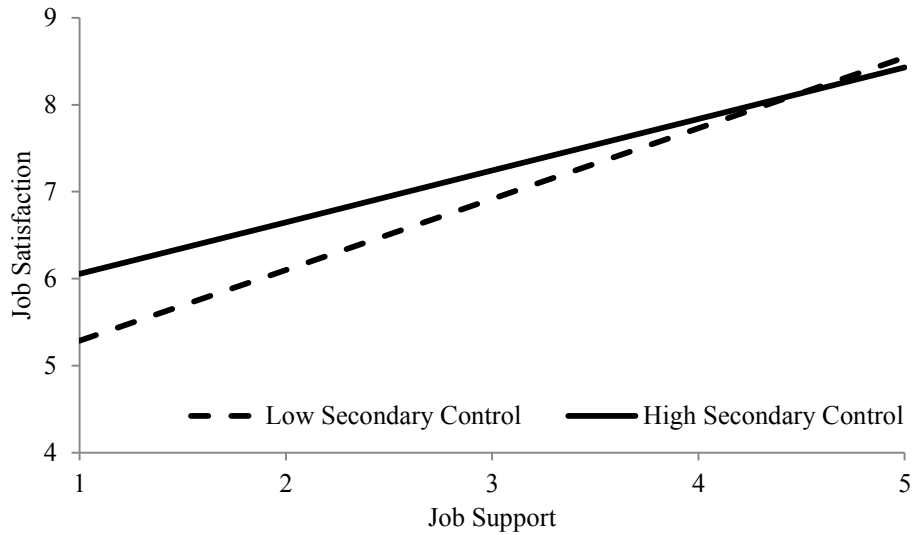
Fourth, the interaction between job demands, job control, and primary control was significant in the job satisfaction final model (B = -0.23, SE = 0.12, $p<0.05$). As can be seen in Figure A4, when primary control was low, the job demands-job satisfaction relationship was less negative when job control was high, however when primary control was high, the relationship varied very little based on the level of job control. This is in contrast to *hypothesis 3A-1,* that job control would only buffer the job demands-outcome relationship at high levels of primary control. Interestingly, at the highest levels of job demands, job satisfaction scores appeared to be dependent on job control and not primary control. Specifically, job satisfaction scores were similar for individuals with high job control and low primary control and individuals with high job control and high primary control.

Figure A4: Variation by Primary Control in Job Control as a Moderator of the Job Demands-Job Satisfaction Relationship
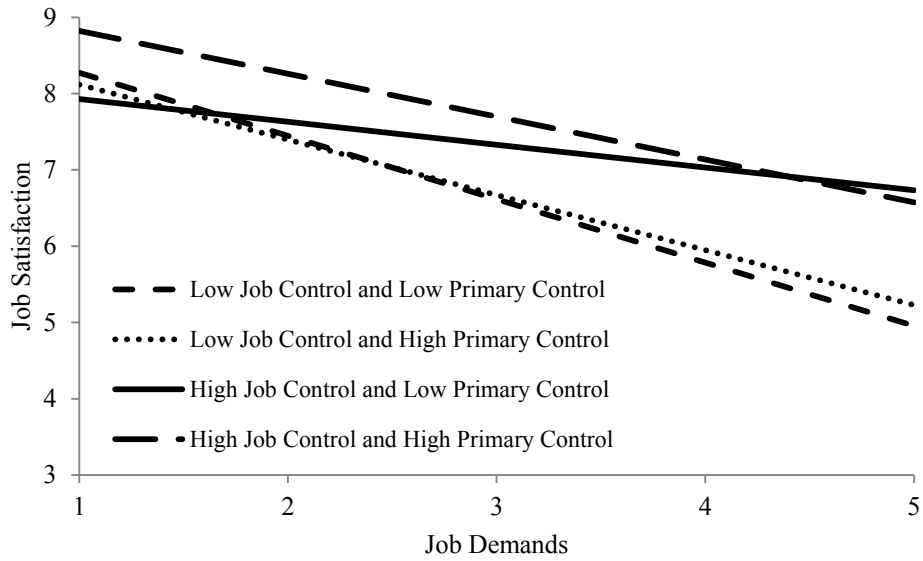
Finally, the relationship between job support and mental health was found to vary by age. The positive relationship was found to increase with age, although non-linearly. There was no relationship between the two in younger adults, but the relationship became and remained positive for the midlife and older adults, suggesting that job support becomes important for mental health as age increases (see Figure A5).

Figure A5: Variation in the Job Support-Mental Health Relationship by Age