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Work Stress: A Review, Analysis, and Extension of the Job Demands-Control (-Support) Model

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WORK STRESS: A REVIEW, ANALYSIS, AND EXTENSION OF THE JOB
DEMANDS-CONTROL (-SUPPORT) MODEL

by

Marcus J. Fila

A dissertation submitted to the Graduate College
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
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WORK STRESS: A REVIEW, ANALYSIS, AND EXTENSION OF THE JOB DEMANDS-CONTROL (-SUPPORT) MODEL

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Occupational stress and health literature is devoted to understanding and predicting the phenomenon of stress in the workplace, given its costly implications to individual and organizational health and well-being. The job demands-control (-support) (JDC(S)) model has been highly influential in occupational stress and health literature for over 37 years, and has been the theoretical foundation of more empirical studies than any other work stress model. To date, over three-hundred published studies have examined relationships between various forms of demands, control over work, and support on numerous physical and psychological strains. However, several issues concerning the model have yet to be addressed. This three article dissertation provides an updated literature review of this prominent model, and to address two of these issues in separate studies.

The last literature review of the JDC(S) model was published by Kain and Jex in 2010. They summarized research which indicated that main effects of demands, control, and support on strain were generally supported, but that moderating effects of control and/or support on the relationship between demands and strain were less frequently found. The authors also highlighted a number of gaps in research on the model, including a meta-analytic review of the model, and the importance of examining moderating effects of control and/or support on alternative conceptualizations of demands. This literature review summarizes the history of the JDC(S) model, discusses how several calls for

research have been addressed since the last review. Further suggestions for future research are also made.

The first study is a meta-analysis of the JDC(S) model. This analysis builds upon the recently published meta-analysis of demand-control-support interrelationships by Luchman and González-Morales (2013), in two ways. First, moderators of interrelationships between demand, control, and support are examined; specifically, gender, nationality, and occupation. Second, moderating effects of gender, nationality, and occupation on relationships between demands, control, and support, respectively, and job satisfaction and emotional exhaustion are examined. Job satisfaction and emotional exhaustion are the most examined forms of well-being and strain in studies of the model.

The second study examines whether moderating effects of control and support resources, which underpin much theory on the JDC(S) model, are applicable to a relatively new concept of demands: that of illegitimate tasks, in a sample of US-based students. Illegitimate tasks refer to tasks that constitute “identity stressors” (Thoits, 1991) by violating an individual’s professional identity. Illegitimate tasks have been shown to have unique variance in relating to strain over-and-above other frequently measured forms of demands (e.g., Semmer et al., 2010). Thus, from a JDC(S) and broader demands-resources perspective, it is important to understand the role of control and/or support resources in moderating negative effects of illegitimate tasks on various types of strain. Knowledge of this may build impetus for interventions, as well as for future theory building on the effects of illegitimate tasks from a work stress perspective. Studying illegitimate tasks will also answer Kain and Jex’s (2010) call to examine moderating effects of control and support on alternative forms of demands.

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Although I have many people to thank for their support and inspiration, this dissertation is dedicated to my wife, Beth, for being everything a husband could want. The only caveat to that statement is that I will always be reminded that she finished her Ph.D. three years before I did!

Marcus J. Fila

TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER	
I INTRODUCTION	1
The Three Purposes of this Dissertation	6
Purpose 1: Conduct an Up-to-Date Review of JDC(S) Literature.....	6
Purpose 2: Meta-Analysis of Demands, Control and Support: Exploring Moderator Moderator Effects of Gender, Nationality, and Occupation	9
Purpose 3: Examining the Moderating Roles of Control and Support on Task Illegitimacy as a Demand Stressor.....	16
References.....	19
II DEMANDS, CONTROL, AND SUPPORT: AN UPDATED LITERATURE REVIEW	35
Introduction.....	35
A Brief Background: Theoretical Foundations of Work Stress Research	36
The Job Demands-Control (-Support) Model.....	37
Job Demands, Control, and Support.	40
Hypotheses of the JDC(S) Model.	41
Research on the JDC(S) Model to Date.....	44
Major Criticisms of the Model.....	51
Inconsistent Multiplicative Support.....	52
Varied and Non-Matching Measurement DCS Constructs.....	53

Table of Contents--Continued

Predominance of Self-Report Measurement.....	56
Predominance of Cross-Sectional Research Designs	61
Failing to Account for Individual Difference Variables.....	64
Challenge-Hindrane Stressors.....	71
Illegitimate Tasks.....	74
Where Now? Future Research on the Model.....	74
Conclusion	77
References.....	79
III JOB DEMANDS, CONTROL, AND SUPPORT: META-ANALYZING MODERATOR EFFECTS OF GENDER, NATIONALITY, AND OCCUPATION	95
Introduction.....	95
Literature Review.....	95
Moderating Work Characteristics Interrelationships, and Relationships with Job Satisfaction and Emotional Exhaustion.	104
The Present Study	110
Method	119
Data Collection	120
Coding.....	121
Primary Analysis.....	122
Moderator Analyses.....	122
Results.....	125
Primary Analysis.....	126

Table of Contents--Continued

Moderator Analyses 128

Discussion 143

 Gender 144

 National Culture 146

 Occupation 149

 Study Limitations, Strengths, and Future Research 151

 Conclusion 154

References* 155

IV STUDENT TASK ILLEGITIMACY AS A DEMAND STRESSOR: THE
 ROLE OF CONTROL AND SUPPORT 169

 Introduction 169

 Literature Review 169

 Stress-as-Offense-to-Self Theory: The Conceptual Background of Illegitimate
 Tasks 171

 Illegitimate Tasks 173

 Illegitimate Tasks in a Student Context 175

 Illegitimate Tasks and Resources: Control and Support 179

 Methods 182

 Participants and Procedure 182

 Measures 183

 Data Analysis 185

 Results 185

Table of Contents--Continued

Discussion.....	190
Implications for Higher Education Student Settings	193
Limitations and Future Research	194
Conclusion	195
References.....	197
V OVERALL CONCLUSION	206
Links between the Three Articles	207
Conclusion	208
References.....	210
APPENDIX	
A. Human Subjects Institutional Review Board Letter of Approval.....	211

LIST OF TABLES

1. Primary Meta-Analytic Results.....	127
2. Moderator Meta-Analytic Results for Gender.....	129
3. Correlational Results for Gender Moderator Analysis (relationship between validity coefficient and proportion of males in the samples).....	130
4. Scores for National Groups on Each of Hofstede's (2001) Cultural Dimensions....	132
5. Correlational Results for Nationality Moderator Analysis (relationship between validity coefficient and Hofstede's (2001) five dimensions of national culture).....	133
6. Moderator Meta-Analytic Results for Nationality.....	135
7. Correlational Results for Occupational Moderator Analysis (relationship between validity coefficient and stress tolerance level of occupations in the sample).....	139
8. Moderator Meta-Analytic Results for Occupation.....	140
9. Means, Standard Deviations, Coefficient Alphas (diagonal), and Correlations.....	186
10. Summary of Hierarchical Regression Models: Student Satisfaction, Anxiety, and Emotional Exhaustion.....	187

LIST OF FIGURES

1. Average effect size of demands and control by average proportion of males....	131
2. Average effect size of demands and job satisfaction by average proportion of males.....	132
3. Average effect size of demands and control with error bars by National Culture.....	137
4. Interaction between Perceived Illegitimate Tasks and Instructor Support on Student Satisfaction.....	189
5. Interaction between perceived illegitimate tasks and instructor support on anxiety.....	189
6. Interaction between perceived illegitimate tasks and instructor support on emotional exhaustion.....	190

CHAPTER I: INTRODUCTION

Much of occupational stress and health literature is devoted to understanding and predicting the phenomenon of stress in the workplace (Kahn & Byosiere, 1992). Lazarus and Folkman (1984) defined stress as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p.19). Work stress is not a single event, but a process that involves appraisal, response, and attempts to meet goals while managing *stressors*. Stressors are demands from the work environment as experienced by individuals (Sulsky & Smith, 2005). Physiological and/or psychological reactions to these stressors constitute strain, which often arises from attempting to function effectively in the face of too many stressors (Kahn & Byosiere, 1992).

The devotion of scientific resources toward better understanding stress and strain may be motivated by its costly implications to individual and organizational health and well-being. For example, according to the American Institute for Stress, excessive work stress costs the US economy over \$300 billion annually in healthcare, missed work, and stress reduction treatments (Stambor, 2006). Given these costs to individual and organizational well-being, attempts to predict and control stressors, before the onset of strain, has been a central concern in abating this "modern day pandemic" (Sulsky & Smith, 2005, p. 2). For example, numerous theories within organizational research have been proposed to explain how characteristics of work relate to stress and strain, and organizational outcomes (e.g., Cummings & Cooper, 1979; Dawis & Lofquist, 1984; Hackman & Oldham, 1980; Hobfoll, 1989). In particular, the notion that human beings seek control over their environment is central to many theories of workplace stress (for

reviews, see Frese, 1989; Ganster, 1989; Spector, 2002) and is regarded as one of the most important elements of the occupational stress process (Kahn & Byosiere, 1992).

In 1979, Robert Karasek introduced the job demand-control (JDC) model, which outlines the impact of work characteristics on stress, health, and occupational wellbeing (Karasek, 1979). Karasek envisioned job demands and job control as essential workplace characteristics for employee well-being, motivation, and productivity; as well as various physiological and psychological strains. Job demands constitute physical, social, or organizational aspects of the job that require physical or mental effort. These include work pacing/time pressure, exacting task requirements, and overall workload demands (De Jonge & Dormann, 2006). Most employees seek homeostasis with their work environment in order to facilitate manageable work (Griffin & Clarke, 2011). Thus, a central tenet of the JDC model is the belief that moderate demand maximizes employee well-being through optimal levels of stimulation which facilitate manageable completion of work tasks (Kahn & Byosiere, 1992; Karasek & Theorell, 1990; Wundt, 1922). In contrast, underutilization can result in stress from boredom, and excessive demands can result in an elevated level of physiological arousal and increased cardiovascular and nervous system attention. If this elevated arousal is sustained, individuals will begin to run out of resources, leading to impairment of physical functioning and psychological well-being (Hobfoll, 2001; Karasek, 1979). Thus, perceptions of work stress can be centered on perceived “fit” between work demands and the availability of coping resources, with stress likely to be experienced if demands are thought to exceed resources, or underutilize them (Edwards & Cooper, 1990; Eulberg, Weekley, & Bhagat, 1988; French, Caplan, & Harrison, 1982; Hobfoll, 2001; Lazarus, 1966).

The term “resources” refers to objects, conditions, energy, or regulatory ability and cognitive and emotional resources that enable employees to facilitate problem solving in order to meet demands (Campbell, Perry, Maertz, Allen, & Griffeth, 2013; Hobfoll, 1989). These include personal resilience, money, status, performance feedback, esteem, career security, and many others (Kahn & Byosiere, 1992). Karasek (1979) originally focused on the resource of *job control*. Job control constitutes an individual’s belief in his/her ability to affect a desired change on their work environment (Greenberger & Strasser, 1986). This includes an employee’s degree of autonomy or decision authority over tasks such as controlling order of task completion, how duties are completed, or the content of the work itself (Ganster & Fusilier, 1989). Thus, control allows employees to intervene and change work processes in order to reduce the perception of insufficient resources, or potential resource loss that lead to feelings of stress (Hobfoll, 2001). Moreover, evidence suggests that even *illusions* of being in control appear to promote well-being (Friedland, Keinan, & Regev, 1992; Spector, 1986). Conversely, stress from a perceived lack of control can induce strain by frustrating the intrinsic need to be and feel competent (Frese, 1989; Spector, 1986; White, 1959).

The JDC model was later extended to account for social support at work as a third predictor of well-being and strain (job demand-control-support [JDACS]; Karasek & Theorell, 1990). Workplace support refers to helpful workplace relationships, generally with supervisors and coworkers, regarding job-related matters (Price, 1997). Social support at work is an aspect of employee social capital, that is the extent to which relationships at work are valuable to the employee in terms of acquiring task information, assistance, or social companionship (Nahapiet & Ghoshal, 1998). Unlike job control, social capital does not afford employees the ability to directly intervene in alteration of

work tasks, or other aspects of the work environment. However, social capital can benefit employees by reducing the burden on their other personal resources (Lin, 1999).

Occupational stress and health literature is replete with evidence that high levels of support are associated with increased well-being; whereas a perceived lack of support can be a catalyst for strain (Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Van der Doef & Maes, 1999).

Both the original and extended versions of the model examine strain using two contrasting, but not mutually exclusive hypotheses. First, the *strain* hypothesis pertains to an increased likelihood of strain when demands are increased, or control and/or support are decreased. For example, Karasek and Theorell (1990) regard factory line workers as typically being subject to high demands, but also have low control due to the routinized nature of their work and the relatively low levels of support within the workplace. Thus, according to the strain hypothesis a job design intervention to reduce strain in factory workers could be effective by additively changing the balance between perceived demands, control, and/or support, such that (i) demands are reduced (ii) control and/or support are increased or (iii), a combination of both, such that demands are decreased and control and/or support are increased.

In contrast, the *buffer* hypothesis is concerned exclusively with the moderating effects of control and/or support on the relationship between demands and strain.

According to the buffer hypothesis, resources of control and/or support will serve to mitigate the effects of high demands on strain. The practical implication of the buffer hypothesis is that it is sometimes unrealistic to recommend lowering work demands (Griffin & Clarke, 2011); such as for military personnel on operations, or for organizations that are short-staffed, or in a peak season of work (e.g., tax specialists).

Thus, workplace interventions to reduce stress should focus exclusively on affording individuals greater control over their work, and/or support from within the organization, in lieu of reducing demands.

An important distinction between the strain and buffer hypotheses lies in the importance placed on *moderating* effects of control and/or support on the relationship between demands and strain. Moderating effects are not necessary to support the strain hypothesis. That is, main effects of demands *and* control and/or support on strain are sufficient to support the strain hypothesis by showing that demands are positively related to strain, and control and/or support are negatively related to strain. Conversely, the buffer hypothesis can only be supported if a moderating effect of control and/or support on the relationship between demands and strain is found. That is, the form of control and/or support measured in the study must specifically moderate, or *buffer*, the form of demand measured, such that negative effects of demands are less when control and/or support are high, versus when they are low (see Figure 1). For example, task demands might be moderated by control over ordering of task completion, but this form of control is arguably less likely to moderate emotional demands (Kain & Jex, 2010). The purpose for this requirement is to show that affording employees' greater control and/or support "resources" mitigates the negative effects of demands on strain. In contrast, the strain hypothesis simply shows that (any form of) demands is positively related to strain, and (any form of) control and/or support reduces strain, independently.

This distinction is tied to differing practical implications surrounding the need to reduce demands in order to minimize strain. Specifically, according to the strain hypothesis, it is necessary to reduce demands in order to reduce employee stress levels, unless control and/or support can be additively raised. Conversely, the buffer hypothesis

implies that reducing demands is unnecessary to lowering stress, because control and/or support resources will directly counteract the effects of demands stressors on strain. Thus, the strain hypothesis focuses on *counterbalancing* demand levels with control and/or support resources levels to reduce strain; whereas the buffer hypothesis focusing on the *counteracting* effects of these resources on strain (Karasek & Theorell, 1990).

The Three Purposes of this Dissertation

The three purposes of this dissertation are to conduct an updated review of literature of the JDC(S) model, and to address two specific outstanding questions emanating from research of the model. This dissertation takes the format of a three-article dissertation (see Foss, 2015). The three articles comprise a literature review article and two empirical articles. Methods, results, and discussion for the two empirical articles are presented in article, rather than traditional dissertation format, within the articles themselves. This dissertation meets all criteria set out by Western Michigan University guidelines for conducting a three-article dissertation (“Exams and Dissertation,” 2016). The three purposes of this dissertation as they pertain to the three articles are further outlined in the following subsections.

Purpose 1: Conduct an Up-to-Date Review of JDC(S) Literature

The JDC(S) model has been highly influential in occupational stress and health literature for over 35 years. It has been the theoretical foundation of more empirical studies than any other work stress model (Griffin & Clarke, 2011; Kain & Jex, 2010). This is arguably because of the model’s simplicity, the ease in which it can be tested given the numerous ways that demands, control, support, and strain can be measured, and the practical implications that can be gleaned from it. However, an up-to-date review of

literature on the model is needed due to progression in research on the model in the six years since the last published reviews (see Häusser et al., 2010; Kain & Jex, 2010).

Most individual studies of the JDC(S) model have examined a single sample of employees based in a specific occupation, within a single country. Moreover, in most cases it has been impractical to directly compare individual studies to one another because different researchers conceptualize and measure job demands, forms of control and support, and types of strain, in different ways (Rijk, Le Blanc, Schaufeli, & di Jonge, 1997). As such, there has been little to connect the vast number of JDC(S) studies (over 300 published examinations to date) other than their theoretical underpinnings. Thus, several reviews of research on the model have been published in order to collate findings (De Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser et al., 2010; Van der Doef & Maes, 1999). These reviews have adopted a vote counting (e.g., non-meta-analytic) method, whereby conclusions are drawn by tallying significant versus non-significant results (Light & Smith, 1971). According to the vote counting method, if the majority of studies show a non-significant finding it is generally concluded that no relationship exists, and vice-versa. These reviews have repeatedly concluded that demands, control, and support are directly related to various forms of strain irrespective of participant demographics, occupation, or nationality, thus strongly supporting the strain hypothesis of the model (e.g., Karasek & Theorell, 1990). However, moderating effects of control and/or support resources on relationships between demands and strains have been far less frequently found. This has led to doubts regarding the predictive value of the buffer hypothesis of the model. That is, researchers have frequently questioned whether resources of control and/or support do actually moderate relationships between perceived demands and various forms of strain (e.g., Beehr, Glaser, Canali, & Wallwey,

2001; De Jonge & Dorman, 2006; Taris & Kompier, 2003). In particular, there has been speculation that moderating effects are heavily dependent on how demands, control, and support are measured, such that moderation effects would only be found if measures of control and/or support were closely related to those of the demands they were hypothesized to buffer (Kain & Jex, 2010; Kristensen, 1995).

In addition to these vote counting reviews, Kain and Jex (2010) published a book chapter that reviewed theoretical underpinnings of the model, and research of the model to date. In doing so, these authors made calls for researchers to address several outstanding theoretical and empirical issues regarding the model, which would further enhance theory building as well as practical understanding of how demands and resources (e.g., control and support) contribute to well-being at work. The first of these issues was for future studies to account for individual characteristics that may interact with demand-control-support dimensions, such as active coping (a wide range of purposeful strategies which are directed towards altering or avoiding job-related stressors; Parkes, 1994), self-efficacy (an individual's judgments of their own capabilities to organize and execute courses of action in order to attain designated goals; Bandura, 1977), and external locus of control (attributing or conceding control to forces outside of oneself; Spector, 1982). A second issue was for studies to operationalize and examine different types of *demands* at work in addition to the commonly examined *task demands* and *supervisor demands*. Given the moderately weak support for the buffer hypothesis, but a growing awareness in occupational stress and health literature of there being many different types of demand at work, the authors argued for studies to examine potential moderating effects of control and/or support resources on alternative types of demands, in order to refine conclusions regarding the buffer hypothesis of the JDC(S) model. Finally, in the most recent of the

vote counting reviews, Häusser et al. (2010) called for a meta-analytic review of the model, to allow for a quantitative test of both the strain and buffer hypotheses, as well as potential moderating variables of these relationships.

Since Häusser et al. (2010) and Kain and Jex (2010), research on the model has taken steps to address these issues. Moreover, doing so has highlighted further issues to be addressed. Therefore, the purpose of writing an up-to-date review of the model is to summarize the history of the model, and to address how calls for additional research by Kain and Jex's (2010), and Häusser et al.'s (2010) have been addressed in the ensuing five years; as well as to offer suggestions for future research.

Purpose 2: Meta-Analysis of Demands, Control and Support: Exploring Moderator Effects of Gender, Nationality, and Occupation

The second purpose of this dissertation is to extend initial meta-analytic research of the JDC(S) model. Despite its enduring contribution to work stress research, and numerous vote counting reviews, attention has only recently turned to meta-analytic research of the model. This is an important transition because aggregating JDC(S) studies can advance the theory by contributing information about the magnitude and stability of the strain and buffer hypotheses as well as the limitations of these theories.

Luchman and González-Morales (2013) took the first step by providing a meta-analysis examining *interrelationships* between the model's demand, control, and support dimensions. This approach differed from that of most primary studies of the model, which have focused on bivariate and/or multivariate (e.g., *buffer*) relationships between each of these three dimensions and various forms of strain. However, the authors' rationale for examining interrelationships between demands, control, and support was that individual perceptions of work characteristics are not completely based on *objective* criteria, such as structural characteristics of the job (e.g., how the job of a police officer

versus a college professor is structured), or aspects of work design, (such as working alone versus in a team), or operating within a hierarchical versus a flatter organizational structure (Kain & Jex, 2010). Thus, given the widely acknowledged importance of perceived demands, control, and support in organizational stress and health literature (Griffin & Clarke, 2011) understanding how perceptions of these work characteristics *interrelate* is important to understanding how perceived changes to one of them might affect interrelationships with perceptions of the other two. For example, if perceived demands are negatively related to perceptions of workplace support (e.g., the more demanding work is perceived to be, the less supportive the work environment is perceived to be, and vice-versa), then greater levels of support might change perceptions of support, and thus reduce the negative perceived relationship between support and demands. Similarly, lowering demands may affect how demands are perceived, which may also reduce the negative relationship between demands and support. By taking this approach Luchman and González-Morales (2013) advanced knowledge of the psychology of the working environment by shedding light on the nature of these demand-control-support interrelationships at the meta-analytic level. Their purpose for doing so was to better inform theory and practice in the field of occupational stress and health.

Luchman and González-Morales (2013) grounded their meta-analytic review in Hobfoll's (1989, 2001) conservation of resources (COR) theory, which views employees as attempting to obtain, retain, protect, and restore resources needed to cope with demand stressors. The authors made several hypotheses regarding JDCS interrelationships. First, they hypothesized that demands would be negatively related to control, because employees perceiving a high degree of control over work could restructure their work in order to reduce lost personal resources due to high demands (Hobfoll, 2001, Spector,

2002). Second, they hypothesized that demands would be negatively related to both supervisory support and coworker support at work. Supervisors generally have an instrumental role in both the structure of an employee's work and the amount of work assigned. Therefore, employees may perceive a loss of resources if they believe they have been assigned too much work (e.g., role overload), or work that is poorly structured (e.g., role ambiguity) (Hobfoll, 2001; Lin, 1999). Moreover, they proposed that demands would be negatively related to coworker support because supportive coworker environments often result in greater task assistance among coworkers. This allows employees the ability to call upon the resources of others when faced with high demands (Hobfoll, 2001; Settoon & Mossholder, 2002). Third, the authors hypothesized that control and workplace support would be positively interrelated because, according to COR theory (Hobfoll, 2001), *gaining* personal resources requires *using* personal resources. Thus, the more resources in one area an individual perceives themselves to have (e.g., control), the more they will perceive themselves to be able to acquire other resources (e.g., support), and vice-versa. According to Hobfoll, this principle of using resources to gain further resources will result *resource gain spirals*, which happen when reciprocal relationships are formed between resources in one domain versus another (Hobfoll, 2001). Thus, Luchman and González-Morales (2013) hypothesized that perceived control would be positively related to supervisor support and coworker support. The relationship to supervisor support is based on an exchange between employee and supervisor, whereby the supervisor can increase an employee's level of control over work in exchange for good performance (Bauer & Green, 1996). The relationship to coworker support comes from increasing authority through positive coworker networks, and increasing autonomy through mobilization of social capital resources (Lin, 1999).

Luchman and González-Morales (2013) found support for four of their five hypotheses regarding DCS interrelationships. First, perceived demands were negatively related to supervisor support ($\bar{r}_{CD} = -.16$, 95% CI -.19 to -.12) and coworker support ($\bar{r}_{CD} = -.11$, 95% CI -.15 to -.08), such that the more demanding work was perceived to be, the less supportive supervisory and coworker relationships were perceived to be, and vice-versa. Second, perceived control was positively related to supervisor support ($\bar{r}_{CC} = .30$, 95% CI .19 to .41), and coworker support ($\bar{r}_{CC} = .23$, 95% CI .14 to .31). Thus on average, those perceiving higher levels of control over their work also perceived themselves to be more supported by their supervisor(s) and coworkers. However, the derived meta-analytic correlation between demands and control was practically zero ($\bar{r}_{DC} = -.02$, 95% CI -.07 to .04), thus failing to support their first hypothesis. This suggests that, on average, perceptions of how demanding work is are unrelated to how much employees perceive control over their work.

Additionally, none of the confidence intervals for their four supported hypotheses included zero. This indicates that effects for each of these relationships at the population level were significant (Judge, Ilies, Bono, & Gerhardt, 2002). For example, the 95% confidence interval for the relationships between perceived demands and both supervisory and coworker support were negative. This indicates that there is a 95% chance that the true relationship at the population level is negative (Hunter & Schmidt, 2004). Additionally, the 95% confidence interval for the relationships between perceived control and both supervisory and coworker support were positive. This indicates that there is a 95% chance that the true relationship at the population level is positive.

Finally, effect sizes for all five meta-analytic interrelationships showed evidence of *heterogeneity*. One of the greatest contributions of meta-analysis is the ability to

correct for distorting effects of individual study artifacts, such as sampling error, measurement error, and other artifacts that produce conflicting results (Hunter & Schmidt, 2004). Heterogeneity, in meta-analytic terms, is when less than 75% of variance in a relationship (e.g., DCS interrelationships) is attributable to these study artifacts. It indicates that something else (e.g., a third variable) may be moderating the relationship. Evidence of heterogeneity is common in most meta-analyses (Kontopantelis, Springate, & Reeves, 2013). However, in the case of Luchman and González-Morales (2013) it indicates the possibility of moderators in *all* demand-control-support interrelationships (Hunter & Schmidt, 2004).

In light of this, the authors pointed to several possible moderators of DCS interrelationships, including participant gender. They examined gender as a moderator because it is widely accepted that men and women, on average, interpret and cope with stress differently (Roxburgh, 1996). Their findings show that samples comprised of mainly female participants obtained negative demand-control correlations. On the other hand, samples comprised of mainly male participants obtained positive demand-control correlations. Luchman and González-Morales suggested that the balance of these gender effects explained the near-zero interrelationship between perceived demands and control. Additionally, they found that average organizational tenure moderated the demand-coworker support relationship such that relationships with coworkers were stronger with more organizational tenure.

Problem Statement for Study. Luchman and González-Morales' (2013) moderator analysis was an exploratory first step. However, the strong suggestion of moderators from their results, as well as the large amount of variance unaccounted for in their analyses suggests further examination of other potential moderators. Therefore, this

dissertation provides a new meta-analysis of demand-control-support interrelationships in order to examine other moderators of these interrelationships. The field of occupational stress and health is placing greater emphasis on understanding differences in how individuals perceive workplace characteristics across different contexts. That is, moderation of established relationships between stressors and strain, as well as of interrelationships between perceived workplace characteristics is now increasingly viewed as the next step to better understanding the context of the relationship between people and work from a stress perspective (Griffin & Clarke, 2011). Specifically, this dissertation examines potential moderating effects of sample nationality and occupation. The rationale for examining these two potential moderators is that organizational behavior and perceptions of work stress are thought to differ between national cultures (e.g., Hofstede, 2001; Yang et al., 2012). Moreover, differences in the social and structural design of different jobs have been shown to manifest in the stress process (Grant, Fried, & Juillerat, 2011; Sulsky & Smith, 2005). For example, in a study of thirteen different occupations, Sparks and Cooper (1999) found demand-control relationships to be moderated by occupational type. In addition, Baba, Tourigny, Wang, Lituchny, and Monserrat (2013) found that correlations between demand-control-support relationships differ by sample nationality.

A second issue relates to the mainstay of research on the JDC(S) model being on understanding the relationships demands, control, and support have with various types of strain. By focusing exclusively on demand-control-support interrelationships, Luchman and González-Morales' (2013) did not examine potential moderating effects of relationships between each of these dimensions, and strain. For example, Luchman and González-Morales (2013) found support that the interrelationship between demand and

control is moderated by gender. However, they did not examine whether gender (or any other potential moderator) moderated the respective relationships between demands, control, and support, and strain. Addressing questions surrounding potential moderating effects of these relationships represents the logical next step in the study of the JDC(S) model, and will play an important role in future theory building surrounding the model. Thus, this dissertation examines potential moderating effects of sample gender, nationality, and occupation on relationships between demands, control, and support, respectively, and job satisfaction and emotional exhaustion, the two most examined psychological states in studies of the JDC(S) model (Häusser et al., 2010). Job satisfaction is a positive and pleasurable state resulting from positive appraisal of the job (Cranny, Smith, & Stone, 1992; Locke, 1976). It represents a manifestation of cognitive evaluations of one's job (Spector, 1997), and can affect organizational functioning through changes in performance, and employees' desire to remain with the organization (Hom, 2010). Emotional exhaustion refers to feelings of being overextended; of being "...drained or used up, unable to face a day's work, totally unenthusiastic" (Sulsky & Smith, 2005 p.45). It is experienced when emotional resources are sufficiently depleted so as to no longer be able to meet the demands of work-related stressors (Lee & Ashforth, 1996).

The current direction of work stress research is to better understand moderating effects of stress-strain relationships at work. Better understanding of moderating effects carries implications for the design of jobs across multiple contexts (Griffin & Clarke, 2011). Therefore, this dissertation is a timely contribution to the literature to address (i) how interrelationships between demands, control, and support, and (ii) relationships

between each of these dimensions and job satisfaction and emotional exhaustion are moderated by gender, nationality and occupation.

Purpose 3: Examining the Moderating Roles of Control and Support on Task Illegitimacy as a Demand Stressor

The third purpose of this dissertation is to answer Kain and Jex's (2010) call to examine moderating effects of control and support on alternative types of demand stressors. Given the changing nature of work, it has become imperative to more closely examine the exact nature of the most egregious stressors that employees face. For example, considering the multiple life-roles the typical human being must juggle, recent efforts have been made to further identify overlooked stressors (i.e. Semmer, Jacobshagen, Meier, & Elfering, 2015), update the taxonomy of occupational stressors (i.e. Rosen, Chang, Djurdjevic, & Eatough, 2010), and apply modern theoretical perspectives to the stress-process (i.e. Semmer, Jacobshagen, Meier, & Elfering 2007).

In line with these efforts, this second empirical study focuses on a relatively new stressor concept: *illegitimate tasks*. Illegitimate tasks refer to tasks that constitute "identity stressors" (Thoits, 1991) by violating an individual's professional identity. A given work task is *legitimate* "to the extent that it conforms to norms about what can reasonably be expected from a given person, and it is *illegitimate* to the extent that it violates such norms" (Semmer, Tschan, Meier, Facchin, & Jacobshagen, 2010). These expectations are based on the normative perceptions on the part of the employee regarding what tasks can reasonably be expected of them given their role within the profession or organization (Semmer, McGrath, & Beehr, 2005; Semmer et al., 2010). For example, task illegitimacy may be perceived based on a misalignment of role expectations, such as asking a paralegal to hold a meeting with a client despite him/her not being expected to possess the necessary credentials or training. Similarly, expecting a

surgeon to clear the bed-pan of a patient is arguably an illegitimate task because hospitals generally assign such tasks to junior nurses. Task illegitimacy can also be perceived when required tasks are thought to be *unnecessary*, such as filling out an excessive amounts of paperwork that has no purpose, or being held to policies which make no sense, such as having to meet an arbitrary deadline (Semmer et al., 2007).

Illegitimate tasks are thought to offend one's sense of self and degrade self-view. As such, they are considered relevant psychological stressors that can have negative impacts on well-being (Semmer et al., 2007). However, illegitimate tasks differ from other existing conceptualizations of task or role demands which have been central to examinations of numerous work stress models, and in particular, the JDC(S) model (Karasek & Theorell, 1990). Specifically, although there have been many different conceptualizations and operationalizations of "demands" in studies of the JDC(S) model (Kain & Jex, 2010), most of these represent varieties of *quantitative* demands. Quantitative demands refer to the amount of work assigned (Karasek & Theorell, 1990). For example, Karasek's (1979) original conception of job demands was that of *role overload*, whereby stress is caused when assigned tasks *quantitatively* exceed what an individual perceives they can reasonably accomplish (Perrewé et al., 2005). Conversely, illegitimate tasks represent a more *qualitative* violation of role expectations. That is, rather than overloading individuals with excessive amounts of work, illegitimate tasks are thought to threaten an individual's sense of competence and of value to others; and thus negatively impact their well-being (Semmer et al., 2005). Thus, the stressor is not a function of there being *too much* work, but the *wrong type* of work given the role of the employee.

Problem Statement for Study. Illegitimate tasks in workplace settings have been found to be related to various forms of psychological strain (Semmer et al., 2015) as well as deviant behaviors (Semmer et al., 2010). However, studies of illegitimate tasks have not yet examined the moderating role of resources (e.g., perceived workplace control and support) which have become commonplace in work stress and occupational health research. Understanding of the role of resources in moderating negative effects of illegitimate tasks on various types of strain may build impetus for interventions, as well as for future theory building on the effects of illegitimate tasks from a work stress perspective. Therefore, the study contributes to this relatively new field by aligning the concept of illegitimate tasks with prior stressor research on other task demands in order to examine the potential moderating effects of resources on the illegitimate task-well-being/strain linkage. Specifically, this dissertation will examine whether control and support resources from the JDC(S) model act as buffers for relationships between illegitimate tasks and job satisfaction, and emotional exhaustion, respectively. Thus, by integrating the buffer hypothesis of the JDC(S) model (Karasek & Theorell, 1990) with this relatively new type of demand stressor, this study contributes to knowledge of both illegitimate tasks, and further understanding of the JDC(S) model as it relates to different types of demand.

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CHAPTER II: DEMANDS, CONTROL, AND SUPPORT: AN UPDATED LITERATURE REVIEW

Introduction

The demands-control (-support) (JDC[S]) model (Karasek, 1979; Karasek & Theorell, 1990) continues to be highly influential in occupational stress and health literature, and has been the theoretical foundation of more empirical studies than any other work stress theory (Griffin & Clarke, 2011; Kain & Jex, 2010). The main ideas of the model are two-fold: that demanding work, control over working processes, and social support within the workplace all independently relate to well-being and strain; and control and support resources mitigate (or buffer) the effects of high demands on these outcomes. Despite its popularity and longevity, the model has been widely criticized for a predominance of self-report versus objective measurement, cross-sectional rather than longitudinal study design, variety and inconsistency in how the three main dimensions are measured, and a lack of consideration of individual difference variables. Kain and Jex (2010) reviewed the first 30 years of research on the model, and called for future research to address these issues. They also suggested that future research examine different conceptualizations of demands, and further individual difference variables. This chapter serves to update the literature of the model, and reviews how calls for future research have been addressed since Kain and Jex's (2010) review. Additionally, further recommendations for continued development of research are suggested, including updating the taxonomy of jobs frequently associated with different combinations of demands control and support, operationalizing these dimensions in several different ways in each study to increase findings of interactive effects, and designing industry- or role-specific measures of these dimensions to improve this consistency.

A Brief Background: Theoretical Foundations of Work Stress Research

Work stress is defined as a negative emotional state due to adverse experiences in the workplace (Beehr & Bhagat, 1985; Hart & Cooper, 2001). According to organizational stress theory (Kahn & Byosiere, 1992), stress is not a single event, but a process involving appraisal, response, and attempts to cope with and manage stressors in order to meet goals. Strains are adverse and potentially harmful reactions to stressful work from attempting to function effectively in the face of too many challenges. Furthermore, certain behavioral outcomes are thought to occur as a result of physiological or psychological strains (e.g., counterproductive work behavior, absenteeism, voluntary turnover, smoking, excessive eating and drinking) (Kahn & Byosiere, 1992).

Organizational stress theory has served as the foundation for over a hundred stress theories which frame relationships between various stressors, strains, and in some cases behavioral outcomes (see Griffin and Clarke, 2011; Sulsky & Smith, 2005). A central theme to many of these theories is the *fit perspective* of work stress, whereby an employee's fit with their working environment (that is, their role or position and their workplace) is fundamental to minimizing stress at work (Edwards & Cooper, 1990; Eulberg, Weekley, & Bhagat, 1988; French, Caplan, & Harrison, 1982). Perceptions of fit are largely driven by cognitive appraisal of correspondence between work demands and the availability of coping resources to meet these demands, with stress thought to be experienced if demands are appraised as *exceeding* resources (French et al., 1982; Lazarus, 1966). The term "resources" refers to many things, such as objects, energy, or work or personal characteristics or conditions that enable employees to facilitate problem solving in order to meet demands by accomplishing goals (Campbell, Perry, Maertz,

Allen, & Griffeth, 2013). However, the central focus appears to be on cognitive and emotional resources needed for work and daily transactions with others (Jex & Yankelevich, 2008), with control over work, and support from within the workplace having been given the most attention (Griffin & Clarke, 2011).

The Job Demands-Control (-Support) Model

In 1979, Robert Karasek introduced the job demand-control (JDC) model, which outlines the impact of work characteristics on stress, health, and occupational wellbeing (Karasek, 1979). Karasek envisioned how demanding jobs are, and how much control individual workers are afforded as essential to well-being, motivation, and productivity, as well as the minimization of psychological and physiological strains. The central tenet of the JDC model is that highly demanding jobs that afford little control over work are most likely to lead to decrements in well-being, and to induce strain. Specifically, in line with research on the classical stress process (e.g., Selye, 1956, 1976; Wundt, 1922) Karasek believed that such conditions would lead to individuals continually devoting high amounts of cognitive resources to meeting demands, which would result in an elevated level of physiological arousal and increased cardiovascular and nervous system attention. Moreover, if sustained, this condition would result in the individual's body beginning to run out of resources, followed by impairment of physical functioning and psychological well-being (Karasek, 1979). Karasek termed positions characterized by high demand low control as *high strain* jobs (Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Karasek, 1979). In a study on psychosocial work design that used data from quality of employment surveys in 1972 and 1977 to categorize a range of occupations based on perceived demands and control, Karasek (1989) found that among others junior nurses and assembly line workers typically characterized their work as high strain.

Although high strain jobs paint a negative picture of demanding work, Karasek (1979) also believed that demanding work can engender *positive* outcomes when accompanied by *high* levels of control. He stated that “some of the most challenging situations, typically of professional work, call for the highest levels of performance, but without negative psychological strain” (Karasek & Theorell, 1990, p. 35). He termed such jobs as *active jobs*. The theory behind active jobs is grounded in classical literature on competence (White, 1959), activation (Scott, 1966), and stimulation (Schwab & Cummings, 1976). Specifically, performance and learning are hypothesized to be maximal in high demand high control circumstances because workers can actively use the control they have been afforded to meet demands. This is thought to engender greater levels of productivity and goal achievement than when control is low (e.g., high strain jobs), or if the work is not demanding. Thus, when considering high strain and active jobs together, Karasek (1979) did not view positive and negative outcomes of demand and control conditions as simply lying at opposite ends of a continuum, but as two separable mechanisms surrounding the amount of control an employee has over his/her work when faced with high demands. According to Karasek (1989) examples of active jobs include electrical engineers, and physicians.

With regards to other combinations of demands and control, Karasek (1979) termed jobs characterized by low demands and low control as *passive jobs*, because workers tend to experience a degree of strain due to boredom from combined with an inability to control their work. Moreover, in line with classical stress theory (e.g., Selye, 1956) he contended that workers in these types of jobs experience a gradual atrophying of skills due to underutilization. Karasek (1989) exemplified public sector clerical work as adhering to the description of *passive jobs*. Finally, Karasek (1979) termed jobs

characterized by low demands but high levels of control as *low strain* jobs, because workers would benefit from high levels of skill decision and autonomy without the pressure of high demands. Results of Karasek's (1989) study suggest that natural scientists often consider their work to be characterized as low strain.

Ten years later, following increased attention to the role of workplace support in the stressor-strain process (e.g., Ganster, 1989), the JDC model was extended to account for workplace social support as a *third* predictor of well-being and strain. This extended model became known as the job demand-control-support (JDCS) model (Karasek & Theorell, 1990). Karasek believed that effects of high strain (i.e., high demands, low control) jobs would be exaggerated if workplace support was also perceived to be low (Johnson & Hall, 1988; Karasek & Theorell, 1990). He termed such conditions as *iso-strain* jobs, whereby workers experience even greater strain through social *isolation*, or a lack of support at work. Conversely, he contended that positive outcomes in active jobs would increase still further for individuals experiencing high levels of support from within their workplace.

In summary, Karasek's model is underpinned by the fit perspective of stress (e.g., Edwards & Cooper, 1990; French et al., 1982), because fit with work is based on perceiving demands to be manageable in conjunction with resources of control over work, and support from within the workplace (Kain & Jex, 2010). In line with other discussions of the model, the acronym "JDC(S)" (Karasek & Theorell, 1990) is used in the remainder of this chapter as an all-encompassing term to reference both the original and extended versions of the model. The following section outlines these dimensions of the model in greater detail.

Job Demands, Control, and Support

Job Demands. Job demands constitute physical, social, or organizational aspects of the job that require physical or mental effort. These include work pacing/time pressure, exacting task requirements, and overall workload demands (De Jonge & Dormann, 2006). According to classical theories on optimal activity level (Selye, 1956, 1976), and performance (Wundt, 1922), a certain level of demand placed upon the worker is beneficial to their psychological well-being, learning, motivation, performance, and job satisfaction. However, too low or high a level of demands can have the inverse affect, causing negative physiological and/or psychological outcomes. As such, most conceptualizations of role-related demand stressors conceive of stress based on how *much* of a stressor (e.g. time pressure or general workload) one experiences, or how *frequently* something considered to be stressful (e.g. interruptions or excessive noise) occurs (Sonnetag & Frese, 2003). Numerous studies in work stress literature found relationships between high levels of demands and a variety of strains, as well as negative relationships with psychological well-being (Griffin & Clarke, 2011).

Job Control. Control constitutes an individual's belief in his/her ability to affect a desired change on their work environment (Greenberger & Strasser, 1986). Karasek (1979) envisioned control as one's degree of autonomy or decision authority over tasks, including ordering of task completion, discretion in how tasks are completed, or a degree of autonomy over the nature of the tasks themselves (Ganster & Fusilier, 1989). The notion that human beings seek control over their environment is regarded as one of the most important elements of the stress process, and is central to many theories of work stress (for reviews, see Ganster, 1989; Spector, 2002). Specifically, the ability to intervene and change work processes may reduce inherently stressful cognitions of

having insufficient resources to complete tasks (Hobfoll, 2001). Moreover, even *illusions* of being in control appear to promote well-being (Friedland, Keinan, & Regev, 1992). This is corroborated by numerous studies that have found strong negative associations between perceived control and psychological strains (Eatough & Spector, 2014). Conversely, perceiving a lack of control can induce strain by frustrating the intrinsic need to feel competent (Frese, 1989; Spector, 1986; White, 1959).

Workplace Social Support. Workplace support refers to helpful relationships at work regarding job-related matters, generally with supervisors and coworkers (Karasek & Theorell, 1990; Maertz, Griffeth, Campbell, & Allen, 2007; Price, 1997). Social support at work is an aspect of employee social capital, which is the extent to which relationships at work are valuable to the employee in terms of acquiring task information or assistance, or social companionship (Nahapiet & Ghoshal, 1998). Unlike job control, social capital does not afford employees the ability to directly intervene in alteration of work tasks, or other aspects of the work environment; however, social capital can benefit employees by reducing the burden on their other personal resources (Lin, 1999). The organizational literature is now replete with evidence that high levels of support are associated with increased well-being; whereas, a perceived lack of support can be a catalyst for strain (Häusser et al., 2010; Luchman & González-Morales, 2013; van der Doef & Maes, 1999).

Hypotheses of the JDC(S) Model

The vast majority of research on the JDC(S) model has focused on *high strain* jobs, with comparatively little attention to *active jobs*, and almost no attention to *passive* or *low strain* jobs (Kain & Jex, 2010). Both the original JDC and extended JDCS versions of the model examine strain using two contrasting, but not mutually exclusive hypotheses each for high strain, and active jobs.

High Strain Jobs. The *strain* hypothesis pertains to an increased likelihood of strain when demands are additively increased, and control and/or support are decreased. It is exclusively concerned with main effects of these dimensions on strain. For example, Karasek and Theorell (1990) regard factory line workers as typically being subject to high demands, but also have low control due to the routinized nature of their work and the relatively low levels of support within the workplace. Thus, according to the strain hypothesis a job design intervention to reduce strain in factory workers could be effective by additively changing the balance between perceived demands, control, and/or support, such that (i) demands are reduced (ii) control and/or support are increased or (iii), a combination of both, such that demands are decreased and control and/or support are increased.

In contrast, the *buffer* hypothesis is concerned exclusively with the moderating effects of control and/or support on the relationship between demands and strain. According to the buffer hypothesis, resources of control and support serve to mitigate the effects of high demands on strain. The practical implication of the buffer hypothesis is that it is sometimes unrealistic to recommend lowering work demands (Griffin & Clarke, 2011); such as for military personnel on operations, or for organizations that are short-staffed, or in a peak season of work (e.g., tax specialists). Thus, workplace interventions to reduce stress should focus exclusively on affording individuals greater control over their work, and/or support from within the organization, in lieu of reducing demands.

An important distinction between the strain and buffer hypotheses lies in the importance placed on supposed *moderating* effects of control and/or support on relationship between demands and strains. Whereas main effects of demands *and* control and/or support on strain are sufficient to support the strain hypothesis by showing that

demands are positively related to strain, and control and/or support are negatively related to strain; the buffer hypothesis can only be supported if a moderating effect of control and/or support is found. That is, the form of control and/or support measured in the study must specifically moderate, or *buffer*, the form of demand measured, such that negative effects of demands are less when control and/or support are high, versus when they are low. The purpose for this requirement is to show that affording employees' greater control and/or support resources mitigates the negative effects of demands on strain. In contrast, the strain hypothesis simply shows that demands, control, and support reduce strain independently.

From a practical perspective, the distinction between the strain and buffer hypotheses is tied to differing *implications* surrounding the need to reduce demands in order to minimize strain. Specifically, according to the strain hypothesis, it is necessary to reduce demands in order to reduce employee stress levels, unless control and/or support can be additively raised. Conversely, the buffer hypothesis implies that reducing demands is unnecessary to lowering stress, because control and/or support resources will directly counteract the effects of demands stressors on strain. Thus, the strain hypothesis focuses on *counterbalancing* demand levels with control and/or support resources levels to reduce strain, whereas the buffer hypothesis focusing on the *counteracting* effects of these resources on strain (Karasek & Theorell, 1990).

Active Jobs. As previously mentioned, the vast majority of research on the model has examined the strain and buffer hypotheses in relation to high strain jobs, with far less attention having been given to active jobs (Kain & Jex, 2010). However, the *activation hypothesis* is the term used for tests of high demands and high control and/or high support with positive outcomes such as performance, learning, or motivation (Karasek,

1979, Karasek & Theorell, 1990). The activation hypothesis is concerned exclusively with *interactive* effects of these dimensions, such that positive relationships between control and/or support and these outcomes are thought to be accentuated by high demands. Moreover, the greatest relationships with these outcomes are expected when both control and support interact with demands, such that all three dimensions are perceived as “high” (Karasek & Theorell, 1990). For example, a lawyer who is performing high demanding work well given high control over work, is thought to perform to even higher standards when well supported by constituents within his/her organization, than when an absence of support is perceived.

Research on the JDC(S) Model to Date

The JDC(S) model has been highly influential in occupational stress and health literature for over 37 years. It has been the theoretical foundation of more published empirical studies (over 300 to date) than any other work stress model (Griffin & Clarke, 2011; Kain & Jex, 2010). Most studies of the model have examined the strain and/or buffer hypotheses in a single sample of employees operating within a single organization or occupation, within a specific country. However, there has been little to connect the vast number of studies published other than their theoretical underpinnings. As such, several reviews of research on the model have been published in order to collate findings (e.g., De Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser et al., 2010; van der Doef & Maes, 1999). These reviews have adopted a vote counting (e.g., non-meta-analytic) method, whereby conclusions are drawn by tallying significant versus non-significant results. According to the vote counting method if the majority of studies show a non-significant finding it is generally concluded that no relationship exists, and vice-

versa (Light & Smith, 1971). Findings and conclusions from each review are outlined in the following sub-sections.

Review 1: Van der Doef and Maes (1999). Van der Doef and Maes (1999) reviewed 63 studies published between the model's 1979 inception, and 1997. Studies were categorized based on examination of (i) job-related and (ii) general psychological well-being outcomes. Job-related well-being outcomes included job satisfaction, work satisfaction, burnout, negative job feelings, occupational stress, job-related worries, and exhaustion. General psychological well-being outcomes included life satisfaction, depression, psychological distress, psychiatric distress, psychological strain, general strain, affective disorder symptomatology, psychotic affective disorder, mild psychiatric morbidity, social dysfunction, tension, anxiety, daily life stress, well-being, irritability, state anger, trait anger, happiness, schizophrenia/delusion/hallucinations, need to recover after work, lack of identification, hostility, and frustration.

Results revealed a moderate level of support for additive effects of demand, control, and support, in accordance with the strain hypothesis; but only weak support for interactive effects as predicted by the buffer hypotheses. Degree of support for the hypotheses was independent of sample characteristics (e.g., sample size, occupation, gender, nationality, and outcome variable). However, greater support was found in studies which employed narrower (rather than broader) measures of demands, control, and support. Fifty-four of 63 studies reviewed were cross-sectional, and nine were longitudinal. Stronger support was found for both strain and buffer hypotheses in cross-sectional studies than in the nine longitudinal studies (van der Doef and Maes, 1999).

Overall, van der Doef and Maes (1999) concluded that support for the strain hypothesis is fairly consistent in both JDC and JDC(S) models, but limited in the few

buffering hypothesis studies. They speculated this as partly due to poor matches between demand, control, and support constructs in most studies, with poor fitting measures of control and support less likely to buffer the negative effects of demands on strain. In this regard, the authors called for future research to improve the measurement of work characteristics, and to undertake more longitudinal studies of the model, given their methodological advantages over cross-sectional studies (which are addressed later in this review).

Review 2: De Lange et al., (2003). Given the relative lack of support for interactive effects in the first review, De Lange et al. (2003) conducted a second review of the JDC(S) model with the goal of increasing support for the buffer hypotheses by reviewing only “high quality” studies. Specifically, where van der Doef and Maes had reviewed *all* studies published to 1997, De Lange and colleagues evaluated the methodological quality of each study based on five criteria, and included only those studies that reached a certain level of quality based on their specifications. The first of these criteria related to *study design*. The authors evaluated whether each study had used a complete panel design for two variables, X and Y, in order to examine cross-lagged effects (i.e., effects of variable X as measured on Time 1 on variable Y as measured on Time 2, and effects of variable Y at time 1 on variable X at time 2). Complete panel designs afford the ability to examine possible reverse- or reciprocal causal effects, in addition to the relationships of interest (e.g., variable X at time 1 on variable Y at time 2) (Zapf, Dormann, & Frese, 1996).

The second stipulation related to *time-lags* between data points for longitudinal studies. De Lange et al., (2003) noted an absence of commonly accepted guidelines regarding the most appropriate time lag for predictor variables (X) to influence criterion

variables (Y) (Taris & Kompier, 2003). However, they contended that researchers should evaluate what time lag is appropriate by considering *how* the effect of X on Y develops over time (Frese & Zapf, 1988). Moreover, the authors posited that although time lags between data points in studies are often motivated by practical considerations (e.g., availability research facilities, and time availability of both researchers and participants), these considerations should be accompanied by plausible theoretical and methodological reasoning for the length of time lag between data points.

Their third criterion related to *measurement*. De Lange et al., (2003) acknowledged that the vast majority of studies of the JDC(S) model utilize survey design methods that come with inherent risks of self-reporting bias (e.g., Schnall, Landsbergis, & Baker, 1994). Thus, they stipulated that internal reliability of survey instruments (i.e., their respective Cronbach alphas) should be acceptably high (e.g., around .70, or higher, Stangor, 1998), in order to minimize possible conceptual overlap between variables. Moreover, they gave preference to studies that combined subjective self-report survey variables with objective (e.g., psychophysiological) measures, in order to reduce possible conceptual overlaps and self-report bias; provided that such measures accurately reflected the individuals' experience of the job.

Fourth, with regard to *method of analysis*, De Lange and colleagues (2003) gave preference to studies employing multiple regression analysis, or structural equation modeling, over those that compared cross-lagged correlations. They reasoned that cross-lagged correlations are more likely to yield erroneous causal conclusions (Taris, 2000) because they depend on the variances of the variables measured (Zapf et al., 1996) as well as across-time stability of variables (Kessler & Greenberg, 1981).

Finally, the authors contended that studies of the model should include a *non-response* examination. That is, researchers should examine possible selectivity of responses (e.g., in terms of gender and age) both for baseline (e.g., time 1) measurement, and for subsequent follow-up measurements. Furthermore, they gave preference to studies that examined whether baseline associations between demand-control-support dimensions and study outcome variables differed for responders and non-responders (i.e., those who did not respond to subsequent measures following their baseline response). They achieved this by comparing associations between work characteristics (e.g., demands, control, and support) and study outcomes at time 1 for the *response* group, versus those who opted not to respond following time 1 (e.g., Etter & Perneger, 1997).

Based on these stipulations, De Lange et al. (2003) selected studies from those published since the model's 1979 inception to 2000, thus chronologically overlapping with van der Doef and Maes' (1999) original review. They developed a point scoring system to rate the methodological quality of each study (see Table 1 in De Lange et al., 2003, p. 286). Studies were rated from 1-4 stars, with one star deemed insufficient for inclusion in their review. However, only 19 studies adhered to their stipulations for two or more stars. Their results showed that, only eight of the 19 studies demonstrated support for the strain hypothesis of the model, and only one study found interactive effects in accordance with the buffer hypothesis (Karasek, 1979; Karasek & Theorell, 1990). Thus despite their considerable stipulations for inclusion to their review, De Lange et al. (2003) were unable to demonstrate that "high quality" studies provided stronger support for the JDC(S) hypotheses (and in particular, the buffer hypothesis) than those included in van der Doef and Maes' (1999) original review. Instead, their review provided further evidence that moderating effects of control and/or support on demand-

strain relationships are rare in JDC(S) studies (Kasl, 1996; Kristensen 1995; Theorell & Karasek, 1996; van der Doef & Maes, 1999). However, the authors conceded that a sample of 19 studies was insufficient to credibly test their hypotheses. Moreover, they acknowledged failing to account for how well measures of demands control and support were matched in each study may have limited their findings regarding buffering effects. This echoed De Jonge, Dollard, Dormann, Le Blanc, and Houtmann (2000), as well as contentions made by van der Doef and Maes (1999) in the first review that conceptual congruence in operationalizations of demand, control, and support measures would yield greater evidence of moderating effects.

Review 3: Häusser et al. (2010). In the most recent vote counting review, Häusser et al. (2010) returned to van der Doef and Maes' (1999) original approach of including *all* published studies of the model, irrespective of methodological characteristics. In doing so, they reviewed 87 studies published between 2000 and 2007, thus chronologically continuing from van der Doef and Maes' end point. Studies examined similar psychological well-being and strain outcomes to the two previous reviews, and results of their review revealed four major findings.

First, Häusser et al., (2010) found that sufficient sample size appears to almost guarantee support for additive effects of demands, control, and social support, as per the strain hypothesis (Karasek, 1979; Karasek & Theorell, 1990). They concluded that studies showing support generally employed larger samples than unsupported studies. Moreover, all studies with $n > 1000$ found at least partial support for additive effects (i.e., whereby relationships were in the direction hypothesized, but not necessarily significant), and full support for main effects was found in *all* studies employing samples of $n > 3,000$. Based on these findings, Häusser et al. (2010) concluded that additive effects of

the model have been proven beyond empirical doubt. Second, as with previous reviews Häusser et al. (2010) found support for additive effects to be consistently lower in longitudinal studies than cross-sectional studies, arguably because of reciprocal/reversed effects in cross-sectional studies (Taris & Kompier, 2003). Third, as with previous reviews, evidence for interactive effects was again sparse. Only 29 of 97 tests (30%) provide partial support for the demands-control interaction, with full support in just 14 tests (13%). Moreover, only seven of 52 tests (13%) provide partial support for the interaction of demands, control, and support, with full support found in only three studies (6%). Finally, Häusser et al., (2010) found studies of the extended JDACS model to be less strongly supported than studies of the original JDC model. However, they did not argue for a problem with the social support dimension due to finding approximately equal support for main effects of demand, control, and support dimensions. Instead, they attributed lower levels of support for the extended model to *stochastic effects* of including an additional criterion, which would be expected to reduce multiplicative effects (Häusser et al., 2010).

Based on their findings, Häusser et al. (2010) called for more experimental rather than survey-based studies of the model to provide causal examinations of its major hypotheses. They also repeated van der Doef and Maes' (1999) call for more longitudinal studies to dangers of reduce reversed or reciprocal causation. The authors also contended that there should be more studies of objective (rather than subjective) measures -- or at least studies with a *mix* of objective and subjective measures – in order to reduce self-report bias in surveys, and because the model purports to make conclusions about the objective environment. Finally, Häusser and colleagues (2010) called for a transition

from vote counting reviews to systematic meta-analyses of the model in order to measure population level effect sizes, and to examine possible moderating variables.

In summary, the JDC(S) model remains the most examined theory in work stress literature (Griffin & Clarke, 2011; Kain & Jex, 2010, Luchman and González-Morales, 2013; Sulsky & Smith, 2005). However, despite fairly consistent support for the strain hypothesis since its 1979 inception, support for the buffer hypothesis has been sporadic throughout. As such, the JDC(S) model has been widely criticized for several theoretical and methodological limitations that are apparent both in many of the individual studies of the model, and collective research on the model (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). These issues, and attempts to address them, are outlined in greater detail in the following section. Further suggestions for future research are then made.

Major Criticisms of the Model

The most enduring criticism of the JDC(S) model is the inconsistency to which buffering effects of control and/or support are found (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). Additionally, the model has been criticized for a predominance of self-report measurement studies, mainly cross-sectional rather than longitudinal research designs, and failing to account for individual difference variables that may moderate relationships underpinning its major hypotheses. These criticisms were echoed most recently by Kain and Jex (2010) in their review of the model. As such, each of these criticisms is expounded upon below. Additionally, the present review serves to update Kain and Jex (2010) by reviewing studies published in the ensuing six years that have adhered to suggestions born out of these criticisms.

Inconsistent Multiplicative Support

As highlighted in the three aforementioned vote counting reviews, and several other theoretical reviews of the model (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003), inconsistent buffering effects is by far the greatest criticism the JDC(S) model (Kain & Jex, 2010). From a theoretical perspective, this inconsistency has led to some scholars doubting the model's predictive value (e.g., Beehr, Glaser, Canali, & Wallwey, 2001). However, Karasek (1979; in De Lange et al., 2003) argued that interactive effects are unnecessary to support the validity of the model because; (1) its basic premise is supported if demands, control, (and support) separately exert main effects on strain; (2) reducing job demands and increasing control and/or support would additively reduce strain even if no interaction is present; and (3) implications for job redesign are the same with or without multiplicative effects. Additionally, in a recent review of the work stress literature Griffin and Clarke (2011) acknowledged difficulty in assessing the unique importance of interactions in the stress process *independently* of main effects, because "interactions are often reported in relation to multiple main effects...and the proportion of variance is often small" (p. 370). However, from a theoretical standpoint it could be argued that an interaction between demands and control (and support) is necessary to validate the model. For example, as Beehr et al. (2001) contended that: "... if main effects are all that constitute the theory, then demands and lack of control are simply a set of independent stressors with no necessary relationship to each other" (p. 117). Thus, the model's strength -- that is, the presupposed interactive effect of control and/or support on demand characteristics -- is at the same time also its *weakness* (De Jonge & Kompier, 1997).

Aside to debate regarding the model's validity as an effective predictor of well-being and strain, it is important to address theoretical and methodological reasons *why* multiplicative effects have been so inconsistent. The following criticisms of the model are theoretical and methodological issues that have arguably contributed to this inconsistency, with Kain and Jex (2010) calling for further studies to address them.

Varied and Non-Matching Measurement DCS Constructs

Several researchers (e.g., De Jonge & Kompier, 1997; Kasl, 1996; Viswesvaran, Sanchez, & Fisher, 1999; Wall, Jackson, Mullarkey, & Parker, 1996) have contended that the probability of finding significant JDC(S) interaction effects is affected by how the model's key dimensions are conceptualized and operationalized. Specifically, inconsistent effects are thought to be attributable to both the number of different ways that demands control (and support) have been measured across studies, and by most instruments being too *global* -- that is, lacking in occupational specificity, and lacking in context when related to the other dimensions -- to reveal consistent interactive effects (e.g., Terry & Jimmieson, 1999; Wall et al., 1996). For example, in their recent review of the model Kain and Jex (2010) included a table of different conceptualizations of demand and control. According to this, job demands have been measured as *self-reported workload, role conflict* (i.e., stress attributed to incompatibility between multiple sets of work demands; Beehr & Newman, 1978) (Karasek, 1979), *physical exertion, hazardous exposure* (both in Landsbergis, 1988), and *patient load* (Fox, Dwyer, & Ganster, 1993). This is by no means an exhaustive list (see Häusser et al., 2010; van der Doef & Maes, 1999). Additionally, control has been measured as autonomy, and decision making latitude (Karasek, 1979), as well as task control, scheduling control, and control over procedure and policies (Fox et al., 1993). Finally, although not included in this table,

workplace support has been measured as an all-encompassing construct, as well as supervisory support, and coworker support (Luchman & González-Morales, 2013). Given this variability, even if it is theoretically plausible that control and/or support could moderate the effects of high demands on strain these effects have probably not been found in studies where the type of control or support measured is incongruent with the type of demands they are hypothesized to buffer (e.g., De Jonge & Kompier, 1997; Kasl, 1996; Viswesvaran et al., 1999; Wall et al., 1996). These concerns were also raised by the authors of aforementioned vote counting reviews (e.g., Häusser et al., 2010; van der Doef & Maes, 1999).

In response to this concern, Häusser et al. (2010) conducted an exploratory analysis to examine whether degree of match between demand and control measures used in studies was associated with a higher likelihood of finding significant interactive effects. Measures of support were not included in this analysis. They divided reviewed studies into categories of “good” and “poor” match. Good match studies as those in which demand and control measures referred to the same level of functioning at the task level. For example, these studies typically operationalized demands as work load or time pressure, and control as control over the timing, scheduling, or pacing of tasks. Studies that utilized occupation-specific rather than global/generic measures were also included in this category. In all, twenty studies were classified as having a good match. Conversely, 76 studies were classified as having a poor match based on relatively unmatched or incongruent measures of demands and control (for example, *emotional* demands and timing control). Häusser et al. (2010) found that 50% of studies in the good fit category evidenced interactive effects of demands and control, whereas only 25% of

studies in the poor fit category found interactive effects. This significant difference, $X^2(1, N = 96) = 4.69, p < .05$ indicates the benefit of congruency between key dimensions.

Unfortunately, despite this evidence many researchers have continued to measure demands, control, and support in numerous different ways, with varying degrees of match between measures. For example, Fransson et al., (2012) compared alternative demand-control-support scales in 17 European cohort studies. Their findings highlighted that not only had different measures been used across studies, but that variation exists between studies regarding which items were used to construct scales. Thus, even ostensibly matching scales are likely to vary in the degree of actual match to others in the same study. Additionally, the variability in measurement extends to outcome variables with several different survey instruments having been used to measure frequently examined outcome variables such as job satisfaction, emotional exhaustion, and anxiety (Fransson et al., 2012). Thus, degree of match between demand, control (and support) measures may also be confounded by differences in how outcomes are measured because a well- or poorly matched set of measures may interact in their relationship with one measure of, say, job satisfaction, but not another. Furthermore, most studies of the model continue to use broad rather than occupation specific measures of demands, control, and support dimensions. This is understandable because most of the validated measures available are not specific to one particular job or industry (Kain & Jex, 2010). However, as previously mentioned the principle of matching measures of key constructs to achieve greater consistency of multiplicative effects is arguably harder to achieve if context is too broad (Beehr et al., 2001). With most empirical studies of the JDC(S) model designed as individual studies in their own right, and with seemingly little to tie them together, it appears that issues of varied and often poorly matched measures is likely to continue.

Predominance of Self-Report Measurement

In empirical studies of the JDC(S) model, dimensions can be measured by imputation of job characteristics, or self-report questionnaires (van Vegchel, De Jonge, & Landsbergis, 2005). In the imputation method, scores for job demands, control, and workplace support are assigned to employees on the basis of their job title, as derived from large national studies (Karasek & Theorell, 1990). This method is recommended for large multi-occupational studies where information about an individual's occupation is available (Landsbergis & Theorell, 2000). The most prominent example of this is the Occupational Information Network (O*Net; Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999) where myriad jobs are compared on demands and resources, as well as attributes and work styles required to be successful, based on previous research. However, viewing stress objectively as a condition or an *event* in a given situation has been criticized for overlooking individual differences in cognitive appraisal of stress (Cooper & Marshall, 1976; Matteson & Ivancevich, 1979). Thus, most researchers of the JDC(S) model have been interested in stressor-strain relationships based on how job characteristics are *perceived* by workers (Kain & Jex, 2010) in accordance with the fit perspective of work stress (e.g., Edwards & Cooper, 1990; French et al., 1982). As such, self-report questionnaires have been used in the vast majority of studies of the model (Luchman and González-Morales, 2013; van Vegchel et al., 2005).

Self-report measures require people to report on their experiences, feelings, or attitudes (van Vegchel et al., 2005). In stress research such measures assess usually the affective, somatic, and cognitive aspects of perceived stress (Sulsky & Smith, 2005). Self-report measures have several benefits to researchers: They are relatively inexpensive, easy to administer to large groups of people, and easily quantifiable.

Moreover, from a validity perspective individual perceptions are a critical component of the stress process because a large body of research suggests that the actual existence or degree of stress may be *less* important to an individual's well-being than how the individual appraises and copes with perceived stress (Aldwin & Revenson, 1987; Lazarus, 1966). Furthermore, validated self-report measures offer a high degree of face validity because arguably the best way to find out if someone is stressed is to *ask* (Sulsky & Smith, 2005).

Despite the obvious benefits of self-report methods they have received repeated criticism for being poor indicators of the *objective* work environment (van Vegchel et al., 2005). That is, the degree to which different employees find the same set of working conditions to be stressful is likely to vary (French et al., 1982; Lazarus, 1966). As such, there may be a danger in generalizing perceptions of demands, control, and support at the individual level to *objective* dimensions of an organization. Self-report measures are also prone to response bias, and a host of cognitive biases including reliance on past experiences or schemas (Sulsky & Smith, 1995). Furthermore, psychological perception of stress may occur earlier or later than objectively measurable symptoms in the context of a stressful experience. Moreover, unreliability (e.g., a low Cronbach alpha) in any of the self-report measures used will attenuate relationships among them (Sulsky & Smith, 2005). Thus, there are inherent dangers in making too strong a conclusion about organizational phenomena using self-reports measures (Sulsky & Smith, 1995; van Vegchel et al., 2005). This is especially the case where self-reports are used to measure both independent *and* dependent variables of interest because of the risk of inflated relationships due to common method variance (Spector, 2006). However, transactional stress theory proposes that only the individual can appraise the challenging or threatening

nature of the stressor (Lazarus & Folkman, 1984). Thus, despite poignant arguments against the use of self-report measures their popularity in work stress research -- including studies of the JDC(S) model -- continues to be unabating (Griffin & Clarke, 2011; Kain & Jex, 2010).

Different Types of Measures in a Single Study. Given the aforementioned potential problems with self-reports measures, Kain and Jex (2010) recommended that researchers either use different types of measures (e.g., subjective *and* objective) to avoid common method bias, or adopt experimental (or quasi-experimental) methods. Several studies have since followed their advice, with more consistent evidence of buffering effects. First, Pekkarinen and colleagues (2013) examined whether perceived control, workplace support, and distributive justice moderated associations between high physical and mental workload and musculoskeletal symptoms, among 975 females nurses working in 152 geriatric units in Finland. Objective workload measures were also taken. These consisted of unit-level incidents or occasions of work, including residents' dependency on physical functions (e.g., bed mobility, toileting, eating, and hygiene), residents' cognitive impairments (i.e., coma, short-term memory decision making, communication, and dependence in eating), and daily behavioral problems (i.e., wandering, verbal and physical abusiveness, resistance to care, and social disruptiveness). However, rather than examining possible interactive effects between perceived control and support resources, respectively, and these measures, objective workloads measures were accounted for (e.g., *held*) in their regression analysis of subjective demand, control, and support measures. Their multilevel logistic regression analyses showed that self-reported physical workload was associated with higher risk of musculoskeletal symptoms among nurses with low

social support. Additional examples of studies of the JDC(S) model that have used objective measures are outlined as follows.

Studies with an Experimental Design. First, Häusser, Mojzisch, and Schulz-Hardt (2011) examined the buffer hypothesis with respect to both psychological (e.g., subjective) well-being, and salivary cortisol as a physiological indicator of strain. Seventy-seven participants worked in a computer simulated workspace for approximately two hours, during which job demands (overall workload) and job control (self-paced vs. machine-paced work) were manipulated in a 2x2x7 study design of high versus low demands and control, and seven time measurements of both subjective well-being and salivary cortisol. Häusser and colleagues (2011) found that in line with the buffer hypothesis, high control (e.g., self-paced rather than machine-paced work) eliminated the impact of high demands on salivary cortisol responses. Their hypothesis of multiplicative effects of demands, control, and time of measurement on salivary cortisol was supported by a three-way interaction ($p < .001$). Given lagged cortisol reactions, no effects were found in times 1 and 2. However, high demands led to increased cortisol reactions only in the low control condition in each of the remaining five time measurements. Conversely, the authors found no main or multiplicative effects of demands and control on subjective well-being. They contended that their findings provided both clear-cut experimental evidence that the negative impact of high demands on endocrinological responses can be buffered by high levels of control, and that the lack of effects on subjective well-being can be attributed to an inherent lack of specificity in subjective well-being measures.

More recently still, Subhani, Malik, Kamel, Saad, and Nandagopal (2015) investigated the impact of demands and control on cognitive arousal. Their experiment involved manipulating task demand and control over method and order of task

completion for *four* demand-control conditions (e.g., high-high, high-low, etc.), and recording electroencephalogram (EEG) to extract levels of cognitive arousal. Both the strain and buffer hypotheses were supported by cognitive arousal levels in association with task performance and subjective well-being feedback. That is, their results showed that the maximum arousal and the *worst* performance occurred under the high demands low control condition. Moreover, high control under conditions of high demands proved to significantly lower arousal and improve task performance when compared to the high demands low control condition. Subhani et al.'s (2015) results not only validate the strain and buffer hypotheses for high strain (e.g., high demands, low control) conditions in an experimental setting, but present a rare experimental examination of the *activation* hypothesis (high demands and *high* control; Karasek & Theorell, 1990).

Finally, O'Donnell, Landolt, Hazi, Dragano, and Wright (2015) assessed the possible buffering effects of control in an experimental design of the strain hypothesis. In a within-subject design, 60 female participants were randomly assigned to one of two control (autonomy) conditions whereby when completing a word processing task in a simulated office environment, they were either given the autonomy to choose their break times, or were assigned them. O'Donnell et al. (2015) measured adaptive physiology using heart rate variability (HRV) and salivary alpha amylase (sAA) as objective physiological markers of stress. To the authors' surprise, although participants reported *increased* perceptions of control in the task in the break-time autonomy versus the standard condition they reported no difference in demands, and performed *worse* than those who had been assigned break times. Thus, their results revealed support for the manipulation of autonomy, but in the opposite direction than hypothesized in the buffer hypothesis. Moreover, increased autonomy was related to dysregulated physiological

reactivity, which is synonymous with typical increases in the stress responses (Schneider, 2004). Thus, their findings suggest that autonomy can become an additional *stressor* when it adds additional complexity to work (e.g., Karasek & Theorell, 1990).

Predominance of Cross-Sectional Research Designs

The majority of JDC(S) studies have adopted cross-sectional rather than longitudinal research designs (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999). Cross-sectional designs allow for all data to be collected at a single time point. However, they have been widely criticized for potential reverse- or reciprocal-causation (Spector, 2006). Reverse/reciprocal causality is cause and effect in reverse, such that the effect precedes the cause (Tharenou, 1993). For example, where findings of a cross-sectional JDC(S) study show a positive relationship between perceived demands and emotional exhaustion, it is possible that being emotionally exhausted may evoke perceptions of job demands being high. Similarly, if results show a negative relationship between perceived control and emotional exhaustion, an employee who feels able to cope with the pressures of work (i.e., who is *not* emotionally exhausted) may be likely to perceive a greater degree of control (cf. Dalgard et al., 2009).

A weight of predictive evidence from longitudinal JDC(S) studies suggests that demands, control, and support respectively do in fact *predict* well-being and strain (Häusser et al., 2010; van der Doef & Maes, 1999). Thus, support of the model's hypotheses in cross-sectional studies may not be due to reverse- or reciprocal-causation. However, it may be a factor in more consistent support being found overall for both the strain and buffer hypotheses in cross-sectional versus in longitudinal studies (Taris & Kompier, 2003) (see Häusser et al., 2010; van der Doef & Maes, 1999). As such, Kain and Jex (2010) as well as the authors of JDC(S) reviews (e.g., Häusser et al., 2010; van

der Doef & Maes, 1999) recommended that more researchers adopt longitudinal research designs. Longitudinal designs do not allow researchers to infer causality in non-experimental survey research (Kasl, 1996; Zapf et al., 1996). However, they reduce the risk of reverse- or reciprocal-causality, particularly when cross-lagged correlations can be obtained that support directionality of effect (De Lange et al., 2003). Since Kain and Jex's (2010) review several further studies have been published that adhere to their call for more longitudinal research.

Studies with Longitudinal Designs. First, De Jonge, van Vegchel, Shimazu, Schaufeli, and Dormann (2010) performed a two-wave longitudinal test of the demand–control model in a sample of 267 health care employees from a Dutch panel survey, with a 2-year time lag between waves. They examined the strain hypothesis using specific types of job demands, and both objective and subjective well-being. The specific types of demands were *mental demands*, measured with an eight-item scale that measured demanding aspects of the job, such as working under time pressure, strenuous work, and job complexity; *emotional demands*, which were assessed using a 12-item scale regarding aspects of work such as being confronted with emotionally demanding behavioral characteristics of clients (e.g., awkward or aggressive behaviors) and traumatic events such as human suffering; and *physical demands*, as measured by a seven-item scale that contained items about carrying heavy loads, severe bending, restricted standing, and carrying at shoulder height. Control was measured as perceived decision authority on the job. Finally, they measured job satisfaction, and subjective well-being in the form of psychosomatic health complaints, as well as objective well-being based on incidents of sickness absence, as recorded by the organization. De Jonge et al. (2010) found significant interactions between demands and control for mental and emotional demands,

but not for physical demands. Specifically, they found a positive relationship between demands and job satisfaction for those who reported high levels of control, and a negative relationship for those reporting low control. Conversely, the relationship between demands and both psychosomatic health symptoms and incidents of sickness absence were negative for those with high levels of control, but positive for those reporting low control.

In another study, Butterworth et al. (2011) used longitudinal data to investigate whether the benefits of having a job depended on its psychosocial qualities (e.g., levels of demands and control, as well as complexity, security, and fair pay), and whether poorer quality jobs were associated with better mental health than unemployment. The authors analyzed seven waves of data from 7,155 respondents of working age for a total of 44,019 observations taken from a national household panel survey. Longitudinal regression models evaluated the concurrent and prospective association between employment circumstances (e.g., unemployment versus employment in jobs varying in psychosocial job quality) and participants' reported mental health. Although as expected the authors found unemployed respondents to have poorer mental health than those who were employed, the mental health of the unemployed was slightly superior to those who were employed in jobs of the poorest psychosocial quality (e.g., high demands, low control, and also routinized work that lacked job security and was poorly paid). Although not a test of the buffer hypothesis, this examination of the strain hypothesis (e.g., main effects of demands and control) across time was revealing given that those who were unemployed experienced better mental health than those employed in psychosocially poor jobs.

Finally, Boyd et al. (2011) used structural equation modeling to conduct a longitudinal test of the model in a sample of 296 Australian university academics in order to determine how well job demands (work pressure, academic workload) and job resources (procedural fairness, job autonomy) would predict psychological strain and organizational commitment over a three-year period. The authors also conducted longitudinal tests of reversed causation to support the validity of their longitudinal design. Their results of SEM analyses showed that resources at time 1 directly predicted strain and organizational commitment three years later, but that demands in the first time wave only predicted strain three years later via job resources. That is, perceived control and procedural fairness at time 1 mediated the relationship. Their results suggest that workers future levels of strain are affected by present levels of resources. Moreover, Boyd et al. (2011) did not find evidence for reversed causation.

Taken together, the results of this study show that although longitudinal studies of the model remain relatively rare, some support does exist for buffering effects on demand-strain relationships. Moreover, these more recent studies have adopted longer gaps between time waves than some of those reviewed by Kain and Jex (2010). Although justification for the length of gap between waves appears to be still lacking, adopting a longer-time lag between waves decreases the chance of finding significant effects. Thus, these studies go some way to validating that hypotheses of the JDC(S) model are valid over time.

Failing to Account for Individual Difference Variables

In line with Karasek (1979), Kain and Jex (2010) contended that main and multiplicative effects of demand, control, and support on well-being and strain might vary based on individual differences; something that the model has been criticized for

overlooking (Kristensen, 1995). In their review, Kain and Jex noted that although Karasek had outlined several possible individual differences (e.g., age, education, income, urban versus rural living), he had not hypothesized what these effects might be. Moreover, in the thirty years leading up to their review relatively little research had been conducted on possible moderating effects of these (or other) individual difference variables. This may have contributed to criticism regarding the model's simplicity, and relative lack of multiplicative effects in primary studies. Kain and Jex (2010) noted, however, that more recent studies of the model had included various measures of individual differences, such as *proactive personality* (defined as the propensity to show initiative, take action, and persevere until the problems one faces are overcome; Parker & Sprigg, 1999), *active coping* (e.g., a wide range of purposeful strategies which are directed towards altering or avoiding job-related stressors; Parkes, 1994), *self-efficacy* (an individual's judgments of their own capabilities to organize and execute courses of action in order to attain designated goals; Bandura, 1977), and *external locus of control* (e.g., the degree to which one attributes or concedes control to forces outside of oneself; Spector, 1982). They reviewed findings of the effects of these individual difference variables on main and multiplicative effects of demand, control, and support dimensions, and reached several initial conclusions.

First, individuals with a proactive personality tend to use autonomy at work to cope with demands more effectively than those with a less proactive personality. However, strain levels tend to be higher for those with a proactive personality when perceived control/autonomy is low (Parker & Sprigg, 1999). Second, Kain and Jex (2010) acknowledged that one's choice of coping methods can depend on the situation (e.g., what resources are at hand). Specifically, they reported that job control mitigated the

relationship between demands and physical forms of strain for those who adopted active coping methods, but not for those who didn't. This was attributed to the ability of those adopting active coping methods to *use* control in order to meet demands (Ippolito, Adler, Thomas, Litz, & Holzl, 2005). Conversely, as with proactive personality, employees reported higher levels of strain when control was perceived to be low (Parker & Sprigg, 1999).

Similarly, Kain and Jex (2010) reported that according to Salanova, Peiro, and Schaufeli (2002), employees reporting high levels of self-efficacy were more likely to experience a buffering effect of control on the relationship between high demands and strain because they believed in their ability to utilize control afforded to them in order to meet demands. However, those with lower levels of self-efficacy did not experience this interaction, even if they reported perceiving high levels of control, because they were unable to utilize it. Finally, with regards to locus of control, Kain and Jex reported that studies had shown control *not to* buffer relationships between demands and anxiety, and demands and musculoskeletal pain for those perceiving an *external* locus of control (Meier, Semmer, Elfering, & Jacobshagen, 2008). However, buffering effects were strongest for those with an internal locus of control, particularly when workplace support was also perceived to be high (Rodriguez, Bravo, & Peiro, 2001).

Individual Difference Research Since Kain and Jex's Review. In the ensuing years since Kain and Jex's (2010) review, further research on the JDC(S) model has taken individual differences into account. For example, there has been further evidence for the effects of *active coping* (van den Tooren, de Jonge, Vlerick, Daniels, & Van de Ven, 2011), *self-efficacy* (Panatik, O'Driscoll, & Anderson, 2011), and *external locus of control* (Parker, Jimmieson, & Amiot, 2010), which largely corroborate the

aforementioned studies reviewed by Kain and Jex (2010). However, researchers have also examined several other individual differences variables.

First, it appears that *hardiness* is an important individual resource in relation to health at work by protecting against stress to enable healthy functioning. Hardiness is defined as a generalized style of functioning that is characterized by a strong sense of commitment to goals, control over circumstances, and willingness to undertake challenge (Bartone, 2000). The quality of hardiness is believed to influence how people interact with their environment by encouraging effective coping with stressful circumstances (Maddi & Kobasa, 1984). Specifically, Hystad, Eid, and Brevik (2011) investigated the role of hardiness in sickness absences from work in a sample of Norwegian Armed Forces employees. They found that hardiness predicted both the likelihood of having sickness absences and the number of absence spells over the following 12 months. Moreover, individuals who reported high demands and *high* control (in line with the activation hypothesis; Karasek, 1979) were absent more often if they reported a *low* versus high levels of hardiness. This suggests that hardiness comes into play when individuals are actively challenged by demanding work over which they perceive a strong measure of control (Hystad et al., 2011).

Another individual difference variable that has recently received investigative attention in a study of the JDC(S) model is *emotional stability*. Emotional stability is defined as the ability to remain calm when faced with stressful circumstances or environments, and to perform effectively under such conditions (Leone, Van der Zee, van Oudenhoven, Perugini, & Ercolani, 2005). It is associated with low levels of negative affect, as well as higher levels of self-confidence, productive coping strategies, such as problem-focused and emotion-approach coping, and a calm demeanor. Conversely, when

faced with challenges, individuals with low levels of emotional stability are more likely to focus on their own inner turmoil, and to direct available resources (e.g., control or support) toward reducing negative emotions rather than to addressing situational demands (Baker & Berenbaum, 2007; Connor-Smith & Flachsbart, 2007). Moreover, individuals who are low in emotional stability are likely to inadvertently invite more stress and strain by dwelling on negative emotions, and to experience anxiety, hostility, and self-doubt (Costa & McCrae, 1987), despite a range of emotion-avoidance coping strategies (Baker & Berenbaum, 2007).

Rubino, Perry, Milam, Spitzmueller, and Zapf (2012) integrated study of the JDC(S) model (Karasek & Theorell, 1990) with the conservation of resources theory, which views stress as triggered by failure to acquire sufficient resources, or by threat or actual loss of them (Hobfoll, 2001), by positing that emotional stability can act as a personal resource by aiding in the management of job demands. The authors tested the moderating effect of emotional stability on job demands of uncertainty and time pressure, and control (i.e., decision latitude) in predicting job dissatisfaction and disengagement. For both uncertainty and time pressure they found that a significant three-way interaction emerged, such that the traditional demand–control interaction was found only in those with high emotional stability, and that those with low-emotional stability did not benefit as readily from decision latitude. Moreover, those with low emotional stability were more susceptible to job demands when they experienced *high* levels of control. This suggests that highly emotionally stable individuals are best able to capitalize on being afforded significant control over their work to manage demands; whereas in uncertain situations, emotionally unstable individuals may view decision latitude as added responsibility that may further contribute to strain (Rubino et al., 2012).

Finally, Daniels, Wimalasiri, Cheyne, and Story (2011), examined whether *personal initiative* moderated demand-control-support relationships with outcomes of idea generation and idea implementation. Personal initiative is defined as a set of co-occurring behaviors consisting of being self-starting, persistent in implementing goals, and having a long-term orientation (Frese & Fay, 2001). Moreover, according to Seibert, Kraimer, and Crant (2001), individuals with high levels of personal initiative are future oriented, and thus may be more predisposed to resolve ambiguous problem situations through the development and implementation of new ideas. Such people also tend to be more creative than those with lower levels of personal initiative (Binnewies, Ohly & Sonnentag, 2007).

Daniels et al. (2011) used an experience sampling methodology whereby participants provided data up to four times per day for up to five working days ($n = 89$). They expected that workers with higher levels of personal initiative would be more likely to use job control to solve problems (e.g., demands) as a way to generate new and useful ideas (c.f., Searle, 2008). They operationalized job control as “changing aspects of work activities to solve problems” (p. 11), and found that the degree to which people reported doing so was associated with higher levels of idea generation for people with high personal initiative.

Additionally, Daniels et al. (2011) operationalized social support in the context of problem solving as “discussing problems to solve problems” (p. 13). They did not expect workers with high levels of personal initiative to use support in the idea generation process, because according to Paulus, Larey, and Dzindolet (2001) cognitive processes relating to idea generation can be hindered by the presence of others. However, people with high levels of initiative tend to be more persistent in *implementing* ideas (Frese &

Fay, 2001), and idea implementation is thought to include a social element (whereby ideas can be both supported and transformed based on feedback; e.g., De Dreu, 2006). Thus, Daniels et al. (2011) expected such people to discuss problems with others in order to refine and implement new ideas for solving problems (Frese & Fay, 2001). They found that the extent to which workers discussed problems to solve problems (e.g., support) was associated with higher levels of idea implementation for those with higher levels of personal initiative. Thus, Daniels et al.'s (2011) findings suggest that individuals with a high degree of personal initiative are more likely to make optimal use of control and support resources, in order to solve problems in the shape of work demands.

Taken together, these results further suggest that such differences are at play when examining the major hypotheses of the JDC(S) model. Furthermore, it appears that multiple individual difference characteristics share similar relationships, when accounted for in studies of the model. That is, the negative effects of strain tend to be less for those who are high in these characteristics, in conjunction with high levels of perceived control and in some cases support. Moreover, positive effects of *high* demands and *high* control (and in some cases, high support) appear to have the strongest affect on active learning and performance-related outcomes (as per the activation hypothesis; Karasek, 1979; Karasek & Theorell, 1990) in people who are strong in these individual difference characteristics.

Further Issues to be Addressed: New Conceptualizations of Demands.

In addition to the theoretical and methodological concerns above, Kain and Jex (2010) followed up Karasek and Theorell's (1990) original call for tests of other demands using the model. That is, although studies have examined a number of different *operationalizations* of demands (e.g., workload, role overload, psychological demands),

the authors called for examinations to test the strain and buffering hypotheses on alternative *conceptualizations* of the term “demands.” Beyond these different operationalizations, and what has already been reviewed and discussed regarding objective versus subjective demands, arguably the most progressive change in relatively recent years is a reconceptualization of demands as being both “bad” and “good” not only in their *quantity* (e.g., eustress, due to a *moderate* versus high or low amount of demands, Selye, 1956; or the different role of demands in the activation versus strain hypothesis, Karasek & Theorell, 1990), but also in terms of the *nature* and *characteristic* of the demands themselves. Thus, there is now greater consideration than before that the *type* of demand stressor may be important in predicting job satisfaction, and strain.

Challenge-Hindrance Stressors

For example, in their meta-analysis of work stress and employee turnover, Podsakoff, LePine, and LePine (2007) argued for two conceptually separate domains of stressor in their examinations, which they purport may somewhat explain inconsistencies in previously reported relationships where demands have operated within a singular domain space (e.g., Selye, 1956; Wundt, 1922). Specifically, Podsakoff et al. (2007) categorized job demands as either *hindrance* or *challenge* stressors. The authors defined hindrance stressors as demands that workers tend to appraise as potentially constraining to their personal development and work-related accomplishment. Examples included *role ambiguity* (i.e., the degree to which work is demanding because of uncertainty regarding expectations; Kahn, Wolfe, Quinn, & Snoek, 1964), *organizational politics*, and concerns about *job security*. In contrast, they defined challenge stressors as those that promote personal growth and achievement (Podsakoff et al., 2007). Examples include high levels of workload, time pressure, job scope, and responsibility. Thus, challenging demands

require some energy, but are *stimulating*. Although the term “job demands” has come to encompass a variety of stressor variables, delineation of demands into negative and positive categories stands in contrast to previous stress research in which the term *stressor* was inherently thought to be *negative* to employee well-being. Interestingly, this conceptualization has stood in contrast to classical stress theory on there being an optimal level of stress for well-being, not a linear negative relationship (e.g., Selye, 1956, 1976).

In their recent meta-analysis, Podsakoff et al. (2007) collated primary studies based on whether stressor variables could be considered to be challenges or hindrances. Their findings revealed that hindrance stressors were more strongly related to strain ($r_c = .56$, 95% CI .50 to .62) than were challenge stressors ($r_c = .40$, 95% CI .34 to .47). However, although hindrance stressors were strongly negatively related to job satisfaction ($r_c = -.57$, 95% CI -.61 to -.52), challenge stressors had a near-zero relationship with job satisfaction ($r_c = -.02$, 95% CI -.10 to .05). Although challenge stressors are thus painted in a more positive conceptual light than hindrance stressors, Podsakoff et al.’s (2007) findings suggest that high levels of challenge stressors increase the occurrence of strain. Moreover, when seeking to enhance employee satisfaction through job redesign, interventions targeting job demands are unlikely to produce meaningful effects.

Despite the relative prominence of the challenge-hindrance stressor framework in recent years, and widespread acceptance that demand stressors can be delineated based on these characteristics, almost no research to date has investigated whether the moderating role of resources (e.g., control and support) differs in relationships between challenge and hindrance stressors, respectively, and job satisfaction and strain. This may be due to questions being raised regarding the accuracy of these concepts as standalone

variables. For example, Schieman (2013) contended that “the conceptual fuzziness of demands and resources in the challenge-hindrance model is problematic on many levels” (p. 9). First, the challenge stressor and hindrance stressor conceptualizations blur the lines between the job attribute and the consequences that flow from it by blending the independent and dependent variables. Specifically, a job characteristic is labeled as a “hindrance stressor” if it is associated with decreased functioning or poor health; but as a “challenge stressor” if it is deemed to be stimulating. Moreover, Schieman (2013) argued that the challenge-hindrance framework obscures key distinctions between demands and *resources*, and, instead characterizes them all as different kinds of demands. That is, challenging demands may encompass positive assessment of resource availability for task completion, whereas hindrance demands may simply be demands that the individual appraises as being imbalanced with resource availability. In addition to these contentions, as previously mentioned transactional stress theory (Lazarus & Folkman, 1984) proposes that only the individual can appraise the challenging or threatening nature of the stressor. Thus, what may be challenging for one individual may be a hindrance to another. Furthermore, a recent study by Webster, Beehr and Love (2011) showed that some employees simultaneously appraised stressors such as role ambiguity, workload and responsibility both as challenges *and* threats.

Despite these arguments, one recent study investigated whether the role of resources differed for challenge and hindrance stressor relationships with strain. Tadic, Bakker, and Oerlemans (2015) conducted a quantitative daily diary study to investigate whether primary school teachers experienced the most positive affect and work engagement on days when they were confronted with highly challenging (vs. low challenge) job demands and *high* resources of control and work support; and the lowest

levels of positive affect and engagement on the days they were confronted with high (vs. low) levels of hindrance demands combined with *low* job resources. They found that hindrance demands had a negative relationship with daily positive affect and work engagement, but that control and support buffered this relationship. In contrast, daily challenge demands had a positive relationship with the two outcomes, and this was made stronger by the presence of resources. Tadic et al. (2015) have taken the first step to showing that resources may in fact have differing effects between challenge and hindrance stressors, but clearly, more research is required to draw firmer conclusions.

Illegitimate Tasks.

Another relatively new conceptualization of job demands is that of illegitimate tasks (Semmer et al., 2005, 2015). The concept of illegitimate tasks, as well as an examination of their effects in a test of the JDC(S) model is covered in article 3 of this dissertation.

Where Now? Future Research on the Model

In addition to addressing Kain and Jex's (2010) calls for future research on the JDC(S) model, there are other concerns that arguably deserve more investigative attention. First, given significant changes in the design of many established types of jobs, as well as the advent of many new types of occupation since Karasek's (1989) original research (see O*Net; Peterson et al., 1999), categorizations of jobs based on demand, control, and support characteristics should be reevaluated. It would also be interesting to ascertain whether certain occupations have changed position in the ensuing period (e.g., from being active jobs, to high strain jobs), and to understand why. Aligned to this, further research could establish whether demographic trends exist in these different categorizations of jobs. For example, given the gradual shift towards greater levels of

gender equality in the workplace, have there been changes in the work characteristic profile of jobs they frequently occupy (e.g., from an arguable tendency towards passive jobs such as clerical work, to more low strain, active, and high strain positions, such as scientists, management consultants, and attorneys?).

Additionally, future studies of the model could address concerns regarding interactive effects by examining a broader array of operationalizations of job demands, control, and support, within a single study (for example, physical demands, emotional demands, task demands; skill discretion, autonomy, and decision making authority; as well as coworker and supervisor support, and perhaps other sources of workplace support, such as from internal counselors). A more comprehensive approach to measuring demands, control, and support makes both theoretical and practical sense, and is necessary both to validating the buffer hypothesis on a more consistent basis, and moving the theory away from criticism due to frequently unjustified reasons for selecting a single measure only of the main constructs (e.g., Kristensen, 1995). Furthermore, future cumulative reviews of JDC(S) research could compare findings across different occupations to better determine what control and support resources are more or less likely to buffer effects of demands on well-being and strain in different jobs. Doing so would increase the likelihood of finding interactive effects because of the greater number of tests that could be performed in a single study (e.g., two types of demands and two types of control would yield four tests of multiplicative effects). However, perhaps more importantly from both a theoretical and practical perspective, such an approach would allow for more specific *matching* between types of demands and control, which would aid efforts to redesign jobs for maximal positive outcomes such as learning, motivation, and performance, and minimization of strain. For non-experimental survey-based studies

of the model, as adopted by the vast majority of studies of the model to date (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999), adding further measures of the three main dimensions of the model would simply be a question of adding more survey instruments to the investigation.

A third recommendation for future research, in line with the second recommendations, is that researchers make a greater effort to focus on forms demand, control, and support that are relevant to the type of work or organization participants work in, rather than relying on global measures. For example, a brick layer performs routinized physical and monotonous tasks (Karasek & Theorell, 1990). The three classical forms of control measured in studies of the JDC(S) model are *skill discretion*, *participation in decision making*, and *autonomy*. However, it is hard to argue that the average brick layer would have, or indeed benefit from either of the first two, much less that either or both would buffer the effects of their specific job demands on strain. Moreover, autonomy may be interpreted contextually. That is, a brick layer may perceive a degree of autonomy when, having been given instructions for the day's tasks, he or she is left to work with little supervision. However, if autonomy is contextualized as having the freedom to make larger scale decisions, such as what shift hours to work, when to take breaks, what products and tools to use, or what freedom to assess the quality of one's own work, then a typical brick layer (that is, an employee of an organization, not an independent contractor) may perceive having little autonomy in their work. Furthermore, even for jobs with seemingly clear task demands, such as a brick layer, psychological demands of the work may be contextualized differently. For example, a laborer who is passionate about brick laying may interpret the nature of his/her work as low in psychological demands: the job is set, the tools are ready, and success is a question of

applying oneself to a relatively set formula. Conversely, as aspiring laborer who wishes to become a manager may find the psychological demands of brick laying higher, because of having to suppress their as yet unfulfilled ambitions.

The validity of a more occupation-specific approach to measurement could also be examined. For example, until now most studies of the JDC(S) model have operationalized demands control and support with broad measures (De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). Thus, it appears that researchers have either *hoped* or *expected* that participants would interpret these constructs in the context of their own job specific relevancies. However, this could be ascertained this by assessing perceptions of *both* broad and job-specific constructs, and comparing respective results.

Finally, given the vast amount of research published on the model, as well as three vote counting reviews (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999), and numerous theoretical articles (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003), cumulative research should now adopt a meta-analytic approach. The transition to meta-analytic research is covered in article 2 of this dissertation.

Conclusion

Although the JDC(S) model has been highly influential in occupational stress literature for over 37 years, it has been widely criticized for inconsistent multiplicative effects of control and/or support with demands on strain and well-being outcomes. Research as a whole on the model has also been criticized for a predominance of self-report versus objective measurement, cross-sectional rather than longitudinal design, variety and inconsistency in how the three main dimensions are measured, and a lack of consideration of individual difference variables. Other considerations include a

progression in our understanding, conceptualization, and operationalization of job demands in recent years, and the need for meta-analytic research. However, the model remains a bedrock of work stress literature, and is popular not only because of its simplicity and the ease in which it can be tested given the numerous ways that demands, control, support, and strain can be measured; but because of the practical implications that can be gleaned from it, and the enduring (and arguably *ubiquitous*) concern regarding job demands, control, and support within the wider work stress and job design literature (Griffin & Clarke, 2011). Thus, its proponent's goals must surely be to increase its reputation for consistent multiplicative effects and rigorous research designs by ensuring that the model remains at the forefront of continually progressing theoretical and methodological developments in scientific research.

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CHAPTER III: JOB DEMANDS, CONTROL, AND SUPPORT: META-ANALYZING MODERATOR EFFECTS OF GENDER, NATIONALITY, AND OCCUPATION

Introduction

After 36 years, the job demands-control (-support) model (JDC(S)) remains one of the most influential on the literatures of work stress and organizational behavior. Despite widespread use, the first meta-analysis of the model was conducted only recently, examining interrelationships between the model's three workplace characteristics: demand, control and support. A rather surprising result was that the demand-control relationship was close to zero. The current analysis extends our understanding of these relationships to include examination of a-priori moderator variables: gender, occupation, and nationality. We further build on the initial review by extending moderator analysis to relationships between demand-control-support dimensions and job satisfaction and emotional exhaustion – the two most examined psychological outcomes in primary studies. The present meta-analysis narrows the field of studies to 141 studies ($N_{\text{(Individuals)}} = 145,424$) of Karasek's model including job satisfaction or emotional exhaustion as outcomes. Our findings show additional patterns of gender moderation, including moderation of the demands-job satisfaction relationship. Additionally, both nationality and occupation moderate *every* DCS interrelationship, and relationship with job satisfaction and emotional exhaustion in some way. Our results offer new understanding as to the boundaries of these relationships, and the JDC(S) model; and invite further theory building and meta-analytic investigation.

Literature Review

Much of occupational stress and health literature is devoted to understanding and predicting the phenomenon of stress in the workplace (Kahn & Byosiere, 1992). Lazarus

and Folkman (1984) defined stress as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p.19). Work stress is not a single event, but a process that involves appraisal, response, and attempts to meet goals while managing *stressors*. Stressors are demands from the work environment as experienced by individuals (Sulsky & Smith, 2005). Physiological and/or psychological reactions to these stressors constitute strain, which often arises from attempting to function effectively in the face of too many challenges (Kahn & Byosiere, 1992).

The devotion of scientific resources toward better understanding stress and strain may be motivated by its costly implications to individual and organizational health and well-being. For example, according to the American Institute for Stress, excessive work stress costs the US economy over \$300 Billion annually in healthcare, missed work, and stress reduction treatments (Stambor, 2006). Given these costs to individual and organizational well-being, attempts to predict and control stressors, before the onset of strain, has been a central concern in abating this "modern day pandemic" (Sulsky & Smith, 2005, p. 2). For example, numerous theories within organizational research have been proposed to explain how characteristics of work relate to stress and strain, and organizational outcomes (e.g., Cummings & Cooper, 1979; Dawis & Lofquist, 1984; Hackman & Oldham, 1980; Hobfoll, 1989). In particular, the notion that human beings seek control over their environment is central to many theories of workplace stress (for reviews, see Frese, 1989; Ganster, 1989; Spector, 2002) and is regarded as one of the most important elements of the occupational stress process (Kahn & Byosiere, 1992).

In 1979, Robert Karasek introduced a highly model, the job demand-control (JDC) model, which outlined the impact of work characteristics on stress, health, and

occupational wellbeing (Karasek, 1979). Karasek envisioned job demands and job control as essential workplace characteristics for influencing employee well-being, motivation, and productivity; as well as various physiological and psychological strains. The model was later extended to account for social support at work as a third predictor of well-being and strain (job demand-control-support [JD-CS]; Karasek & Theorell, 1990). Both the original and extended versions of the model examine strain using two contrasting, but not mutually exclusive hypotheses. First, the *strain* hypothesis pertains to an increased likelihood of strain when demands are increased, or control and/or support are decreased. For example, Karasek and Theorell (1990) regard factory line workers as typically being subject to high demands, but also have low control due to the routinized nature of their work and the relatively low levels of support within the workplace. Thus, according to the strain hypothesis a job design intervention to reduce strain in factory workers could be effective by additively changing the balance between perceived demands, control, and/or support, such that (i) demands are reduced (ii) control and/or support are increased or (iii), a combination of both, such that demands are decreased and control and/or support are increased.

In contrast, the *buffer* hypothesis is concerned exclusively with the moderating effects of control and/or support on the relationship between demands and strain. According to the buffer hypothesis, resources of control and/or support will serve to mitigate the effects of high demands on strain. The practical implication of the buffer hypothesis is that it is sometimes unrealistic to recommend lowering work demands (Griffin & Clarke, 2011); such as for military personnel on operations, or for organizations that are short-staffed, or in a peak season of work (e.g., tax specialists). Thus, workplace interventions to reduce stress should focus exclusively on affording

individuals greater control over their work, and/or support from within the organization, in lieu of reducing demands.

An important distinction between the strain and buffer hypotheses lies in the importance placed on *moderating* effects of control and/or support on the relationship between demands and strain. Moderating effects are not necessary to support the strain hypothesis. That is, main effects of demands *and* control and/or support on strain are sufficient to support the strain hypothesis by showing that demands are positively related to strain, and control and/or support are negatively related to strain. Conversely, the buffer hypothesis can only be supported if a moderating effect of control and/or support on the relationship between demands and strain is found. That is, the form of control and/or support measured in the study must specifically moderate, or *buffer*, the form of demand measured, such that negative effects of demands are less when control and/or support are high, versus when they are low (see Figure 1). The purpose for this requirement is to show that affording employees' greater control and/or support "resources" mitigates the negative effects of demands on strain. In contrast, the strain hypothesis simply shows that (any form of) demands is positively related to strain, and (any form of) control and/or support reduces strain, independently.

This distinction is tied to differing practical implications surrounding the need to reduce demands in order to minimize strain. Specifically, according to the strain hypothesis, it is necessary to reduce demands in order to reduce employee stress levels, unless control and/or support can be additively raised. Conversely, the buffer hypothesis implies that reducing demands is unnecessary to lowering stress, because control and/or support resources will directly counteract the effects of demands stressors on strain. Thus, the strain hypothesis focuses on *counterbalancing* demand levels with control and/or

support resources levels to reduce strain; whereas the buffer hypothesis focusing on the *counteracting* effects of these resources on strain (Karasek & Theorell, 1990).

The JDC(S) model has been highly influential in occupational stress and health literature for over 35 years. It has been the theoretical foundation of more empirical studies than any other work stress model (Griffin & Clarke, 2011; Kain & Jex, 2010). This is arguably because of the model's simplicity, the ease in which it can be tested given the numerous ways that demands, control, support, and strain can be measured, and the practical implications that can be gleaned from it. Most individual studies of the JDC(S) model have examined a single sample of employees based in a specific occupation, within a single country. Moreover, in most cases it has been impractical to directly compare individual studies to one another because different researchers conceptualize and measure job demands, forms of control and support, and types of strain, in different ways (Rijk, Le Blanc, Schaufeli, & di Jonge, 1997). As such, there has been little to connect the vast number of JDC(S) studies (over 300 published examinations to date) other than their theoretical underpinnings. Thus, several reviews of research on the model have been published in order to collate findings (i.e., Belkic, Landsbergis, Schnall, & Baker, 2004; De Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Schnall, Landsbergis, & Baker, 1994; Theorell & Karasek, 1996; Van der Doef & Maes, 1998, 1999). Most of these reviews have adopted the vote counting (e.g., non-meta-analytic) method, whereby conclusions are drawn by tallying significant versus non-significant results (Light & Smith, 1971). According to the vote counting method, if the majority of studies show a non-significant finding it is generally concluded that no relationship exists, and vice-versa. These reviews have repeatedly concluded that demands, control, and support are

directly related to various forms of strain irrespective of participant demographics, occupation, or nationality, thus strongly supporting the strain hypothesis of the model (e.g., Karasek & Theorell, 1990). However, moderating effects of control and/or support resources on relationships between demands and strains have been far less frequently found. This has led to doubts regarding the predictive value of the buffer hypothesis of the model. That is, researchers have frequently questioned whether resources of control and/or support do actually moderate relationships between perceived demands and various forms of strain (e.g., Beehr, Glaser, Canali, & Wallwey, 2001; De Jonge & Dorman, 2006; Taris & Kompier, 2003). In particular, there has been speculation that moderating effects are heavily dependent on how demands, control, and support are measured, such that moderation effects would only be found if measures of control and/or support were closely related to those of the demands they were hypothesized to buffer (Kain & Jex, 2010; Kristensen, 1995).

Despite its enduring contribution to work stress research, attention has only recently turned to cumulative (e.g., *meta-analytic*) research of the model. This is an important transition because accumulating and aggregating JDC(S) studies can advance the theory by contributing information about the magnitude and stability of the propositions as well as the limitations of the theory.

Luchman and González-Morales (2013) took the first step by providing a meta-analysis examining *interrelationships* between the model's demand, control, and support dimensions. This approach differed from that of most primary studies of the model, which have focused on bivariate and/or multivariate (e.g., *buffer*) relationships between each of these three dimensions and various forms of strain. Unfortunately, studies testing the buffer hypothesis have consistently suffered from low power, which is often a

weakness of interactional research (McClelland & Judd, 1993). As such, although meta-analytic investigation of the buffer hypothesis would be revealing, lack of uniformity in the research domain (i.e., inconsistent control variables) prevents such an investigation. However, the authors' rationale for examining interrelationships between demands, control, and support was that individual perceptions of work characteristics are not completely based on *objective* criteria, such as structural characteristics of the job (e.g., how the job of a police officer versus a college professor is structured), or aspects of work design, (such as working alone versus in a team), or operating within a hierarchical versus a flatter organizational structure (Kain & Jex, 2010). Thus, given the widely acknowledged importance of perceived demands, control, and support in organizational stress and health literature (Griffin & Clarke, 2011) understanding how perceptions of these work characteristics *interrelate* is important to understanding how perceived changes to one of them might affect interrelationships with perceptions of the other two. For example, if perceived demands are negatively related to perceptions of workplace support (e.g., the more demanding work is perceived to be, the less supportive the work environment is perceived to be, and vice-versa), then greater levels of support might change perceptions of support, and thus reduce the negative perceived relationship between support and demands. Similarly, lowering demands may affect how demands are perceived, which may also reduce the negative relationship between demands and support. By taking this approach Luchman and González-Morales (2013) advanced knowledge of the psychology of the working environment by shedding light on the nature of these demand-control-support interrelationships at the meta-analytic level. Their purpose for doing so was to better inform theory and practice in the field of occupational stress and health.

Our study contributes to the Luchman and González-Morales' (2013) meta-analysis *and* the broader stress-strain literature in two important ways. First, we replicate and extend Luchman and González-Morales' (2013) exploratory moderator analysis (i.e., gender moderating the interrelationships), by also examining the potential moderating effects of employee nationality and occupation type. Our rationale for examining these three potential moderators is grounded in previous theoretical and empirical work. For example, different biobehavioral tendencies in males and females are thought to underpin interpretation of, and coping with stress (Roxburgh, 1996). Additionally, organizational behavior and perceptions of work stress are thought to differ between both national cultures and occupations; based on social and structural differences in how jobs are designed, which are thought to manifest in the stress process (Grant, Fried, & Juillerat, 2011; Hofstede, 2001; Sulsky & Smith, 2005). Thus, our investigation is important to furthering knowledge in our field because in the increasingly globalized workplace, sensitivity to variation in -- and effects of -- national culture on work characteristics is growing (Hofstede, 2001). Moreover, appreciation for the effects of these differences in organizational research is increasing (Change & Lu, 2009; Purl, Hall, & Griffeth, in press).

Our second contribution is to examine moderating effects of gender, nationality, and occupation type on relationships between demand, control, and support work characteristics, and job satisfaction and emotional exhaustion: the most examined markers of well-being and strain in studies of the model (Häusser et al., 2010). Job satisfaction is a positive and pleasurable state resulting from positive appraisal of the job (Cranny, Smith, & Stone, 1992; Locke, 1976). It represents a manifestation of cognitive evaluations of one's job (Spector, 1997), and can affect organizational functioning

through changes in performance, and employees' desire to remain with the organization (Hom, 2011). Emotional exhaustion refers to feelings of being overextended; of being "...drained or used up, unable to face a day's work, totally unenthusiastic" (Sulsky & Smith, 2005 p.45), and is experienced when emotional resources are sufficiently depleted so as to no longer be able to meet the demands of work-related stressors (Lee & Ashforth, 1996).

Over half of all published JDC(S) studies have examined relationships between demands, control, and support, and outcomes of job satisfaction and/or emotional exhaustion. These two outcomes have dominated research on the model because of widely predicted effects of unmanageable or unhealthy work situations on these indicators of well-being and strain (see Griffin & Clarke, 2011). Moreover, job satisfaction and emotional exhaustion are known antecedents of unwanted outcomes, such as counterproductive work behavior (Mount, Ilies, & Johnson, 2006), and voluntary turnover (Griffeth & Hom, 2001). Luchman and González-Morales (2013) examined the bivariate and multivariate meta-analytic relationships between demands, control, and support, and these outcomes (i.e., job satisfaction and burnout). However, they did not examine possible moderators of these relationships. Thus, we aim to advance knowledge of how gender, nationality, and occupation might impact the scope and magnitude of relationships between demand, control, and support work characteristics, and job satisfaction and emotional exhaustion. By doing so, our work recognizes the importance of *context* on accurately assessing long-established relationships in the field of occupational health. Specifically, the field of occupational stress and health is placing greater emphasis on understanding differences in how individuals perceive workplace characteristics across different contexts. That is, moderation of established relationships

between stressors and strain, as well as of interrelationships between perceived workplace characteristics is now increasingly viewed as the next step to better understanding the context of the relationship between people and work from a stress perspective (Griffin & Clarke, 2011). We believe this to be critically important to more effective job design, and to more accurately refining parameters for stress interventions in order to reduce or prevent occupational strain.

Moderating Work Characteristics Interrelationships, and Relationships with Job Satisfaction and Emotional Exhaustion

Job Demands, Control, and Support. Job demands constitute physical, social, or organizational aspects of the job that require physical or mental effort. These include work pacing/time pressure, exacting task requirements, and overall workload demands (De Jonge & Dormann, 2006). Most employees seek homeostasis with their work environment in order to facilitate manageable work (Griffin & Clarke, 2011). Thus, a central tenet of the JDC(S) model is that moderate demands maximizes employee well-being through optimal levels of stimulation which facilitate manageable completion of work tasks (Kahn & Byosiere, 1992; Karasek & Theorell, 1990; Wundt, 1922). In contrast, underutilization can result in stress from boredom; and excessive demands can result in an elevated level of physiological arousal and increased cardiovascular and nervous system attention (Karasek, 1979). If this elevated arousal is sustained, individuals will begin to lose resources, eventually leading to impairment of physical functioning and psychological well-being (Hobfoll, 2001; Karasek, 1979). Thus, perceptions of work stress can be centered on perceived “fit” between work demands and the availability of coping resources, with stress likely to be experienced if demands are thought to exceed resources (Edwards & Cooper, 1990; Eulberg, Weekley, & Bhagat, 1988; French, Caplan, & Harrison, 1982; Hobfoll, 2001; Lazarus, 1966).

The term “resources” refers to objects, conditions, energy, or work or personal characteristics, such as cognitive and emotional resources, that enable employees to accomplish goals (Campbell, Perry, Maertz, Allen, & Griffeth, 2013; Hobfoll, 1989). The two resources which underpin Karasek’s (1979; Karasek & Theorell, 1990) model are control over work, and workplace support.

Job control constitutes an individual’s belief in his/her ability to affect a desired change on their work environment (Greenberger & Strasser, 1986). This includes an employee’s degree of autonomy or decision authority over tasks such as controlling order of task completion, how duties are completed, or the content of the work itself (Ganster & Fusilier, 1989). Thus, control allows employees to intervene and change work processes in order to reduce the perception of insufficient resources, or potential resource loss that lead to feelings of stress (Hobfoll, 2001). Moreover, evidence suggests that even *illusions* of being in control appear to promote well-being (Friedland, Keinan, & Regev, 1992). Conversely, stress from a perceived lack of control can induce strain by frustrating the intrinsic need to feel competent (Frese, 1989; Spector, 1986; White, 1959). The notion that human beings seek control over their environment is central to many theories of workplace stress (for reviews, see Ganster, 1989; Spector, 2002) and is regarded as one of the most important elements of the occupational stress process.

Workplace support refers to helpful workplace relationships, generally with supervisors and coworkers, regarding job-related matters (Price, 1997). Social support at work is an aspect of employee social capital, which is the extent to which relationships at work are valuable to the employee in terms of acquiring task information or assistance, or social companionship (Nahapiet & Ghoshal, 1998). Unlike job control, social support does not afford employees the ability to directly intervene in alteration of work tasks, or

other aspects of the work environment; however, it can reduce the burden on their other personal resources (Lin, 1999). Organizational literature is replete with evidence that high levels of support are associated with increased well-being, whereas a perceived lack of support can be a catalyst for strain (Häusser et al. 2010; Van der Doef & Maes, 1999).

The First Meta-Analysis: DCS Interrelationships, and Exploratory

Moderator Analysis. Luchman and González-Morales (2013) grounded their meta-analytic review in Hobfoll's (1989, 2001) conservation of resources (COR) theory, which views employees as attempting to obtain, retain, protect, and restore resources needed to cope with demand stressors. The authors made several hypotheses regarding JDCS interrelationships. First, they hypothesized that demands would be negatively related to control, because employees perceiving a high degree of control over work could restructure their work in order to reduce lost personal resources due to high demands (Hobfoll, 2001, Spector, 2002). Second, they hypothesized that demands would be negatively related to both supervisory support and coworker support at work. Supervisors generally have an instrumental role in both the structure of an employee's work and the amount of work assigned. Therefore, employees may perceive a loss of resources if they believe they have been assigned too much work (e.g., role overload), or work that is poorly structured (e.g., role ambiguity) (Hobfoll, 2001; Lin, 1999). Moreover, they proposed that demands would be negatively related to coworker support because supportive coworker environments often result in greater task assistance among coworkers. This allows employees the ability to call upon the resources of others when faced with high demands (Hobfoll, 2001; Settoon & Mossholder, 2002). Third, the authors hypothesized that control and workplace support would be positively interrelated because, according to COR theory (Hobfoll, 2001), *gaining* personal resources is more

likely when one feels that one *has* personal resources. Thus, the more resources an individual perceives themselves to have in one area (e.g., control), the more they will perceive themselves to be able to acquire other resources (e.g., support), and vice-versa. According to Hobfoll, this principle of using resources to gain further resources will result *resource gain spirals*, which happen when reciprocal relationships are formed between resources in one domain versus another (Hobfoll, 2001). As such, Luchman and González-Morales (2013) hypothesized that perceived control would be positively related to supervisor support and coworker support. The relationship to supervisor support is based on an exchange between employee and supervisor, whereby the supervisor can increase an employee's level of control over work in exchange for good performance (Bauer & Green, 1996). The relationship to coworker support is by developing authority through positive coworker networks, and increasing autonomy through mobilization of social capital resources (Lin, 1999).

Luchman and González-Morales (2013) found support for four of their five hypotheses regarding DCS interrelationships. First, perceived demands were negatively related to supervisor support ($\bar{r}_c = -.16$, 95% CI -.19 to -.12) and coworker support ($\bar{r}_c = -.11$, 95% CI -.15 to -.08), such that the more demanding work was perceived to be, the less supportive supervisory and coworker relationships were perceived to be, and vice-versa. Second, perceived control was positively related to supervisor support ($\bar{r}_c = .30$, 95% CI .19 to .41), and coworker support ($\bar{r}_c = .23$, 95% CI .14 to .31). Thus on average, those perceiving higher levels of control over their work also perceived themselves to be more supported by their supervisor(s) and coworkers. However, the derived meta-analytic correlation between demands and control was practically zero ($\bar{r}_c = -.02$, 95% CI -.07 to .04), thus failing to support their first hypothesis. This

suggests that, on average, perceptions of how demanding work is are unrelated to how much employees perceive control over their work. Additionally, none of the confidence intervals for their four supported hypotheses included zero. This indicates that effects for each of these relationships at the population level were significant (Judge, Ilies, Bono, & Gerhardt, 2002). For example, the 95% confidence interval for the relationships between perceived demands and both supervisory and coworker support were negative. This indicates that there is a 95% chance that the true relationship at the population level is negative (Hunter & Schmidt, 2004). Additionally, the 95% confidence interval for the relationships between perceived control and both supervisory and coworker support were positive. This indicates that there is a 95% chance that the true relationship at the population level is positive.

Finally, effect sizes for all five meta-analytic interrelationships showed evidence of *heterogeneity*. One of the greatest contributions of meta-analysis is the ability to correct for distorting effects of individual study artifacts, such as sampling error, measurement error, and other artifacts that produce conflicting results (Hunter & Schmidt, 2004). Heterogeneity, in meta-analytic terms, is when less than 75% of variance in a relationship (e.g., DCS interrelationships) is attributable to these study artifacts. It indicates that something else (e.g., a third variable) may be moderating the relationship. Evidence of heterogeneity is common in most meta-analyses (Kontopantelis, Springate, & Reeves, 2013). However, in the case of Luchman and González-Morales (2013) it indicates the possibility of moderators in *all* demand-control-support interrelationships (Hunter & Schmidt, 2004).

The Need for Further Meta-Analytic Investigation. Lack of stability in meta-analytic findings, such as those in Luchman and González-Morales' (2013) initial review,

can imply a need to explore boundary conditions for meta-analytic effects. Two possibilities exist: (i) artifacts affecting the validity estimate (e.g., sampling error, range restriction, and construct validity differences; Hunter & Schmidt, 2004) were not sufficiently accounted for by these authors, or (ii) population level heterogeneity in the validity estimate (that is, *moderation*), does exist. For example, the near zero correlation between demands and control found by Luchman and González-Morales (2013) could hold for all populations; or, there may be on average a positive or negative relationship between perceived demands and control in predominately male versus predominantly female workplaces, or vice-versa. Without the ability to assess the level of artifacts in each primary study of the model, testing for moderation at the meta-analytic level is a logical alternative.

The general hypothesis that a boundary would exist for DCS relationships with job satisfaction and emotional exhaustion follows from the buffering hypothesis (e.g., Karasek & Theorell, 1990). That is, multiplicative relationships between demands, control, and support create situations where a group difference on *any* of the three variables will likely change the population relationship for all *other* relationships. For instance, past research has found that men perceive more control over their work than women (Hall, 1989; Muhonen & Torkelson, 2003; Roxburgh, 1996). In isolation, this should not affect the relationship of demands on strain; however, according to the buffer hypothesis a change in demands for someone with low control will be more influential than a change in demands for someone with high control. This results in a group difference in the magnitude of the relationship between demands and strain outcomes for groups that differ on control. Thus, following the buffer hypothesis, any group difference

on demands, control, or support will create a moderating effect of the population effect size on strain outcomes for the other constructs.

Luchman and González-Morales (2013) pointed to several possible moderators of DCS interrelationships, including participant gender. They examined gender as a moderator because it is widely accepted that men and women, on average, interpret and cope with stress differently (Roxburgh, 1996). Their findings show that samples comprised of mainly female participants obtained negative demand-control correlations. On the other hand, samples comprised of mainly male participants obtained positive demand-control correlations. Luchman and González-Morales suggested that the balance of these gender effects explained the near-zero interrelationship between perceived demands and control. Additionally, they found that average organizational tenure moderated the demand-coworker support relationship such that relationships with coworkers were stronger with more organizational tenure. However, as an admittedly exploratory analysis, Luchman and González-Morales (2013) left an open invitation for further examination of moderating effects.

The Present Study

The following sub-sections outline three factors that we believe will drive a moderating relationship at the population level of DCS interrelationships, and of relationships with job satisfaction and emotional exhaustion. Our focus on these is grounded in previous theoretical and empirical work, which points to their importance to the stress process, and a growing momentum in stress literature to understand how gender, nationality, and occupation type might affect perceptions of workplace characteristics, and affect well-being and strain.

Gender as a Moderator. Studies investigating gender differences in work stress over the past two decades have produced contradictory results, with some indicating no differences (e.g., Galanakis, Stalikas, Kallia, Karagianni, & Karela, 2009), and others suggesting that men (e.g., Vermeulen & Mustard, 2000) and women (e.g., Matud, 2004) experience more psychological stress than the other sex. However, there is consensus amongst researchers that different biobehavioral tendencies underpin the stress process in women than in men (Niedhammer, Goldberg, Leclerc, Bugel, & David, 1998; Roxburgh, 1996), particularly in how they perceive stressors, and attempt to cope with stressful encounters (e.g. Bellman, Forster, Still, & Cooper, 2003; Quick, Quick, Nelson & Hurrell, 1997). For example, Eaton and Bradley (2008) found that women often appraise demand stressors as more distressing than men do. This may be due to women being less effective at coping with stress than men, in accordance with the differential vulnerability hypothesis (McDonough & Walters, 2001; Roxburgh, 1996; Vermeulen & Mustard, 2000), or because women are exposed to higher levels of stress than men, as per the differential exposure hypothesis (Tytherleigh, Jacobs, Webb, Ricketts, & Cooper, 2007).

With regards to coping, studies have found that men use more active and instrumental problem-focused coping, which centers on proactive strategies to tackle stressors, such as time management, organization, and assertive communication; whereas women tend more towards passive, emotion-focused coping, which is based on distraction, relaxation, and gaining emotional support (Matud, 2004; Ptacek, Smith, & Zanas, 1992). Moreover, problem-focused coping may explain why men have been found to perceive more control over their work than women (Hall, 1989; Muhonen & Torkelson, 2003). This may also explain why Karasek and Theorell (1990) found women to demonstrate a negative relationship between perceived demands and control ($r = -.24$),

and men to demonstrate a small positive relationship ($r = .08$), as recently corroborated meta-analytically by Luchman and González-Morales (2013). Finally, due to the social nature of dealing with demands, emotion-focused coping may explain why women tend to seek out and utilize social support more than men do (Ptacek et al., 1992; Wohlgemuth & Betz, 1991).

Given the indication of group differences from Luchman and González-Morales' (2013) original review; previous work which points to gender differences in how demands are interpreted, and control and support resources are perceived to be present, are called upon, and utilized; and differential effects on well-being and strain, we believe that gender differences in mechanisms underlying perceptions of demand, control, and support work characteristics will create variance in DCS interrelationships, and in relationships with job satisfaction and emotional exhaustion.

Hypothesis 1a: Gender will moderate interrelationships between demands, control, and support.

Hypothesis 1b: Gender will moderate relationships between demands, control, and support, respectively, and both job satisfaction and emotional exhaustion.

Nationality as a Moderator. Hofstede (1980) defines culture as “the collective programming of the human mind that distinguishes the members of one human group from those of another” (p. 24). National culture reflects the shared meaning system of members of a certain country (Rokeach, 1968). As such, organizations within a given country share common characteristics, such as values, that derive out of their shared nationality (Bolino & Turnley, 2008). Moreover, these shared national characteristics are generally thought to outweigh the characteristics of any single organization (Adler, 1990). If so, the pressure to become isomorphic may result in shared national cultural

characteristics being stronger than inherent differences across organizations *within* a given national culture (Erez, 2011).

According to the theory of culture's consequences, these enduring national values that shape organizational behavior differ between national cultures (Hofstede, 2001). Moreover, differences in national culture are likely to influence perceptions of work stress based on how employees appraise and respond to working conditions. For example, normative prescriptions stemming from differences in national culture may shape primary appraisal of what constitutes demanding conditions at work (Levenson, Soto, & Pole, 2007), as well as secondary appraisals of what coping resources (such as control) are necessary and acceptable in the workplace (Earley & Francis, 2002), and what workplace supports are available (Oyserman, Coon, & Kimmelmeier 2002).

Despite the theoretical basis of this argument, comparatively little research has shed light on potential differences in national cultural from a work stress perspective. This is perhaps due to most studies of theoretical frameworks such as the JDC(S) model having utilized nationally homogenous samples, or mixed samples without the inclusion of comparison between national cultures. An exception to this is Baba, Tourigny, Wang, Lituchy, and Inés Monserrat (2013), who compared the effects of demands, control, and support on the stress of nurses in four countries (China, Japan, Argentina, and Trinidad/Tobago). Interrelationships between the model's key dimensions differed somewhat between countries (for example, the relationship between demands and control was $r = .09$ for China, $r = .13$ for Argentina, $r = .18$ for Trinidad and Tobago, and $r = .24$ for Japan), which suggests that differences in national culture may affect these perceptions. More specifically, this may be due to mean differences in control if the

buffer hypothesis is acting within each of these nations (China $M = 4.69$; Argentina $M = 4.38$; Trinidad and Tobago $M = 5.36$; Japan $M = 5.37$).

In another study, Yang et al. (2012) examined relationships between individualism-collectivism (I-C; Hofstede, 1980) and employees' appraisals of and reaction to three demanding conditions (i.e., work hours, workload, and organizational constraints) in 6,509 managers from 24 countries. I-C is a cultural value which prescribes the degree to which self-construal (that is, *self-definition*) should follow socially independent or interdependent criteria. Generally, more individualistic cultures show greater expression of independence, than more collectivist cultures (Hofstede, 2001). I-C is one of five dimensions of national cultural variability identified by Hofstede (1980), and adopted by others (see Taras, Kirkman, & Steel, 2010). Moreover, its relevance has been studied in a number of employee and organizational outcomes (e.g., Ng, Sorensen, & Yim, 2009). Most recently, Yang et al. (2012) found that for work hours, workload, and organizational constraints, relationships between perceived demands and both job satisfaction and turnover intentions were stronger in more individualistic than more collectivist countries. The authors reasoned that these findings may reflect differing attitudes towards demands across cultures which vary in I-C. In particular, workers from more individualistic cultures may find higher demands more stressful because any delay in work processes due to resource constraints would be in conflict with their personal-goal-driven self-construal; as would be seeking support from within the workplace. Conversely, those from more collectivistic cultures tend to form interdependent work self-definition embedded in group relationships. Moreover, they tend to be more comfortable in seeking support to meet higher demands, and thus may regard high

demands as less stressful, and therefore less resource depleting (Markus & Kitayama, 1991).

We believe that adding to Baba et al. (2013) and Yang et al. (2012) will shed further light on the role of national culture in appraisal of, and coping with stressors at work; and will more fully align research on the JDC(S) model with research on Hofstede's cultural dimensions. Given extensive evidence of differences between national cultures for *all* of Hofstede's (2001) dimensions (e.g., Taras et al., 2010), in addition to individualism-collectivism, we focus on the four other dimensions of power distance, masculinity-femininity (alternatively labelled achievement-nurturance), uncertainty avoidance, and long-term versus short-term orientation.

Power distance reflects the degree to which a culture believes that institutional or organizational power should be distributed equally or unequally, and to the degree to which decisions of the power holders should be challenged versus accepted. Employees in national cultures characterized by lower power distance are more likely to view authority figures as less removed from them, and are more likely to challenge their decisions. Achievement-nurturance refers to valuing behaviors such as assertiveness, achievement, and wealth acquisition; versus acts of caring for others, ensuring social support structures, and behaviors that are thought to enhance quality of life. Uncertainty avoidance refers to feeling threatened by ambiguous, uncertain situations, responding by establishing more structure to avoid these situations. Thus, high positive scores on uncertainty avoidance indicate lower levels of tolerance for ambiguity, and a greater desire for consensus. Finally, long-term orientation cultures are, on average, more focused on the future than short-term oriented cultures. As such, they are more willing to delay short-term material or social success, or short-term emotional gratification to

prepare for the future, and as such value persistence, perseverance, and adaptability in the face of challenges (Hofstede, 2001).

Based on accumulating evidence of differences in dimensions of national culture (e.g., Hofstede, 2001; Taras et al., 2010), and findings to date regarding national culture and the JDC(S) model (e.g., Baba et al., 2013; Yang et al., 2012), we believe that national differences will lead to divergent impact on demand, control, and support interrelationships, and on relationships with job satisfaction and emotional exhaustion. That is, we believe that national culture will moderate demand-control-support interrelationships, and relationships with these outcomes.

Hypothesis 2a: National culture will moderate interrelationships between demands, control, and support.

Hypothesis 2b: National culture will moderate relationships between demands, control, and support, respectively, and both job satisfaction and emotional exhaustion.

Occupation as a Moderator. It is now widely accepted that differences in how jobs are designed manifest in the stress process (Grant, Fried, & Juillerat, 2011; Sulsky & Smith, 2005). For example, Sulsky and Smith (2005) purport that “you would probably agree that the job of a demolitions expert is more stressful than that of a janitor” (p. 83). Thus, understanding the nature of structural and social differences between occupations is becoming increasingly important as job design research continues to develop. A prominent example of this is the Occupational Information Network (O*Net; Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999), where myriad comparisons of job demands, as well as attributes and work styles required to be successful can be made on the basis of previous research.

Models of job design such as the job characteristics model (Oldham & Hackman, 2005), and the JDC(S) model (Karasek & Theorell, 1990) also acknowledge that how employees perceive and are affected by workplace characteristics varies between jobs. For example, Karasek and Theorell (1990) used US Quality of Employment Surveys (QES) to show that perceptions of demands, control, and support differed between occupations, and that these differences underpinned “categories” of jobs from the perspective of likely patterns in psychological well-being. Specifically, the authors showed that professional occupations (such as law and architecture) are characterized by perceptions of high demands and control, which they termed *active jobs*; whereas clerical occupations are characterized by perceptions of low demand and control, and are thus *passive jobs*.

Despite the importance of understanding how job stressors and resources are perceived and may relate to strain across different occupations (e.g., Cooper, Clarke & Rowbottom, 1999), surprisingly little empirical attention has been paid to this issue, with few if any clearly discernible patterns. Of the few studies to date, Narayanan, Menon, and Spector (1999) found that clerical employees reported a lack of control and high workloads as major stressors, whereas interpersonal conflict was a major stressor to salespeople and university professors. Additionally, Chang and Lu (2009) examined differences in perceptions of stress from factors intrinsic to the job, relationships with others, and career achievement across high school teachers, shop clerks, factory employees, and civil servants. They found that shop clerks and civil servants experienced the highest stress levels, and teachers the lowest stress levels based on these stressors.

Similarly, little comparison has been made within JDC(S) research, due to the majority of primary studies having utilized either homogeneous occupational samples or

heterogeneous samples without including a comparison of occupational-specific effects (see Häusser et al., 2010). One study by Sparks and Cooper (1999) investigated the moderating role of occupation on demands and control, focusing on mental and physical ill-health. Based on data from 7,099 employees across 13 different occupations, they found that mean scores of perceived demands and control differed between occupations, such that physicians experienced greater mental demands than some government workers, and air traffic controllers perceived less control than any other included occupation. The authors also found that perceived demands and control were more strongly associated with mental and physical ill-health in some occupations more than others. However, few if any studies have furthered investigation in this area throughout the last 16 years.

We build upon the work of Sparks and Cooper (1999) by examining occupation type as a possible moderator of demand-control-support interrelationships, and of relationships with job satisfaction and emotional exhaustion, at the meta-analytic level. Despite the relative paucity of studies to date, we believe that the aforementioned encyclopedic differences of characteristics between jobs (as detailed on O*Net), as well as initial evidence that demands and resources are perceived differently across occupations lead to a justifiable contention that occupation will moderate demand-control-support interrelationships, and relationships with job satisfaction and emotional exhaustion.

Hypothesis 3a: Occupation type will moderate interrelationships between demands, control, and support.

Hypothesis 3b: Occupation type will moderate relationships between demands, control, and support, respectively, and both job satisfaction and emotional exhaustion.

Method

We used Hunter and Schmidt's (2004) method of meta-analysis. This involved estimating true population correlations among variables by taking the weighted average of correlations from published and unpublished primary studies between the demand, control, and where applicable, support dimensions of the model, and job satisfaction and emotional exhaustion. True population correlations were estimated by applying weights that account for sampling and measurement error in both the predictor and the criterion, using Hunter and Schmidt's meta-analysis software program (VG6).

Given expansive research on the JDC(S) model, numerous possible approaches exist to undertake a meta-analysis. For example, with regard to the main dimensions themselves, arguments have been made for delineating *demands* (Crawford, LePine, & Rich, 2010), and *support* (Luchman & González-Morales, 2013). Moreover, the model is known for allowing different operationalizations of demands, control, and support across studies (i.e., task demands, supervisor demands; see Van der Doef & Maes, 1999; see also Kristensen, 1995). Given the number of relationships to be examined when including moderators, we believe it impossible to cumulatively assess all possible combinations of delineation of constructs and operationalizations within a single review. Thus, for the sake of parsimony and practicality we estimate effect sizes of *composite* demands, control, and support dimensions. Additionally, numerous forms of strain have been examined in primary studies of the model (see aforementioned reviews). However, we believe it would be challenging to summarize DCS relationships with *all* outcomes within

a single review; especially in conjunction with our previous points regarding construct delineation, and operationalization. Therefore, we focus our review on the two most examined outcomes in JDC(S) research - job satisfaction and emotional exhaustion - to offer an approach that is both parsimonious, and strongly representative of research on the model (see Häusser et al., 2010; van der Doef & Maes, 1999). Taken together, we view our approach as a valuable first step to examining potential moderators of DCS interrelationships, and relationships with strain; and one that is both in line with the model's original dimensionality (Karasek & Theorell, 1990), and possible within a single review. Future studies could adopt a more granular approach to reviewing JDC(S) literature.

Data Collection

We searched for all published and unpublished articles on the JDC(S) model from 1979 to present. This involved several stages. First, all primary studies examining job satisfaction and/or emotional exhaustion in the aforementioned reviews were collected using Google Scholar, Psych INFO, and our institution's inter-library loan system. Second, we broadened our search using the following keywords: "Demands", "Control", "Support", "Karasek", as well as "Job Satisfaction", or "Emotional Exhaustion". Finally, we emailed at least one author (usually the primary) from almost all studies collected to request further published or unpublished studies of the model. In total, over 120 scholars were contacted throughout the world. This yielded a further 17 studies, most of which had not been published. In total, we collected 141 studies of the JDC(S) model which examined job satisfaction and/or emotional exhaustion.

Coding

A standardized procedure was used for coding primary studies based on Cooper's (2010) recommendations. Studies were coded based on sample size, zero-order correlations between requisite variables, and Cronbach alphas of these variables; as well as participant nationality and occupation (both of which were homogeneous within most studies), and the gender ratio of participants. Where some of the more recent studies had not included a correlation table, authors were contacted to request this.

A correlation was recorded for each relationship between a given study's operationalization of demands, control, support, job satisfaction and/or emotional exhaustion. In studies where one or more of these dimensions were operationalized in multiple ways, respective correlations were averaged in order for one correlation to be recorded (see Hunter & Schmidt, 2004). For example, in a study operationalizing demands as "supervisor demands" and "task demands", the respective correlations between these and the study's operationalization of control were averaged. This principle was applied for all relationships. Similarly, Cronbach alphas of multiple operationalizations of a construct were averaged, so that one alpha could be reported (Hunter & Schmidt, 2004, p. 121). For example, if supervisor demands yielded an alpha of .90, and task demands an alpha of .80, the reported alpha for "demands" was .85. From the 141 studies we coded $k = 723$ correlations. This corresponded to $N_{(\text{Individuals})} = 145,424$. The average sample size was 1,031.

Following two training sessions, the complete coding of studies was carried out separately by three research assistants. Agreement on study characteristics was almost unanimous, and all three coders were in agreement on approximately 92% of correlations and Cronbach alphas. The remaining 8% were independently recoded by two additional

subject matter experts. Finally, any remaining discrepancies were checked and re-coded by both of the subject matter experts in conjunction with the first author. In total, the coding process involved over 150 hours of work across a six-month period.

Primary Analysis

Hunter and Schmidt's (2004) random-effects model of meta-analytic procedures (aided by their estimation program [VG6]) was used to estimate the population effect sizes. Final calculations of effect sizes were then investigated for availability bias and outliers. A funnel plot visualizes effect sizes plotted against the inverse of standard error (not shown; Duval & Tweedie, 2000). This was inspected for asymmetry and outlying studies. All apparent outliers were checked for transcription errors in the original work, and authors were contacted to verify direction and magnitude of the relationships. No asymmetry was detected; however, the estimated number of missing cases was computed as an indicator of the effect of availability bias (Duval & Tweedie, 2000). The estimated number of missing cases did not exceed six for any of the relationships examined, implying little effect of publication bias.

To test for homogeneity in the population effect size estimate, we used Hunter and Schmidt's (2004) 75% rule. This test is a rule of thumb for determining if the heterogeneity is practically significant. The ratio of the estimate of error variance in the population effect size to variance in the observed effect sizes was compared to .75. If this value exceeds .75 the remaining unexplained variance is most likely due to uncorrected artifacts in the studies, and should be ignored.

Moderator Analyses

Moderators (i.e., gender, nationality, and occupation) were coded to test for the effects on each relationship. Two methods – correlation and sub-grouping analysis - were

used to analyze the influence of each potential moderator. Correlation is the recommended method for testing the degree of moderation when a hypothesized moderator variable is *quantitative* (Hunter & Schmidt, 2004). However, Hunter and Schmidt (2004) also note that the correlation method will be attenuated by unreliability in both the moderator variable and the validity coefficients, and thus result in an *underestimate* of the degree of moderation. As such, to assure correct judgment given this downward bias, the sub-grouping method was used to corroborate the correlation method. The sub-grouping method is the recommended for moderator variables that are categorical (Hunter & Schmidt, 2004). In some cases, subjective decisions are required to assign categories (for example, clustering of national cultures, and of occupations in the present study). Moderation in the sub-grouping method is considered to be significant when the 95% confidence intervals between two subgroups do not overlap. Moderation is considered to be partially significant when there is no overlap, but the upper boundary of one subgroup is the same as the lower boundary of another (Hunter & Schmidt, 2004).

For gender, the bivariate correlation between the validity coefficients and the proportion of males in the sample was calculated. However, studies were also sub-grouped based on whether they had a majority (e.g., over 50%) of male or female participants. Average correlations were then calculated for the two subgroups along with the corresponding 95% confidence intervals. Additionally, we conducted a third method of detecting gender-related moderation in response to the arbitrary majority-split of the subgroup analysis. Specifically, the average correlation for each overlapping set of 20 studies--starting from the proportionally least male sample to the most male sample--was calculated, in order to more accurately represent any change in average correlation as the proportion of male-to-females workers changed. These average correlations were then

plotted graphically by the average proportion of males in the 20 samples (see figures 1 and 2). This graphical method was also used to allow estimation of the ideal split between male and female samples for the most representative average correlation.

For nationality, our goal was to disaggregate the primary nationality of each study sample as much as possible, but to also ensure that each group contained sufficient validity coefficients to justify meta-analysis (approximately 10, Hunter & Schmidt, 2004). Thus, although our initial goal was to analyze cumulative national samples for individual countries, we were only able to achieve this in the case of countries where JDC(S) research has been popular (i.e., the United Kingdom, the Netherlands, and Australia). In order to maximize our coverage of national cultures, other nations with insufficient published samples for individual representation were clustered together based on geography. Based on study availability, our final selection of individual and clustered national cultures included Australia, the United Kingdom, the Netherlands, North America (comprising the US and Canada), the rest of Continental Europe (comprising all European nations with samples other than the UK and the Netherlands), and Pan-Asia (comprising all Asian nations with samples). Based on these methods, data from three samples from Israel could not be included.

We then recorded scores for Hofstede's (2001) five dimensions of national culture for each national culture group. Where nations had been clustered, scores for each nation were averaged for a score to represent that cluster. The bivariate correlation between the validity coefficients and each of Hofstede's (2001) five dimensions was calculated for each group. Average correlations were then calculated for the six national subgroups along with the corresponding 95% confidence intervals.

Similar to nationality, our goal for occupation was to disaggregate sample occupation as much as possible and ensure that each group contained sufficient validity coefficients to justify meta-analysis. Primary studies of the model have utilized a broad range of differing occupational samples. Given this heterogeneity, we clustered occupations to form occupational groups. These groups - Education, Law Enforcement, Healthcare, Business Services, Clerical, and Manufacturing - are similar to those found on O*Net (Peterson et al., 1999). Certain occupations—such as firefighters and welfare workers--could not be clustered due to a lack of samples, and a high degree of difference from our established clusters. However, these comprised no more than 8% of studies for any of the examined relationships. Primary studies with multi-occupation samples were not included unless all occupations within the sample were delineated, and could fit within one of our six occupational clusters. The correlation between validity coefficients and the O*Net stress tolerance level of occupations in the sample was calculated. Average correlations were then calculated for the six occupational subgroups along with the corresponding 95% confidence intervals.

Results

Tables 1, 2, 6, and 8 include the number of correlations (k), total sample size (N), sample weighted (i.e., “bare bones” meta-analysis; Hunter & Schmidt, 2004) average correlation (\bar{r}), sample weighted average correlation corrected for unreliability (\bar{r}_c), the 80% credibility interval around the corrected average correlation, and the 95% confidence interval around the average, uncorrected correlation, for the primary analysis, and moderator analyses of gender, national culture, and occupation, respectively. A 95% confidence interval which excludes zero indicates that the population parameter is likely not zero (Judge, Ilies, Bono, & Gerhardt, 2002). Alternatively, the 80% credibility

interval is used to judge the likelihood and practical significance of moderators (Whitener, 1990). Tables 1, 2, 6, and 8 also detail estimates of variance for the observed correlations, sampling error, the population correlation, and the unexplained variance for each relationship. The percent of unexplained variance was used to test the relationships for moderators using the 75% rule (as described above; Hunter & Schmidt, 2004). To assess the significance of the difference in sub-grouped estimates we calculated confidence intervals around each estimate (Hunter & Schmidt, 2004). The degree of overlap in confidence intervals reflects the significance of the difference between estimates, with non-overlapping estimates statistically significant at the .05 level (Bland & Peacock, 2002). Tables 3, 5, and 7, show correlational results for gender, national culture, and occupation moderator analyses, respectively.

Primary Analysis

The results of our meta-analysis of interrelationships between demands, control, and support are outlined in Table 1.

Table 1
Primary Meta-Analytic Results

		k	N	r	Var(o)	Var(e)	Var(ρ)	%Var unexp	80% Credibility		95% Confidence		
									Lower	Upper	Lower	Upper	
Demands	Control	130	115,105	-0.02	0.074	0.002	0.072	0.97	-0.02	-0.37	0.32	-0.08	0.03
	Support	91	83,258	-0.14	0.032	0.002	0.031	0.95	-0.16	-0.39	0.06	-0.20	-0.13
Control	Support	91	83,258	0.26	0.038	0.001	0.037	0.96	0.32	0.08	0.57	0.28	0.36
Satisfaction	Demands	91	75,587	-0.21	0.031	0.002	0.029	0.94	-0.27	-0.48	-0.05	-0.30	-0.23
	Control	91	75,587	0.37	0.013	0.001	0.012	0.89	0.46	0.32	0.60	0.44	0.48
	Support	64	58,490	0.41	0.034	0.001	0.033	0.97	0.49	0.26	0.72	0.44	0.53
EmoExh	Demands	60	63,099	0.40	0.014	0.001	0.012	0.92	0.51	0.37	0.65	0.48	0.54
	Control	61	63,236	-0.16	0.027	0.001	0.025	0.94	-0.20	-0.40	0.00	-0.24	-0.16
	Support	45	40,570	-0.25	0.009	0.001	0.008	0.86	-0.30	-0.41	-0.18	-0.32	-0.27

Note. k = number of independent samples in analysis, N = total sample size in k studies, r = mean-weighted correlation, %Var unexp = percent of variance unexplained = sample weighted average correlation corrected for unreliability. Table also includes 80% credibility interval around the corrected average correlation, 95% confidence interval around the average, uncorrected correlation. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

There was no relationship between perceived demands and control ($= -.02$, 95% CI $-.08$ to $.03$). Demands were negatively related to workplace support ($= -.16$, 95% CI $-.20$ to $-.13$), and control was positively related to workplace support ($= .32$, 95% CI $.28$ to $.36$). In general, these relationships align with Luchman and González-Morales' (2013) findings. Additionally, job satisfaction was negatively related to demands ($= -.27$, 95% CI $-.30$ to $-.23$), but positively related to both control ($= .46$, 95% CI $.44$ to $.48$), and to workplace support ($= .49$, 95% CI $.44$ to $.53$). Finally, emotional exhaustion was positively related to demands ($= .51$, 95% CI $.48$ to $.54$), and negatively related to control ($= -.20$, 95% CI $-.24$ to $-.16$), and to workplace support ($= -.30$, 95% CI $-.32$ to $-.27$).

Moderator Analyses

As is clear from Table 1, the amount of explained variance in the observed correlations never exceeds 16%, much less 75%. However, this is comparable to other meta-analyses (e.g., Crawford, LePine, & Rich, 2010; Luchman & González-Morales, 2013). This small proportion of explained variance (i.e., less than 75%) indicates the presence of moderators (Hunter & Schmidt, 2004). Additionally, given the 80% credibility intervals, any moderation would likely involve a change in the *strength* of the relationship rather than a change in the *direction*, with the exception of relationships between demands and control, and demands and support.

Gender. Results of sub-group moderator analysis between study variables and gender are presented in Table 2. On average, women have a stronger negative demands-control relationship ($= -.13$, 95% CI $-.17$ to $-.09$) than men ($= .00$, 95% CI $-.09$ to $.09$). This difference is significant because there is no overlap between the 95% confidence intervals of the male and female sub-groups (Hunter & Schmidt, 2004).

Table 2
Moderator Meta-Analytic Results for Gender

		k	N	Var(o)	Var(e)	Var(ρ)	%Var unexp	80% Credibility		95% Confidence			
								Lower	Upper	Lower	Upper		
<u>Demands</u>													
Control	Female	66	50,541	-0.10	0.044	0.002	0.042	0.95	-0.13	-0.39	0.13	-0.17	-0.09
	Male	44	36,203	-0.02	0.142	0.002	0.140	0.98	0.00	-0.48	0.48	-0.09	0.09
Support	Female	49	40,439	-0.13	0.048	0.002	0.047	0.96	-0.16	-0.43	0.12	-0.20	-0.11
	Male	30	26,122	-0.14	0.021	0.002	0.019	0.92	-0.18	-0.36	0.00	-0.22	-0.14
<u>Control</u>													
Support	Female	49	40,439	0.26	0.061	0.002	0.059	0.97	0.33	0.02	0.64	0.28	0.38
	Male	30	26,122	0.28	0.019	0.002	0.017	0.91	0.36	0.19	0.53	0.32	0.40
<u>Satisfaction</u>													
Demands	Female	42	29,237	-0.26	0.028	0.002	0.026	0.93	-0.32	-0.52	-0.11	-0.35	-0.28
	Male	34	31,088	-0.17	0.043	0.002	0.041	0.96	-0.22	-0.48	0.04	-0.28	-0.16
Control	Female	42	29,237	0.36	0.017	0.002	0.015	0.90	0.46	0.30	0.62	0.44	0.49
	Male	34	31,088	0.37	0.009	0.001	0.007	0.84	0.47	0.36	0.57	0.44	0.49
Support	Female	31	23,575	0.40	0.030	0.001	0.029	0.96	0.48	0.26	0.70	0.43	0.52
	Male	23	20,827	0.43	0.051	0.001	0.050	0.98	0.53	0.24	0.82	0.45	0.61
<u>EmoExh</u>													
Demands	Female	38	32,336	0.42	0.012	0.001	0.010	0.90	0.51	0.38	0.64	0.48	0.53
	Male	15	14,112	0.31	0.027	0.002	0.025	0.93	0.46	0.26	0.66	0.39	0.53
Control	Female	39	32,473	-0.17	0.033	0.002	0.031	0.95	-0.22	-0.44	0.01	-0.26	-0.17
	Male	15	14,112	-0.14	0.046	0.002	0.044	0.95	-0.19	-0.46	0.08	-0.28	-0.10
Support	Female	30	26,547	-0.26	0.008	0.001	0.007	0.84	-0.30	-0.41	-0.20	-0.33	-0.28
	Male	11	7,135	-0.21	0.024	0.002	0.022	0.91	-0.26	-0.44	-0.07	-0.33	-0.18

Note. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

The correlations between validity coefficients and the proportion of males vs. females (with males as the reference group) in the sample are presented in Table 3. The relationship between demands and control was the only significant correlation, $p < .05$ ($r = .28, p = <.01$), whereby the relationship became more positive as the proportion of workers was more male dominated, with a jump from negative to positive at around 65% male (see figure 1).

Table 3
Correlational Results for Gender Moderator Analysis (relationship between validity coefficient and proportion of males in the samples)

IV	DV	n	r	p
Demands	Control	110	0.28	<0.01
	Support	79	0.06	0.60
Control	Support	79	0.14	0.21
	Satisfaction			
Satisfaction	Demands	76	0.08	0.51
	Control	76	0.14	0.22
	Support	54	0.21	0.13
EmoExh	Demands	54	-0.02	0.89
	Control	55	-0.08	0.54
	Support	41	0.11	0.50

Note. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

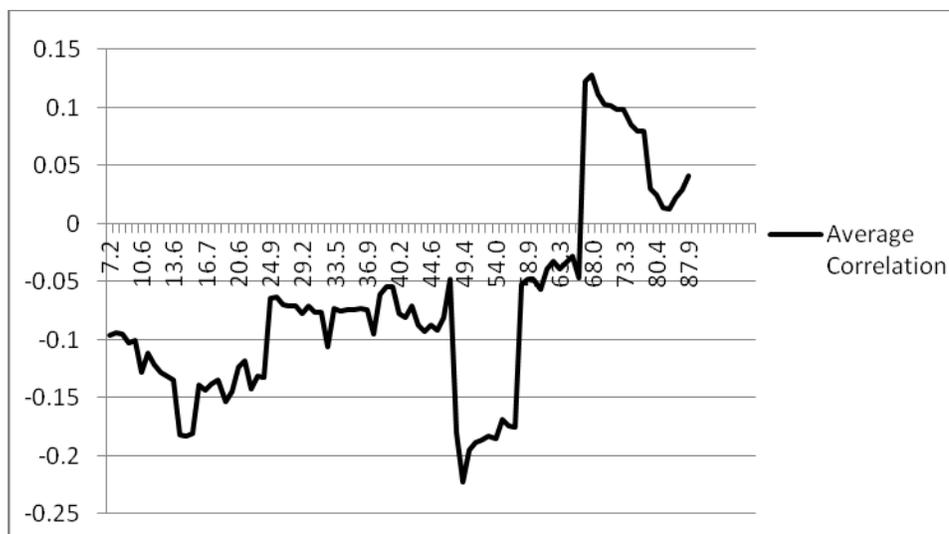


Figure 1. Average effect size of demands and control by average proportion of males

One inconsistency between correlation and sub-grouping methods was the relationship between demands and satisfaction. Despite the correlation being quite small ($r = .08$, $p = .51$, see Table 3) which suggests no moderation, the sub-group analysis confidence intervals only overlapped by a single number (95% CI $-.35$ to $-.28$ for females and 95% CI $-.28$ to $-.16$ for males, see Table 2). This suggests a marginally significant moderating effect (Bland & Peacock, 2002), whereby males have a smaller negative demands-job satisfaction relationship than females. Given this inconsistency, we conducted a third method of detecting gender as a possible moderator. Results of this third method show a large jump in population parameter estimates around the 30% male mark, with more female oriented samples having a drastically lower estimate (see figure 2).

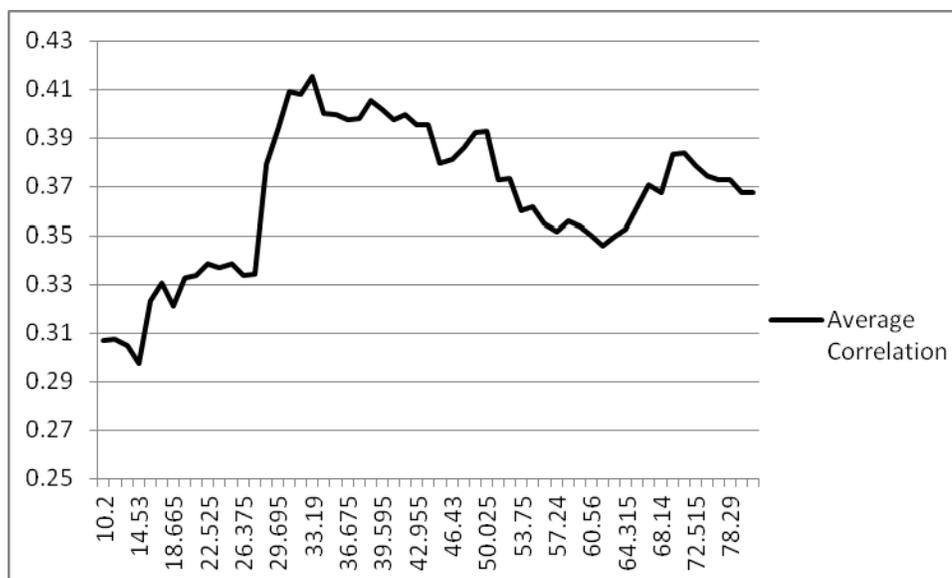


Figure 2. Average effect size of demands and job satisfaction by average proportion of males

National Culture. Tables 4 shows scores for Hofstede's (2001) five dimensions of national culture. Table 5 shows several significant correlations between reliability-corrected validity coefficients and scores on these five dimensions.

Table 4
Scores for National Groups on Each of Hofstede's (2001) Cultural Dimensions

	IND	PD	UNA	MAS	CD
Australia	90	36	51	61	31
UK	89	35	35	66	25
Holland	80	38	53	14	44
Europe	73	64	48	41	-
N. Amer	86	40	47	57	26
Pan Asia	30	60	66	62	88

Note: IND = Individualism, PD = Power Distance, UNA = Uncertainty Avoidance, MAS = Masculinity (or achievement-nurturance), CD = Confucian Dynamism (long-term vs. short-term orientation). Europe = Europe minus the UK and Holland, N. Amer = United States and Canada. Scores averaged for clustered nations (e.g., Europe, US Can, and Pan Asia).

Table 5
Correlational Results for Nationality Moderator Analysis (relationship between validity coefficient and Hofstede's (2001) five dimensions of national culture)

IV	DV	n	IND	PD	UNA	MAS	CD
Demands							
	Control	134	-0.08	0.04	-0.09	0.19*	0.04
	Support	93	-0.14	0.12	-0.08	0.07	0.25*
Control							
	Support	93	-0.06	0.33*	0.13	0.14	0.25*
Satisfaction							
	Demands	90	0.22*	-0.18	-0.21 [†]	0.19 [†]	-0.16
	Control	89	0.12	-0.07	-0.05	0.26*	-0.22 [†]
	Support	63	0.16	-0.18	-0.20	0.05	-0.07
EmoExh							
	Demands	61	0.18	-0.07	-0.04	0.12	-0.10
	Control	62	-0.17	-0.01	-0.20	0.08	0.06
	Support	46	-0.27 [†]	0.09	0.17	0.14	0.17

Note: IND = Individualism, PD = Power Distance, UNA = Uncertainty Avoidance, MAS = Masculinity (or achievement-nurturance), CD = Confucian Dynamism (long-term vs. short-term orientation). MAS has n = 120, 82, 82, 82, 81, 57, 51, 52, and 38, respectively.

* $p < .05$, [†] $p < .10$. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

First, the correlation between job demands and job satisfaction is more positive with increased individualism, $r = .22$, $p < .05$. Second, the correlation between control and support is more positive with greater power distance, $r = .33$, $p < .05$. Third, correlations between demands and control, and control and job satisfaction are more positive with higher achievement-nurturance, $r = .19$, $p < .05$, and $r = .26$, $p < .05$. Fourth, correlations between demands and support, and control and support are more positive with longer-term orientations, $r = .25$, $p < .05$, and $r = .25$, $p < .05$. Finally, no relationships were significantly related to uncertainty avoidance at the .05 level, although demands were marginally related to satisfaction for this dimension. There were several additional marginally significant relationships ($p < .10$).

Results of sub-group moderator analysis between study variables and national groups are presented in Table 6.

Table 6
Moderator Meta-Analytic Results for Nationality

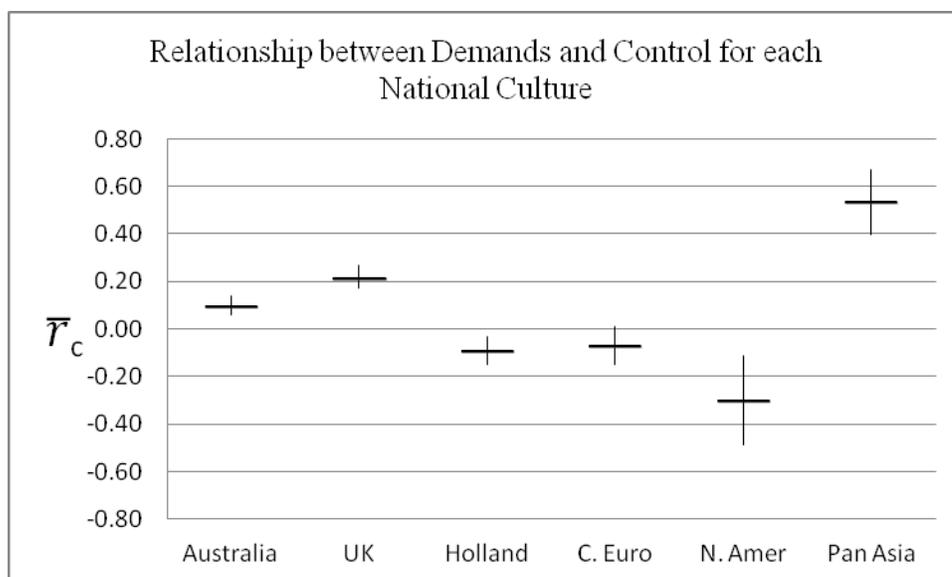
		k	N	Var(o)	Var(e)	Var(ρ)	%Var unexp	80% Credibility		95% Confidence			
								Lower	Upper	Lower	Upper		
<u>Demands</u>													
Control	Australia	32	15,453	.08	.0320	.0032	.0288	.90	.10	-.12	.32	.06	.14
	UK	15	15,922	.19	.0517	.0013	.0504	.98	.22	-.07	.50	.17	.27
	N. Amer	22	17,500	-.23	.2545	.0021	.2524	.99	-.30	-.94	.34	-.49	-.11
	Holland	33	32,181	-.07	.0802	.0017	.0785	.98	-.09	-.45	.27	-.15	-.03
	C. Euro	22	25,651	-.05	.0783	.0015	.0768	.98	-.07	-.43	.28	-.15	.01
Support	Australia	28	14,368	-.16	.0111	.0026	.0085	.76	-.18	-.30	-.07	-.21	-.16
	UK	11	15,282	-.08	.0438	.0010	.0428	.98	-.09	-.35	.18	-.14	-.03
	N. Amer	13	14,557	-.20	.0145	.0012	.0132	.91	-.25	-.40	-.10	-.31	-.19
	Holland	21	24,684	-.11	.0463	.0013	.0450	.97	-.14	-.41	.13	-.20	-.08
	C. Euro	16	12,732	-.18	.0307	.0018	.0289	.94	-.23	-.44	-.01	-.29	-.16
<u>Control</u>													
Support	Australia	28	14,368	.34	.0296	.0023	.0273	.92	.41	.20	.63	.38	.45
	UK	11	15,282	.19	.0444	.0009	.0435	.98	.22	-.05	.48	.16	.27
	N. Amer	13	14,557	.27	.0118	.0013	.0104	.89	.37	.24	.50	.31	.42
	Holland	21	24,684	.22	.0918	.0012	.0905	.99	.28	-.11	.66	.20	.36
	C. Euro	16	12,732	.30	.0152	.0018	.0135	.88	.40	.25	.55	.35	.44
<u>Satisfaction</u>													
Demands	Australia	28	14,496	-.16	.0322	.0028	.0295	.91	-.20	-.42	.02	-.23	-.16
	UK	16	18,690	-.14	.0296	.0012	.02839	.96	-.17	-.39	.04	-.22	-.13
	N. Amer	17	19,534	-.29	.0448	.0011	.0436	.97	-.37	-.64	-.10	-.46	-.28
	Holland	17	14,482	-.27	.0425	.0016	.0409	.96	-.34	-.60	-.08	-.40	-.28
	C. Euro	10	4,895	-.20	.0243	.0031	.0213	.87	-.25	-.44	-.07	-.31	-.20

Table 6 - continued

Control	Australia	28	14,496	.44	.0090	.0020	.0070	.78	.55	.44	.66	.53	.57
	UK	16	18,690	.37	.0270	.0009	.0261	.97	.44	.23	.65	.40	.48
	N. Amer	17	19,534	.37	.0095	.0011	.0084	.88	.50	.38	.61	.45	.54
	Holland	17	14,482	.30	.0397	.0015	.0376	.96	.38	.14	.63	.33	.44
	C. Euro	10	4,895	.33	.0221	.0027	.0194	.88	.43	.25	.61	.38	.48
Support	Australia	25	13,590	.57	.0458	.0012	.0446	.97	.68	.41	.95	.63	.74
	UK	11	15,282	.39	.0590	.0007	.0583	.99	.46	.15	.77	.38	.53
	N. Amer	10	17,114	.34	.0927	.0006	.0920	.99	.40	.02	.79	.22	.58
	Holland	10	9,999	.37	.0749	.0010	.0739	.99	.44	.09	.79	.34	.54
	C. Euro	7	2,238	.27	.1755	.0043	.1712	.98	.34	-.19	.87	.14	.53
<u>EmoExh</u>													
Demands	Australia	4	1,188	.38	.0018	.0035	0	0	.44	.44	.44	.43	.45
	UK	3	2,431	.57	.0362	.0007	.0355	.98	.63	.39	.87	.58	.68
	N. Amer	5	1,851	.54	.0544	.0021	.0523	.96	.66	.37	.95	.50	.82
	Holland	28	28,460	.39	.0131	.0011	.0120	.92	.48	.34	.62	.45	.51
	C. Euro	17	25,685	.40	.0216	.0008	.0208	.96	.53	.35	.72	.47	.59
Control	Australia	4	1,188	-.30	.0080	.0044	-.0036	.44	-.38	-.45	-.30	-.41	-.34
	UK	3	2,431	-.23	.0209	.0015	.0195	.93	-.26	-.31	-.20	-.44	-.08
	N. Amer	5	1,851	-.20	.0607	.0041	.0567	.93	-.26	-.57	.04	-.43	-.09
	Holland	29	28,597	-.16	.05669	.0015	.0552	.97	-.19	-.49	.11	-.28	-.11
	C. Euro	17	25,685	-.17	.0507	.0011	.0496	.98	-.22	-.50	.07	-.31	-.13
Support	Australia	3	1,009	-.38	.0176	.0029	.0147	.83	-.44	-.60	-.29	-.48	-.40
	UK	2	2,424	-.27	.0245	.0008	.0237	.97	-.29	-.49	-.10	-.34	-.25
	N. Amer	4	1,453	-.29	.0175	.0029	.0145	.83	-.32	-.48	-.17	-.44	-.21
	Holland	22	24,476	-.24	.0305	.0011	.0294	.96	-.28	-.50	-.06	-.33	-.23
	C. Euro	13	9,840	-.28	.0334	.0015	.0319	.96	-.33	-.56	-.10	-.41	-.24

Note. C. Europe = Continental Europe minus the UK and Holland, N. Amer = United States and Canada. National groups listed in descending order of individualism according to Hofstede (2001). Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

All DCS interrelationships and relationships with job satisfaction and emotional exhaustion had some significant differences between national groups, suggesting nationality to be a significant source of moderation. For example, North America had the strongest *negative* demands-control relationship ($= -.30$, 95% CI $-.49$ to $-.11$). This value was significantly different from Australia, the United Kingdom, and Pan Asia. Conversely, the United Kingdom had the strongest positive relationship between perceived demands and control ($= .22$, 95% CI $.17$ to $.27$), which also differed significantly from Australia, the Netherlands, and Continental Europe. Finally, the positive demands-control relationship in Australia ($= .10$, 95% CI $.06$ to $.14$), although weaker than that of the UK, also differed from the negative demand-control relationships of the Netherlands and Continental Europe.



Note. UK = United Kingdom, C. = Continental, N. = North.

Figure 3. Average effect size of demands and control with error bars by National Culture

Directionality of effects for all other DCS interrelationships, and relationships with job satisfaction and emotional exhaustion conformed to theoretical norms (see Table 6). However, national culture moderated every one of these relationships. For example, the negative demands-support relationship ranged from very small ($= <-.01$ for Pan Asia) to moderately small ($= -.25$ for North America), with differences between national groups (i.e., when comparing the UK or Pan Asia to Australia, Europe, and North America). Interestingly, the confidence interval for Pan Asia (95% CI $-.16$ to $.15$) suggests a relatively even divide between workers perceiving a negative, and *positive* relationship between demands and support; although results should be interpreted with caution due to the small number of Pan Asian samples ($k = 5$) (Hunter & Schmidt, 2004). Moreover, Pan Asia had the strongest positive relationship between control and support ($= .43$, 95% CI $.45$ to $.62$), with the same caveat (e.g., $k = 5$). With regards to outcomes, the negative demands-job satisfaction relationship ranged from ($= -.17$ for UK workers) to ($= -.37$ for North American workers), with significant differences in strength between UK workers ($= -.17$, 95% CI $-.22$ to $-.13$) and both Dutch workers ($= -.34$, 95% CI $-.40$ to $-.28$) and North American workers ($= -.37$, 95% CI $-.46$ to $-.28$), as well as Continental European workers ($= -.44$, 95% CI $-.31$ to $-.20$). North Americans also perceived a stronger negative demands-job satisfaction relationship than did Australians ($= -.20$, 95% CI $-.23$ to $-.16$).

Space restrictions prevent us outlining every significant relationship of interest. Moreover, there is little discernible pattern between relationships. However, our findings strongly support the notion that national culture is a moderator.

Occupation. Correlations between study variables for each occupational group type are presented in Table 7.

Table 7
Correlational Results for Occupational Moderator Analysis (relationship between validity coefficient and stress tolerance level of occupations in the sample)

IV	DV	n	r	p
Demands	Control	94	-0.13	.223
	Support	62	-0.05	.729
Control	Support	62	-0.00	.976
	Satisfaction			
Satisfaction	Demands	94	-0.07	.574
	Control	70	-0.06	.627
	Support	50	-0.01	.961
EmoExh	Demands	48	-0.04	.803
	Control	49	-0.05	.744
	Support	37	0.04	.824

Note. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

There are no significant correlations. However, all DCS interrelationships and relationships with job satisfaction and emotional exhaustion had some significant differences between occupational groups, suggesting occupation to be a significant source of moderation (see Table 8). Results varied considerably between relationships. This may be partially due to variability in number of study samples (k) included in each occupational group, with researchers having overwhelmingly focused on healthcare workers in studies of the JDC(S) model.

Table 8
Moderator Meta-Analytic Results for Occupation

		k	N	Var(o)	Var(e)	Var(ρ)	%Var unexp	80% Credibility		95% Confidence			
								Lower	Upper	Lower	Upper		
<u>Demands</u>													
Control	Educ.	15	6,431	-.18	.0352	.0038	.0316	.89	-.24	-.46	-.01	-.27	-.20
	Law En.	11	8,289	.04	.0979	.0022	.0957	.98	.05	-.35	.45	-.01	.11
	Health	47	36,383	-.11	.0447	.0021	.0426	.95	-.15	-.42	.11	-.20	-.10
	Bus. S.	6	2,530	-.07	.2009	.0023	.1987	.99	-.09	-.39	.21	-.17	-.01
	Clerical	8	6,400	.10	.0244	.0048	.0196	.80	-.22	-.41	.73	-.29	-.16
	Manu.	5	1,580	-.18	.2009	.0023	.1987	.99	.16	-.40	-.04	.00	.33
Support	Educ.	13	5,910	-.04	.1434	.0032	.1402	.98	-.04	-.52	.44	-.12	.04
	Law En.	9	7,282	-.17	.0384	.0017	.0671	.96	-.21	-.46	.04	-.25	-.17
	Health	35	30,733	-.16	.0575	.0016	.0559	.97	-.18	-.49	.12	-.24	-.13
	Bus. S.	4	2,404	-.21	.0534	.0025	.0509	.95	-.27	-.55	.02	-.39	-.14
<u>Control</u>													
Support	Educ.	13	5,910	.46	.0334	.0021	.0314	.94	.56	.34	.79	.52	.60
	Law En.	9	7,282	.34	.0342	.0015	.0327	.96	.42	.19	.65	.38	.46
	Health	35	30,733	.22	.1388	.0016	.1372	.99	.27	-.20	.75	.18	.36
	Bus. S.	4	2,404	.22	.0858	.0022	.0836	.97	.27	-.10	.64	.13	.41
<u>Satisfaction</u>													
Demands	Educ.	10	5,328	-.36	.0079	.0024	.0055	.70	-.46	-.56	-.37	-.48	-.44
	Law En.	9	11,603	-.26	.0236	.0011	.0225	.95	-.33	-.53	-.14	-.37	-.30
	Health	32	19,719	-.27	.0469	.0021	.0448	.96	-.32	-.59	-.05	-.37	-.27
	Bus. S.	4	2,425	-.25	.0425	.0030	.0395	.93	-.35	-.60	-.10	-.44	-.26
	Clerical	5	1,580	-.23	.0720	.0044	.0676	.94	-.28	-.62	.05	-.39	-.18
	Manu.	8	6,400	-.16	.1002	.0021	.0981	.98	-.22	-.62	.19	-.37	-.06

Table 8 - continued

Control	Educ.	10	5,328	.34	.0058	.0026	.0033	.56	.45	.38	.53	.44	.47
	Law En.	8	6,700	.43	.0210	.0014	.0197	.94	.57	.39	.75	.54	.60
	Health	32	19,719	.36	.0172	.0019	.0153	.89	.45	.30	.61	.42	.48
	Bus. S.	4	2,425	.33	.0038	.0025	.0014	.36	.46	.41	.51	.43	.48
	Clerical	5	1,580	.41	.0154	.0034	.0120	.78	.50	.36	.64	.45	.56
	Manu.	8	6,400	.38	.0102	.0012	.0090	.88	.44	.32	.56	.39	.49
Support	Educ.	10	5,328	.35	.0295	.0021	.0274	.93	.42	.21	.63	.38	.46
	Law En.	8	6,700	.62	.1378	.0007	.1371	.99	.76	.29	1.23	.66	.86
	Health	24	17,029	.41	.0274	.0013	.0261	.95	.48	.27	.69	.43	.53
	Bus. S.	3	2,306	.37	.0089	.0016	.0072	.82	.47	.36	.58	.42	.53
<u>EE</u>													
Demands	Educ.	15	6,698	.50	.0056	.0018	.0038	.68	.60	.52	.68	.58	.62
	Health	24	24,422	.41	.0242	.0010	.0233	.96	.50	.30	.69	.45	.54
Control	Educ.	15	6,698	-.21	.0151	.0031	.0119	.79	-.26	-.40	-.12	-.29	-.23
	Health	24	24,422	-.15	.0325	.0015	.0310	.96	-.19	-.41	.04	-.24	-.14
Support	Educ.	13	6,177	-.28	.0042	.0023	.0019	.46	-.31	-.37	-.26	-.33	-.30
	Health	17	19,024	-.25	.0081	.0011	.0070	.87	-.29	-.40	-.18	-.32	-.26

Note. Educ. = Educators, Law En. = Law Enforcement workers, Health = Healthcare workers, Bus. S. = Business Services workers, Manu. = manufacturing workers. Satisfaction = Job Satisfaction, EmoExh = Emotional Exhaustion.

With regards to the demand-control interrelationship, effect sizes ranged from moderately *negative* ($= -.24$, 95% CI $-.27$ to $-.20$) for education workers, to small-to-moderately *positive* ($= .16$, 95% CI $<.01$ to $.33$) for manufacturing workers. The demand-control relationship for Educators was also significantly different from that of business services workers ($= -.09$, 95% CI $-.17$ to $-.01$), and law enforcement workers ($= .05$, 95% CI $-.01$ to $.11$). Moreover, there was a partially significant difference from that of healthcare workers ($= -.15$, 95% CI $-.20$ to $-.10$). Additionally, the positive demand-control relationship for manufacturing workers was significantly different from that of healthcare workers ($= -.15$, 95% CI $-.20$ to $-.10$), and clerical workers ($= -.22$, 95% CI $-.29$ to $-.16$).

Directionality of effects for all other DCS interrelationships, and relationships with job satisfaction and emotional exhaustion were as expected, based on JDC(S) theory (Karasek & Theorell, 1990) as outlined previously. Moreover, as with nationality, occupation moderated every one of these relationships (see Table 8). For example, the negative demands-support relationship was significantly weaker for educators ($= -.04$, 95% CI $-.12$ to $.04$) than for health workers ($= -.18$, 95% CI $-.24$ to $-.13$), law enforcement workers ($= -.21$, 95% CI $-.25$ to $-.17$), and business services workers ($= -.27$, 95% CI $-.39$ to $-.14$). Moreover, the negative demands-job satisfaction relationship was stronger for educators ($= -.46$, 95% CI $-.48$ to $-.44$), than for all other occupational groups except for business service workers, from which the relationship for educators was marginally significantly more negative ($= -.35$, 95% CI $-.44$ to $-.26$). Furthermore, the relationship between demands and emotional exhaustion was stronger for educators ($= .60$, 95% CI $.58$ to $.62$) than for health workers ($= .50$, 95% CI $.45$ to $.54$).

Although results show varying patterns across relationships of interest, one overarching pattern is that law enforcement workers and educators differed significantly for *every* relationship that contained a sufficient number of studies for comparison. For example, law enforcement works had a stronger negative demand-support relationship, and a weaker positive control-support relationship, than did educators. However, law enforcement workers had a weaker demand-job satisfaction relationship, and stronger positive relationships between both control and support, and job satisfaction. Similarly, healthcare workers differed from either educators, law enforcement employees, or *both* occupations, for every relationship except between control and support, respectively, and emotional exhaustion.

Discussion

Examinations of the JDC(S) model span three continents and 15 countries, with over forty different occupations represented across 300+ studies throughout the last 36 years. The first meta-analysis was conducted only recently (Luchman & González-Morales, 2013), and results strongly suggested moderation of each interrelationship between demands, control, and support. The authors also conducted an exploratory moderator analysis, and found gender to moderate the demand-control relationship; and job tenure to moderate the demand-coworker support relationship. We further examined gender as a moderator of DCS interrelationships, and extended our moderator analyses to national culture, and occupation, given extant theory and early empirical findings which suggest that they may moderate these relationships. We also extended our moderator analyses to stressor-strain relationships between demands, control, and support, respectively, and both job satisfaction and emotional exhaustion, which are the two most examined outcomes in JDC(S) research (Häusser et al., 2010). Our results largely support

our hypotheses regarding national culture and occupation, and partially support our hypotheses regarding gender. We expand on these results as follows.

Gender

Our hypotheses were based on previous findings which suggest that, on average, males and females perceiving the same magnitude of job demands may have different reactions to these stressors, as well as different coping mechanisms. Specifically, females perceiving their work to be highly demanding may appraise demand stressors as more distressing than men do (e.g., Eaton & Bradley, 2008), and may also perceive less control over their work than men (e.g. Bellman et al., 2003). Our results add support to, and extend those of Luchman and González-Morales' (2013) exploratory review of gender as a moderator.

First, our findings suggest that either the work environment or the *perceived* work environment differs from a demand-control perspective between male dominated workplaces and non-male dominated workplaces. Specifically, male dominated workplace environments, on average, seem to follow a positive demand-control relationship; whereas increasingly heterogeneous and predominately female work environments seem to follow a negative relationship. A positive demand-control relationship implies that—at least to a point—perceptions of control over work increase with greater demands, but also that demands are perceived to be higher with greater control. This corresponds with Karasek and Theorell's (1990) less frequently examined *activation* hypothesis, whereby workplaces characterized by high demands, but also high levels of control result in positive outcomes, such as increased performance, motivation, and well-being. Conversely, in accordance with Karasek and Theorell's (1990) much researched *strain* and *buffer* hypotheses, a negative relationship implies that perceptions

of control resources reduce with higher demands, but also that increasing workers' control is likely to reduce how demanding work is perceived to be.

Possible practical implications are that females may more actively seek control-related resources to compensate; and perhaps even more so if they also perceive social support resources for emotion-focused coping (e.g., Ptacek et al., 1992; Wohlgemuth & Betz, 1991) to be lacking. Thus, organizations that pay greater attention to designing jobs around control-related resources may benefit from improvement in stress levels and well-being among their all employees, but particularly female employees. Clearly, further work is needed in this area.

Our second finding extends Luchman and González-Morales' (2013) original review, by showing that gender moderates the demands-job satisfaction relationship. Specifically, males, on average, have a smaller negative demands-job satisfaction relationship than females; which suggests that highly demanding work is more likely to impair job satisfaction in female, than male workers. As such, we recommend that management and job design consultants consider this in order to avoid potentially greater decrements in job satisfaction in females than in males. Alternatively, this scenario is likely to become increasingly prevalent as greater numbers of women continue to enter the workforce and reach higher level positions that are inherently demanding (e.g., Smith, Smith, & Verner, 2006) than in previous generations. Moreover, if gender as a job design consideration is left unabated, this demographic shift may in turn lead to greater levels of absenteeism and unwanted voluntary turnover in female than in male employees, given their links with reduced job satisfaction (e.g., Hom, 2011).

One can only speculate as to whether generations of relative unawareness of --or ambivalence to-- gender differences in job design have slowed attainment of gender

equality in the workplace. However, as progressive society continues to break away from inequalities of the past, we encourage a reevaluation of job design as it relates to gender norms for effective functioning.

National Culture

Several discernible patterns of moderation demonstrate the importance of Hofstede's (2001) five dimensions of national culture to underpinnings of the JDC(S) model (see Table 6). For example, the corresponding increases between job demands and job satisfaction, and individualism, suggests that on average worker satisfaction in more individualistic countries is more closely tied to perceptions of job demands than in less individualistic countries. Thus, changes to demand structures are more likely to either positively or negatively affect well-being in these cultures, versus other cultures that give less prioritization to the individual above the collective. Second, positive resources spirals, in accordance with COR (Hobfoll, 2001) and demand-resources theory (Demerouti et al., 2001) are more likely in cultures with higher, rather than lower power distance. Thus, affording employees either greater control or support is more likely to positively affect perceptions of the other (and perhaps *other* resources) in cultures which are more accepting of unequal power distributions, and unquestionable decision authority, than in lower power-distance cultures.

Additionally, several findings from our sub-group analysis of national culture merit further attention. First, the UK and North America apparently have an almost inverse demands-control relationship (see Figure 3). This stark contrast is perhaps surprising, given presumed similarities between the two countries' cultures and working practices (Coller, 1996), and carries strong implications for the design --or *redesign*-- of work across the two countries. Specifically, offering North American employees more

control over their work may decrease their perception of how demanding the work is, and thereby possibly reducing strain; whereas making work less demanding may increase perceptions of control (Karasek & Theorell, 1990). Conversely, affording British employees greater control over their work may actually *increase* how demanding work is perceived to be. This latter finding indicates that long-established notions about the demand-control relationship (i.e., Karasek, 1979) do not hold for every national group.

Second, UK workers perceived a significantly smaller positive relationship between control and support than Australian, North American, and Pan Asian workers. This implies that positive resources spirals are, on average, less prevalent in the UK than in these other cultures. Thus, provision of one resource is less likely to result in provision of other resources. One possible implication of this is that worker well-being may suffer more in the UK based on theory and previous findings that control and support are inversely related to strain (Campbell et al., 2013), and may mitigate the effects of demands on strain (Karasek & Theorell, 1990). Thus, UK managers may need to be more purposeful in their provision of *each* individual resource to workers, due to lower natural gains from resource spirals (e.g., Luchman & González-Morales, 2013).

Third, with regards to strain, UK workers perceived a stronger positive relationship between demands and emotional exhaustion than Dutch workers, and a somewhat (e.g., partially significant) more positive relationship than other European workers. Additionally, North American workers also perceived a stronger relationship between than Dutch workers. One implication of this is that increasing demands in some cultures may lead to more severe cases of emotional exhaustion in employees – and greater potential for outcomes such as unwanted turnover, given its link to emotional exhaustion (e.g., Griffeth & Hom, 2001), than in others. Conversely, attempts to reduce

emotional exhaustion by lowering demands may be more fruitful in these cultures than in others where the relationship may be weaker.

As pointed out in the results section, discussion of all relationships is unrealistic given space restrictions. However, there is clear evidence that national culture moderates DCS interrelationships, and relationships with job satisfaction and emotional exhaustion. One clear pattern of moderation was the contrast of Australian versus North American samples. Specifically, North American workers tended to have the strongest (positive or negative) relationships when demands were involved (e.g., the relationship between demands and control); whereas Australian workers tended to have the strongest relationships when control or support was involved (e.g., the relationship between control and job satisfaction). This suggests that demand structures at work play a more prominent role in shaping perceptions of resources, and of strain, in North America, whereas access to resources may be a more dominant factor in well-being and strain in Australian work culture.

Despite variability in our findings across the relationships of interest, we envision practical implications to be manifold. For example, multinational organizations may endanger the well-being of their employees as well as the health of the organization if replicable jobs across locations are designed without consideration of different national cultural norms. For example, management of a British organization with offices in North America should be mindful of the vast difference in how North American workers, on average, perceive control over work in relation to demands, compared with British workers. Without this awareness, multinational organizations may suffer consequences of strained employees in one culture more than another, and simply attribute this to “cultural differences”, without due consideration to how they can be at least somewhat overcome

by more purposeful job design. Another implication is that of expatriate stress, which is when employees assigned to work in another culture suffer decrements to their well-being and/or their performance due to unfamiliarity with, or inability to adjust to, their host culture (Thomas & Lazarova, 2006). Again, we believe that purposeful job design which accounts for control and support resources as well as how demanding work is, would contribute to alleviating possible misconceptions regarding the ability of workers from other national cultures to “blend in”.

Occupation

Our results point to several interesting findings. First, workers on average seemingly perceive the relationship between demands and control differently based on occupation. For example, a negative demand-control relationship for educators, clerics, and healthcare workers points to reduced feelings of control over work as demands increase; whereas a positive demand-control relationship for manufacturing workers, suggests that they perceive greater control when demands are higher than lower. We attribute this at least in part to different underlying purposes between these types of work. That is, educators, clerics, and healthcare workers may perceive high demands as unwanted restrictions in *how* they work (i.e., Rudlow, 1999). For example, educators may feel rushed in class preparation or grading tasks with higher workloads; overloaded clerics may perceive less control over the ability to meet personal or organizational standards for thoroughness with each administrative duty; and busy healthcare workers may perceive less control over their ability to comprehensively examine and/or advise patients, in lieu of providing rushed, if not sub-optimal, solutions. In contrast, high demands in the manufacturing sector are essential to continued business functioning. Thus, to a point, busyness may be perceived as more closely tied to job safety and

prosperity for manufacturing workers (e.g., Tucker, 2013) than for those in certain other professions, which may elicit feelings of control. Conversely, our findings suggest that job design interventions to increase control may reduce perceived demands for educators, clerics, and healthcare workers more than for manufacturing workers. This may be due to manufacturing work arguably being more routinized than work in these other professions (see Karasek & Theorell, 1990). Thus, control over work may be less of a buffer to high demands than in, for example, education, where relative autonomy is widely thought to be a trade-off for higher pay (c.f., Darley, Zanna, & Roediger, 2003). We acknowledge, however, that further work is needed to better understand the reasons for these disparities.

Second, consistent differences across relationships between law enforcement and education workers point to four distinct trends. First, the stronger negative demand-support relationship for law enforcement workers suggests that strong workplace support can do more to reduce how demanding the job is perceived to be, than in education. This may be due the somewhat unpredictable nature of demands, as well as the prevalence of psychological “shocks” (e.g., Holtom, Mitchell, Lee, & Inderrieden, 2005) in law enforcement work, for which support may be highly beneficial; versus the more predictable demand scheduling of the education sector. Second, a weaker positive control-support relationship for law enforcement workers suggests that resources spirals play a lesser role than in education. Thus, offering workplace support may be less useful to increasing perceptions of control in law enforcement officers, than in educators. We note, however, that the control-support relationship is significantly stronger for law enforcement workers than the other occupational groups. Third, the weaker negative demands-job satisfaction relationship for law enforcement workers may also be due to relative acceptance of unpredictable work demands for law enforcement professionals,

who must operate on a shift-by-shift basis. Conversely, educators may view higher demands as impinging upon familiar work patterns for longer periods of time (e.g., a semester or academic year). Finally, the stronger positive relationships between both control and support resources and job satisfaction for law enforcement workers than educators suggests that even though control resource spiraling effects are somewhat lower in law enforcement work than in education, resources remain *independently* important for satisfaction with the job.

In sum, our results point to the multifaceted differential role of resources in job design across occupations; in counteracting demands, increasing perceptions of other resources, and in promoting well-being.

Study Limitations, Strengths, and Future Research

There are several limitations of our study, which should be noted. First, although recent research has made a clear distinction between challenge and hindrance stressors (e.g., LePine, Podsakoff, & LePine, 2005), we made no such distinction here, due to the lack of a distinction in most primary studies of the JDC(S) model. However, we acknowledge the importance of this distinction, and recommend that future researcher accounts for potentially differing relationships between challenge and hindrance stressors, and various resources (including control and support), as well as salient outcomes. Similarly, distinctions have been made between different types of support, such instrumental support in the form of direct assistance with tasks or other resources, and emotional support as an empathy-related, or esteem building resource (Semmer et al., 2008); as well as distinctions between supervisor and coworker support (e.g., Ng & Sorensen, 2008). However, we examined support as a global construct, given the similar

treatment of support in most primary studies of the JDC(S) model, and due to the large number of relationships examined in our study.

A second limitation is that our findings likely reflect confounding between the moderators examined, given a natural imbalance in where studies were conducted, and in what fields. For example, all but one study (Canadian) for education was from a Dutch or otherwise European sample; whereas, clerical worker and manufacturing worker samples were from diverse national regions. Moreover, clerical workers and educators tended to be more female than manufacturing workers. However, although interpretation of our meta-analytic results should be made with awareness of potential multi-moderator effects, they do not eliminate the likelihood of effects attributable to the moderator in question. Moreover, we recommend that future research examine other possible moderators of these relationships, such as racial composition of samples, given ties between race and work stress (Kim, Bursac, DiLillo, White, & West, 2009).

Finally, two other limitations of our study are inherent to the research designs often used in primary studies of the model. First, many of the primary studies included in our review used cross-sectional data, thus allowing for potential reverse- or reciprocal-causation (e.g., Spector, 2006) whereby impaired psychological well-being can impact an individual's perception of the environment (cf. Dalgard et al., 2009). Second, the data underpinning our meta-analysis is taken from studies where employees self-report perceptions of individual-level work characteristics, and outcomes. Although this approach is common to most work stress research, increasing attention is now being given multilevel views of work characteristics. For example, some studies are now examining how "meso-level" (i.e., higher-level such as organization-level) constructs affect and are affected by work characteristics (e.g., Ohly & Fritz, 2010). Thus, although

individual-level perceptions of work characteristics are not completely determined by *shared* perceptions (Morrison, Payne, & Wall, 2003), studies at the purely individual level risk overlooking potentially important aspects of how these work characteristics are interrelated, and how they affect salient outcomes, such as job satisfaction and emotional exhaustion. Another consideration is that potential common method bias may inflate meta-analytic estimates (Hunter & Schmidt, 2004). Thus, our estimates should be interpreted in relation to this potential source of inflation.

Despite these limitations, our meta-analysis of the JDC(S) model makes several important contributions to the work stress literature. First, by examining potential moderators of DCS interrelationships, we extend current understanding of the theoretical and empirical boundaries of the JDC(S) model by (i) corroborating primary meta-analytic findings of the first review, (ii) building upon exploratory analysis of moderators from the first review, and (iii) aligning research of the JDC(S) model – and the wider demands-resources perspective - with growing momentum to understand moderating effects of perceptions of workplace characteristics, and on relationships with established markers of well-being and strain. Second, by conducting three types of moderator analyses of gender, including subgrouping studies based on male/female majority, and examining change in average correlation as the proportion of male workers rose, we added richer context to previous evidence of gender effects on demand-control-support interrelationships, such as that presented by Karasek and Theorell (1990), and Luchman and González-Morales (2013). Third, our findings show that national culture is a strong moderator of these relationships. Given the major change in today's modern labor market toward a trend of global integration of business, with geographical boundaries tending to disappear to make way for cross-national teams (Duarte & Rossier, 2008), understanding

of how cultural differences may affect interrelationships between workplace characteristics, and effects of strain is becoming increasingly important. Finally, despite Karasek and Theorell's (1990) early illustration of how demands, control, and support differ between occupations, the homogeneity of occupations in most primary study samples has resulted in little, if any, research being conducted on the potential moderating effects of nationality. Our findings suggest that certain relationships between workplace characteristics and strains are moderated by participant occupation. Particularly in the case of demands-control, this carries strong implication for managers or consultants considering the design of work for employees within specific countries, or from an international context.

Conclusion

The JDC(S) model has been a mainstay of work stress and organizational literature for over 35 years. It is one of the most researched models in work stress history, and has a presence which spans the scholarly globe, not only in organizational research, but research in areas of physiology and medicine. Despite its ongoing popularity, the model has repeatedly received criticism for its simplicity, openness to multiple operationalizations of its dimensions, subjective measurement of supposedly objective constructs, and for ignoring individual differences (Kain & Jex, 2010). However, as we continue to witness changes to the constitution today's workforce, feel the effects of the arguably irreversible forces of internationalization, and face an increasing awareness of the modern day pandemic of stress (Sulsky & Smith, 2005), perhaps we are only now getting beneath the surface of job demands, control over work, and support, which are central to research on job design and work stress.

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*A list of the studies meta-analyzed is available upon request.

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CHAPTER IV: STUDENT TASK ILLEGITIMACY AS A DEMAND STRESSOR: THE ROLE OF CONTROL AND SUPPORT

Introduction

This study examined illegitimate tasks in relation to anxiety and emotional exhaustion in a college student setting through the demand-control-support framework. All research to date on illegitimate tasks has been in work settings. However, reports from 473 college students indicated that illegitimate tasks may also be important in student domains, as they were linked to both psychological strain markers. In addition, perceptions of control did not moderate relationships between illegitimate tasks and student well-being indicators, but perceptions of instructor support did. Specifically, Instructor support buffered the negative effects of illegitimate tasks on anxiety and emotional exhaustion, such that the relationship between perceived task illegitimacy and both outcomes was less for students perceiving higher levels of support. However, an unexpected pattern emerged for instructor support as a buffer for illegitimate tasks on student satisfaction, which underscores the need to further explore the function of social support in relation to illegitimate tasks.

Literature Review

Stressors constitute physical or psychological demands from a context-driven environment (e.g., work, college), within which individuals have an identity (Thoits, 1991). Stress is not a single event, but a process involving appraisal, response, and attempts to cope with and manage stressors in order to meet goals (Sulsky & Smith, 2005). Strain represents an organism's stress reactions from attempting to function effectively in the face of too many environmental challenges (Karasek & Theorell, 1990). The negative effects of excessive stress and resultant strains are manifold to individual

and organizational well-being (Sulsky & Smith, 2005). As such, scholars and practitioners continue to be devoted to understanding and predicting stress and relationships with strains. This includes shedding further light on what these stressors *are*, which continues to be imperative given the changing nature of work and education (e.g., Kain & Jex, 2010).

In line with these efforts, our study focuses on one relatively new stressor concept: illegitimate tasks. Illegitimate tasks represent task assignments that individuals feels they “should not have to do” because they are not appropriate given their role (e.g. as a professional; Semmer Jacobshagen, Meier, & Elfering, 2015). In accordance with the Stress-as-Offense-to-Self (SOS) theory (Semmer, Jacobshagen, Meier, & Elfering, 2007) illegitimate tasks violate an individual’s sense of role identity by creating unreasonable and/or unnecessary obstacles to goal attainment. In this regard, illegitimate tasks are distinct from other classical task-related stressors because such tasks are not necessarily perceived as illegitimate due to their intrinsic qualities, but because of the nature of the demand for a given person, place, time, or situation (Semmer et al., 2007, 2015).

The entire context of research on illegitimate tasks to date has centered on their undermining effects on self-view in *work* roles. For example, illegitimate tasks at work have been found to have direct ties to psychological strain (Semmer et al., 2015) and counterproductive work behavior (Semmer, Tschan, Meier, Facchin, & Jacobshagen, 2010). However, from a theoretical standpoint the identity-threatening nature of such tasks (e.g., Thoits, 1991) could equally transfer to other settings in which tasks are assigned, and thus be an important factor for well-being and performance for those in these other settings. In particular, individuals who are actively shaping their self-identity perceptions, such as adolescents and young adults, may be particularly vulnerable to

social information which is inconsistent with a relatively fragile self-view. Indeed, college students are adjusting to life at university, separating oneself from family and friends, and engaging in identity exploration (Samuolis & Griffin, 2014) which is a particularly salient aspect of this period of life.

Thus, it is important for theoretical development that we understand boundaries of generalizability of this stressor, especially to populations who may be particularly vulnerable, such as those at the college age. As such, our study contributes to this relatively new field by examining relationships between illegitimate tasks and psychological strain in college students. Higher education students are constantly receiving tasks assignments from their course instructors, some of which are perceived as unfair or offensive (Goodboy, 2011) suggesting illegitimacy in task requests is not a unique experience to the workplace. However, if illegitimate tasks function in a similar manner in students in higher education as they do with employees, then they represent a new and important concern for health (e.g. Kottwitz et al., 2013), attitudes (e.g. Eatough et al., 2015), emotions, and potentially behaviors such as withdrawal (e.g. Semmer et al., 2010) or dissent (Goodboy, 2011) for student populations as well.

Stress-as-Offense-to-Self Theory: The Conceptual Background of Illegitimate Tasks.

Life roles (i.e. parent, friend, employee, student) are integrated with identify (Ashforth, 2001). For example, the prominent role of work in many people's lives means that professional roles can become an integral part of one's identity (Ashforth, Harrison, & Corley, 2008; Haslam & Ellemers, 2005) and, thus, part of the self (Oyserman, Elmore, & Smith, 2012). Because our roles comprise the holistic sense of who we are, violation of our roles can threaten a positive self-view (Thoits, 1991).

The Stress-as-Offense-to-Self (SOS) framework (Semmer et al., 2007; 2015) is grounded in people's striving to maintain a positive self-image (Sedikides & Strube, 1997). It argues that threats to an individual's self-image are often at the core of stressful experiences, and that identity-relevant stressors damage psychological well-being based on self-threat. According to the framework, there are two pathways by which this may take place. First, an individual may experience psychological damage through perceived personal failure or demonstrations of a lack of competence. This pathway is termed "Stress as Insufficiency (SIN)". Alternatively, psychological well-being may be eroded by sensing disrespect from others. For example, inconsideration from others can convey disrespect which may threaten an individual's sense of self-worth or self-esteem. This pathway is termed "Stress as Disrespect (SAD)". Failure to meet self-prescribed standards for positive self-evaluation, and/or external social cues conveying disrespect from relevant others can threaten one's sense of worth and self-esteem, and ultimately lead to degraded psychological well-being, and strain (Semmer et al., 2007).

Relevance of Task Characteristics. One implication of the SOS framework is that tasks may contain social messages directed towards the recipient (Semmer & Beehr, 2013). For example, the concept of *illegitimate tasks* has emanated from SOS theory because certain tasks can be interpreted as containing *self-threatening* messages (Semmer et al., 2007). Self-threatening messages may disrupt or prohibit an individual from adequately fulfilling their role, which may lead to psychological damage (e.g., Thoits, 1991). We expand further on the concept of illegitimate tasks and their social messages in the following section.

Illegitimate Tasks

The concept of illegitimate tasks brings to light a conceptualization of stress that, until recently, has been largely ignored by organizational research (Semmer et al., 2015). Illegitimate tasks represent task assignments that -- in the mind's eye of a role-occupant - - violate what can be reasonably expected of them. That is, illegitimate tasks are those which an individual feels he/she "should not have to do" because they violate normative prescriptions regarding expectations in a given role. These normative prescriptions are held by the individual, but are arguably shaped by more collective norms at the occupational and/or organizational levels (Semmer, McGrath, & Beehr, 2005; Semmer et al., 2010).

Tasks are illegitimate to the extent that they are perceived to be either *unnecessary* or *unreasonable*. Unreasonable tasks are those that fall outside of, or beyond, expectations associated with a specific role. Thus, in the example of work, unreasonable tasks may be viewed as illegitimate based on incompatibility with one's occupational status. This can happen when beginners or those in junior positions are assigned tasks that require a greater level of skill, experience, or expertise than they can reasonably be expected to possess. For example, asking a paralegal to hold a meeting with a client, something that is actually within an attorney's role and above the paralegal's credentials or training (Eatough, et al., 2015). Tasks can also be perceived to be demeaning to the level of skill, training, and seniority one has accomplished, such as asking a doctor or senior nurse to empty a patient's bedpan. In a work role, examples of unnecessary tasks may include filling out an excessive amount of paperwork that has no purpose, or being held to policies that make no sense, such as having to meet an arbitrary deadline. Tasks can also be perceived as unnecessary due to organizational inefficiencies,

such as having to enter the same data separately on two incompatible computer systems (Semmer et al., 2015).

Tasks are not necessarily perceived as illegitimate due to their intrinsic qualities, but because of the nature of the demand for a given person, place, time or situation (Semmer et al., 2007). Thus, illegitimate tasks may not necessarily be difficult to carry out (e.g. due to lack of resources), or aversive (e.g. “dirty work”). In fact, a given task may be considered legitimate or illegitimate based on its *context*. For example, a college professor may consider opening a door for a student perfectly legitimate if the student is waylaid with books and needs help to do it. However, being *expected* to stand holding the door open for the entire class for each period may be seen as illegitimate, given the respective roles of professors and students in higher education. Such tasks signal a lack of respect for the individual in question, and induce a sense that “I shouldn’t have to do this” (Björk, Bejerot, Jacobshagen, & Härenstam, 2013).

Illegitimacy Relationships with Well-being and Strain. Stressors in general are related to a wide range of strains (Kahn & Byosiere, 1992). Thus, our consideration of illegitimate tasks as a form of stressor means that, in accordance with the stressor-strain model (Jex, 2002) we should expect such tasks to be related to strain. Specifically, illegitimate tasks should induce negative affective reactions, especially if exposure to such tasks is deemed by the individual to be frequent or severe. To date, a vast amount of prior research has established a negative relationship between constructs conceptually related to illegitimate tasks, such as unfairness or injustice, with negative psychological well-being (e.g. Barsky & Kaplan, 2007). Moreover, previous work examining illegitimate tasks *specifically* has reported similar patterns by demonstrating relationships between chronic exposure to illegitimate tasks and several established markers of well-

being in employee samples (Semmer et al., 2010), such as feelings of resentment and irritation over time, and burnout (Semmer et al., 2015). Other research that has explored the *daily* experience of illegitimate tasks has found that individuals report greater anger and depressed mood, and lower job satisfaction, at the end of work days in which illegitimate tasks were perceived to be high, with effects on depressive mood remaining elevated through the next work day (Eatough et al., 2015).

Illegitimate Tasks in a Student Context

As previously mentioned, work to date in the area of illegitimate tasks has focused entirely on the employment context. However, from a theoretical perspective, this role-violation stressor can apply to many life-roles (e.g., Thoits, 1991). College students may be particularly vulnerable to the experience of role-violating stressors due to the delicate status of identity development at that life stage (Samuolis & Griffin, 2014). In fact, research suggests that the number one ranked experience to trigger student misbehavior and dissent is “unfair assignments”, followed by instructor offensiveness and instructor violation of syllabus (Goodboy, 2011). This work suggests that student perception of the appropriateness of assignments is quite important for student behavior. Furthermore, students are concerned with the role-related behavior between the instructor and the student, such that it is in line with those respective social roles and implied contracts, and may display dissent behaviors such as vengeance against the instructor if violated (Goodboy, 2011).

In order to broaden existing knowledge of illegitimate tasks we focus on this relatively new stressor in the context of higher education students. Previous studies have examined how stressors such as a lack of control over one’s work (e.g. Stupnisky, Perry, Renaud, & Hladkyj, 2013), work overload (e.g. Hunter & And, 1992), and other

academic as well as financial, and relationship stressors (e.g. Dzokoto, Hicks, & Miller, 2007) impact well-being in students in higher education settings. Thus, in consideration of the aforementioned SOS framework, we believe that examining the role of illegitimate tasks in higher education students will contribute to literatures in both fields, and is both *appropriate* given the theoretical generalizability of this stressor, and *necessary* given the unique context of stressors in higher education.

We define illegitimate tasks for students as tasks assigned by course instructors that are perceived by students as *inappropriate to learning*. Such tasks may be seen as unsuitable to learning goals (e.g., *unreasonable* tasks), or those assigned simply to create work without expressed connection to the learning process (e.g., *unnecessary* tasks). To further illustrate, we provide several examples of illegitimate tasks in a student context. First, a student may perceive task illegitimacy when assigned a task for that he or she perceives having been ill-prepared to complete, based on not having the required prerequisite knowledge. Second, task illegitimacy may be perceived when assigned work is so rudimentary as to be a waste of a student's time and energy. Third, a student may also perceive the classroom environment itself as illegitimate, such as having to conform to unduly restrictive rules that may be more legitimate to a middle school, rather than college environment. For example, a student may believe that a total ban on laptop use is undeservedly restrictive, and limits their ability to take class notes. Fourth, "busy-work" (e.g., Tokarski, 2011) assignments that do not clearly contribute to the instructor's stated learning goals of the class may be seen unnecessary, and thus illegitimate in the context of learning.

Relationships with Subjective Student Well-being and Strain. In the current study, we conceptualize well-being as a subjective construct (Diener, Oishi, & Lucas,

2003), which has both positive and negative components. Commonly, subjective well-being is defined as a perception of psychological health or quality of life which is thought to have both affective and cognitive components (Lubin & Whitlock, 2004). The affective component refers to one's emotional experience, which can be positive or negative as suggested by Diener, et al. (2003). The cognitive component refers to one's subjective evaluation of mental health and satisfaction with life.

We include multiple indicators of subjective well-being in the current work, including undesirable states of student *anxiety* and *emotional exhaustion*, and the desirable cognitive state of student *satisfaction with college life*. We examine the relationship between illegitimate tasks and these three outcomes, for two reasons. First, studies of the *related* concept of perceived unfairness have shown that unfair treatment is negatively related to job satisfaction, and that unfair treatment from supervisory figures is related to anxiety and emotional exhaustion (Donovan, Drasgow, & Munson, 1998; Tepper, 2000). Second, these three indicators have been widely examined in studies of other stressors in the workplace (e.g., Halbesleben, 2010, Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Luchman & González-Morales, 2013). Thus, demonstrating the predictive value of illegitimate tasks on these three outcomes in higher education students could further substantiate the contribution of illegitimate tasks as a stressor. The expected relationships between illegitimate tasks and these outcomes are described below.

Anxiety. Anxiety refers to a cloudy, unpleasant emotional state characterized by concerns, fright, distress, and restlessness (Hamama, Ronen, & Rahav, 2008). It is a response to physical and/or psychological danger, or the threat of such danger, and is characterized by tension, worry, fear, and restlessness. Anxiety is thought to be triggered either by stimuli originating from the environment, and particularly situations that are

perceived to be dangerous or threatening, such as in the case of illegitimate tasks. For example, individuals may experience anxiety when they fear negative evaluation or their social value is in question (e.g., Baumeister & Tice, 1990).

When it comes to students, levels of anxiety are of particular concern. The negative relation between anxiety and task performance is well-documented in children and adults (e.g., Eysenck, Derakshan, Santos, & Calvo, 2007). For example, anxiety has been found to mediate between psychological stress and working memory performance (Hood, Pulvers, Spady, Kliebenstein, & Bachand, 2015), making anxiety a particularly important outcome when studying the stress process in a student population. We suspect that illegitimate tasks may spark student anxiety through both the self-relevant threat inherent in the task undertone as well as the demand of having to navigate the tasks themselves or likely face negative consequences as students (e.g., a poorer grade) for failing to do so.

Hypothesis 1: Perceptions of task illegitimacy are positively related to anxiety for college students.

Emotional Exhaustion. Emotional exhaustion refers to feelings of being overextended, of being "...drained or used up, unable to face a day's work, totally unenthusiastic" (Sulsky & Smith, 2005, p.45). Individuals experience emotional exhaustion when their emotional resources are sufficiently depleted so as to no longer be able to meet the demands of task-related stressors (Lee & Ashforth, 1996). Illegitimate tasks require mental and emotional effort, which should result in emotional exhaustion. However, we also believe this link will be prevalent because exhaustion is attributable to threats to identity (Swann, Johnson, & Bosson, 2009).

Hypothesis 2: Perceptions of task illegitimacy are positively related to emotional exhaustion.

Satisfaction with College Life. Satisfaction from the perspective of *work* is a positive and pleasurable state resulting from positive appraisal of the job (Cranny, Smith, & Stone, 1992; Locke, 1976). It represents a manifestation of cognitive evaluations of one's job (Spector, 1997), and can affect functioning through changes in performance, and desire to continue performing within a specified role (Hom, 2011). Although an attitudinal variable, low job satisfaction is regarded by many stress researchers as a form of psychological strain because it indicates a lack of psychological well-being at work (Kahn & Byosiere, 1992). According to job characteristics theory, *task* characteristics are thought to impact job satisfaction (Fried & Ferris, 1987; Hackman & Oldham, 1975). Moreover, in a study of daily dairies of illegitimate tasks and employee well-being, Eatough et al. (2015) found perceptions of daily task illegitimacy to be negatively related to state-levels of job satisfaction. Thus, in a higher education context, we expect illegitimate tasks to be negatively related to student satisfaction with college life because such tasks may diminish a student's efficacy to reach desired learning outcomes.

Hypothesis 3: Perceptions of task illegitimacy are negatively related to satisfaction with school.

Illegitimate Tasks and Resources: Control and Support

In many cases, illegitimate tasks may not be able to be eliminated entirely because they may be unavoidable (i.e. it is the institution's policy to ban laptop usage in the classroom, regardless of how unfair or unreasonable it seems to the students) or immeasurable (i.e. instructors cannot know the prior knowledge every student has to tailor instruction individually). As such, it is important to begin to identify how we can

create a contextual environment that reduces the negative outcomes associated with their presence. For this purpose, we integrate another theoretical framework: that of demands and resources (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Several stress theories examine the role of resources as *mitigators* of reduced psychological well-being in stressor-strain relationships (e.g. Demerouti, et al., 2001; Hobfoll, 2001; Karasek & Theorell, 1990). A common focus shared by many of these models is the desire of employees for states of homeostasis or equilibrium with the work environment in order to facilitate manageable work (Griffin & Clarke, 2011). Chief among these models is the conservation of resources model (COR: Hobfoll, 1989), which views employees as attempting to obtain, retain, protect, and restore resources needed to cope with demand stressors. “Resources” encompass many things, such as objects, personal characteristics, and conditions. However, the central focus is on cognitive and emotional resources needed for work and daily transactions with others (Campbell, Perry, Maertz, Allen, & Griffeth, 2013; Jex & Yankelevich, 2008). According to Hobfoll (1989), stress is triggered by failure to acquire sufficient resources, or by threat or actual loss of them.

The concept of homeostasis between demands and resources has been examined most frequently using the job demands-control (support) (JDC(S)) model (Karasek & Theorell, 1990). According to the model, psychological well-being is most likely to be degraded when individuals perceive their role to be highly demanding, but lacking in opportunities for control over the structure of work and lacking in support. Control represents an individual’s belief in his/her ability to affect a desired change on their environment (Greenberger & Strasser, 1986). This includes degree of autonomy or decision authority over tasks such as controlling one’s order of task completion, and how duties are completed (Ganster & Fusilier, 1989). Support refers to helpful relationships

(Maertz, Griffeth, Campbell, & Allen, 2007; Price, 1997). In contrast to control, support does not afford individuals the ability to directly alter tasks; although it can benefit individuals by reducing burden on their other personal resources (Lin, Ye, & Ensel, 1999).

Although the broader demands-resources framework encompasses many resources, control and support are acknowledged as being central to most research studies (Griffin & Clarke, 2011). As such, we examine student illegitimate tasks from a demands-resources perspective through the lens of the JDC(S) model (Karasek & Theorell, 1990), in order to further understand the role of these resources as potential mitigators of strains from such tasks. Although the role of perceived control and social support in understanding illegitimate tasks has recently begun to be studied (i.e. Björk et al., 2013), no work to date has explored the *moderating* role of control and support in the illegitimate task-strain relationship. Thus, more work is needed to explore the specific boundary conditions in which illegitimate tasks pose a threat to well-being.

With regards to control, because illegitimate tasks signal insufficiency, high perceived control over such tasks may buffer the severity with which personal competence is threatened by creating a sense of power over the illegitimate task. Conversely, a lack of control may create feelings of helplessness to failure, in accordance with the SOS model (Semmer et al., 2007). For example, a feeling of uncontrollability over achievement in college (e.g. “The professors are trying to make me fail with such difficult exams”) can lead to decreased feelings of responsibility, negative affect, decreased motivation, and poor academic performance (Weiner, 1985). However, students with a high sense of perceived control report exerting more effort, having higher motivation, and having less negative emotions such as boredom and anxiety (Perry,

Hladkyj, Pekrun, & Pelletier, 2001). Thus, students who perceive high control may be less vulnerable to the threat illegitimate tasks may pose to goal achievement and to personal competence.

Hypothesis 4: Perceptions of control and task illegitimacy will interact, such that high perceived control will buffer the effects of illegitimate tasks on anxiety, emotional exhaustion, and student satisfaction.

With regards to support, we expect that high support may mitigate the threat to self-evaluation that illegitimate tasks pose. Because high support from instructors inherently conveys caring, concern, and consideration (see Caplan, Cobb, French, Van Harrison, & Pinneau, 1975), this directly competes with illegitimate tasks, which are purported to signal inconsideration, disrespect, and thoughtlessness (Semmer et al., 2015). Thus, we expect that students who feel able to seek out their instructor for help and dialog may experience less of a threat to goal achievement from illegitimate tasks, and less of a threat to self-concept via validation from instructor support experiences.

Thus, we propose that:

Hypothesis 5: Perceptions of support and task illegitimacy interact, such that high support from instructors buffers the effects of illegitimate tasks on student satisfaction, anxiety, and emotional exhaustion.

Methods

Participants and Procedure

Participants were 473 undergraduate students enrolled at three US higher education institutions: one private undergraduate college (Hope College), and two large public universities (Ohio University, and Baruch College – The City University of New York). Internal Review Board (IRB) approval for the study has been granted by all three

institutions, and by Western Michigan University as part of the dissertation. Data was collected from 2013-2015, and has already been entered into SPSS. Advertisements for participations were placed on regulated university research systems, and communicated verbally in classes. The age range of participants was from 18 to 48 years, with a mean age of 21.25 years, and a standard deviation of 3 years. Fifty-three percent are women; 49.4% are Caucasian, 4.2% are African American, 32.3% are Asian, 9.3% are Hispanic, and the remaining 4.2% are of other ethnic groups (no participants are Native American). Participants provided informed consent prior to beginning the survey. Surveys were administered either through an anonymous online data collection server, or through anonymous paper and pencil completion. A small amount of course credit was offered as an incentive. All surveys were administered at a single time point. Participants were assured of the confidentiality of their responses. Participation was voluntary.

Measures

Items from original scale instruments outlined in the following sub-sections were modified to reflect the experience of a student in higher education, rather than an employee. For all scales, response options for each item were on a 5-point scale (1 = strongly disagree, 5 = strongly agree). All scales in their original form have been validated (e.g., sufficiently high cronbach alpha) in other published studies.

Illegitimate Tasks. Illegitimate tasks were assessed with an adapted version of the 8-item Bern Illegitimate Task Scale (Semmer et al., 2015). The original scale consists of two facets, namely unnecessary task and unreasonable tasks and items were modified to suit an academic (versus work) environment. Sample items include: “Do you have aspects of school work to take care of, which keep you wondering if they exist only because your instructor wants to create work for you?”, and “Do you have aspects of

school work to take care of, which keep you wondering if they are an appropriate way to learn the material?" Two additional study-written items were included: "Do you have any aspects of school work to take care of which you believe require a more advanced knowledge or training than someone in your course should have?" (unreasonable task), and "Do you have any aspects of school work to take care of which you believe are so rudimentary that they are a waste of your time?" (unnecessary task), for a ten-item adapted scale, with 5-items for each facet. Because the items were adapted for this specific sample, a confirmatory factor analysis was conducted using MPlus 7 to ensure items loaded on the two facets as expected and reported in previous research (Semmer et al., 2015). All items loaded onto the two factors as expected, with acceptable overall model fit (CFI = .91; RMSEA = .05).

Control over Illegitimate Tasks. Control was assessed with an adapted three-item version of the Work Control Scale developed by Dwyer and Ganster (1991) to measure control over student illegitimate tasks. Items reflect perceived overall control over having to do illegitimate tasks. Sample items include: "How much control do you personally have over how much unreasonable school work you do?" and "How much is the amount of unnecessary work you have to do controllable?"

Social Support from Instructors. Social support from instructors was assessed with an adapted version of the four-item social support scale by Caplan et al. (1975), where the instructors are listed as the support source. Sample items include: "I can rely on my instructors when things get tough in school", and "It is very easy to talk with my instructors."

Anxiety. Anxiety was assessed with 5 items adapted from the scale by Parker and Decotiis (1983). Sample items include: “I have felt fidgety or nervous as a result of school”, and “School gets to me more than it should.”

Emotional Exhaustion. Emotional exhaustion was assessed with nine student-adapted items from Maslach & Jackson (1986). Sample items include: “I feel emotionally drained at college”, and “I feel fatigued when I get up in the morning and have to face another day of college.”

Student Satisfaction. Student satisfaction was assessed with 2 items adapted from the scale by Cammann, Fichman, Jenkins, and Klesh (1979). The two items are: “In general, I like being a student”, and “All-in-all, I am satisfied with being a student.”

Data Analysis

Data from self-report surveys were entered into an SPSS 21 data file. Measures for illegitimate tasks, control over illegitimate tasks, and instructor support were each mean-centered to facilitate interpretation of interactive effects (Enders & Tofighi, 2007). Main and interactive effects were examined using hierarchical linear regression analyses, and significant interactions were plotted. Variance inflation factor (VIF) statistics indicated no multicollinearity effects in any of the regression models (all VIF statistics were below 1.25), supporting the use of regression (Hair, Anderson, Tatham, & Black, 1992).

Results

Means, standard deviations, reliabilities, and correlations of study variables are shown in Table 9. Table 10 shows the results of all hierarchical linear regressions relating to hypotheses 1-5.

Table 9
Means, Standard Deviations, Coefficient Alphas (diagonal), and Correlations

Variable	Mean	SD	1	2	3	4	5	6
1. Illegitimate Tasks	2.98	0.62	(.85)					
2. Control	3.12	0.79	.02	(.83)				
3. Instructor Support	3.20	0.76	-.09*	.20**	(.80)			
4. Student Satisfaction	3.60	0.91	-.17**	.16**	.20**	(.89)		
5. Anxiety	3.13	0.89	.24**	-.08	-.09	-.11*	(.84)	
6. Emotional Exhaustion	2.99	0.83	.34**	.12	-.10*	-.26**	.58**	(.87)

Note. N=473. Coefficient alphas are on the diagonal; correlations are below the diagonal.

* $p < .05$

** $p < .01$

First, as shown in Table 9, illegitimate tasks were positively related to anxiety ($r = .24$), and emotional exhaustion ($r = .34$) and negatively related to student satisfaction, ($r = -.17$) as predicted by Hypotheses 1, 2, and 3 respectively. Furthermore, even when controlling for perceptions of control over college work and support from instructors, perceived illegitimate tasks were positively related to undesirable affective states of anxiety ($b = 0.34, p < .01$), and emotional exhaustion ($b = 0.45, p < .01$), and negatively related to student satisfaction ($b = -0.23, p < .01$), suggesting that even when control and support are statistically held equal, illegitimate tasks are accounting for variance in the focal outcomes.

With regards to interactive effects, Hypothesis 4 predicted an interactive effect between illegitimate tasks and perceived control on well-being outcomes. However, this hypothesis was not supported as perceptions of illegitimate tasks did not interact with perceived control, thus failing to support Hypothesis 4. See Table 10.

Table 10

Summary of Hierarchical Regression Models: Student Satisfaction, Anxiety, and Emotional Exhaustion

	Student Satisfaction	Anxiety	Emotional Exhaustion
	<i>B</i>	<i>B</i>	<i>B</i>
Step 1			
Illegitimate Tasks	-0.23**	0.34**	0.45**
Control	0.16*	-0.08	-0.07
Support	0.18**	-0.07	0.02
	$\Delta R^2 = .08^{**}$	$\Delta R^2 = .07^{**}$	$\Delta R^2 = .12^{**}$
	$\Delta F(3, 461) = 12.91^{**}$	$\Delta F(3, 462) = 11.12^{**}$	$\Delta F(3, 457) = 21.29^{**}$
Step 2			
Illegitimate Tasks*Control	0.05	0.05	0.04
Illegitimate Tasks *Support	-0.18*	-0.15*	-0.18*
	$\Delta R^2 = .01^\dagger$	$\Delta R^2 = .01^*$	$\Delta R^2 = .01^*$
	$\Delta F(6, 458) = 2.40^\dagger$	$\Delta F(6, 459) = 1.63$	$\Delta F(6, 454) = 5.27^*$

$^\dagger p < .10$

* $p < .05$

** $p < .01$

With regards to interactive effects, hypothesis 4 predicted an interactive effect between illegitimate tasks and perceived control on well-being outcomes. However, this hypothesis was not supported as perceptions of illegitimate tasks did not interact with perceived control, thus failing to support hypothesis 4. Hypothesis 5 predicted an interactive effect between illegitimate tasks and support from instructors. As expected, perceived illegitimate tasks and support from instructors interacted in the prediction of all three outcomes, supporting hypothesis 5; however, results did not conform to the expected direction only for student satisfaction. Specifically, perceptions of illegitimate tasks and support interacted on student satisfaction ($\beta = -.18, p < .05$), such that support was a buffer only for those perceiving task illegitimacy to be low (that is, reporting the experience of infrequent illegitimate task assignments). Simple slope analyses indicated that at $\pm 1SD$ (standard deviation) of support, illegitimate tasks had a non-significant relationship with satisfaction for students who reported low support ($t = -.58, ns$), but a significant, negative relationship with satisfaction under conditions of high support ($t = -3.98, p < .05$; see Figure 4). For the other two well-being outcomes, however, results were as expected. Perceived illegitimacy of tasks and support from instructors interacted to predict anxiety ($\beta = -.15, p < .05$) and emotional exhaustion ($\beta = -.18, p < .05$). That is, for those perceiving a high degree of task illegitimacy, anxiety and emotional exhaustion was mitigated when support from instructors was perceived to be high, in line with expectations (see Figures 5 and 6). At $\pm 1SD$ of support, illegitimate tasks had a non-significant relationship with anxiety and emotional exhaustion for students who reported high support ($t = 1.75, ns; t = 1.80, ns$), but a significant, positive relationship with anxiety under conditions of low support ($t = 5.88, p < .05; t = -1.96, p < .05$; see Figures 5 and 6).

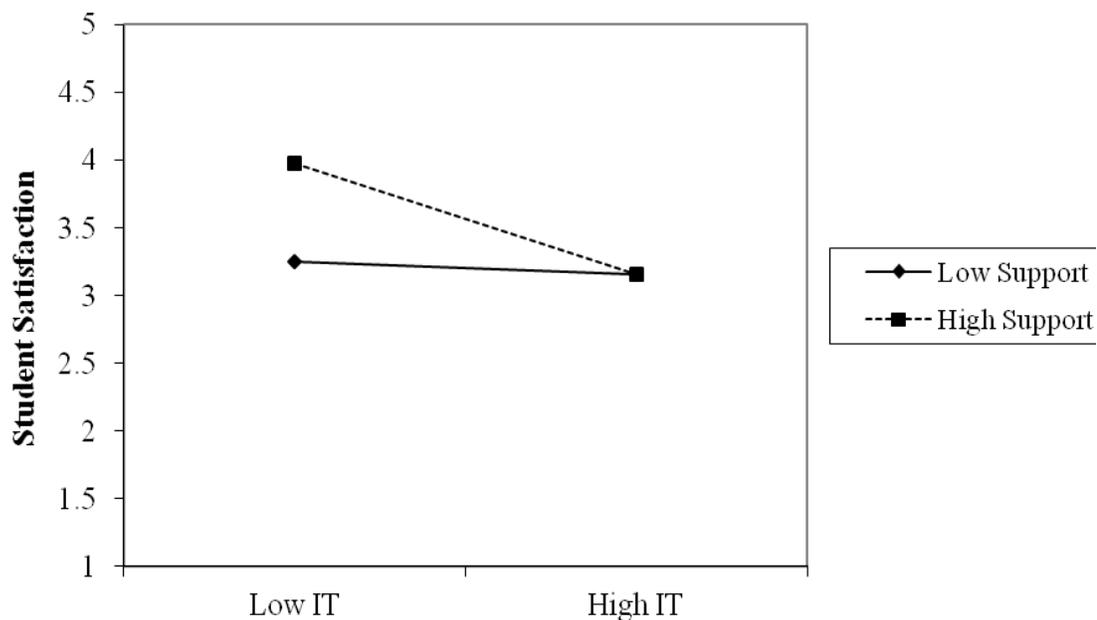


Figure 4. Interaction between perceived illegitimate tasks and instructor support on student satisfaction

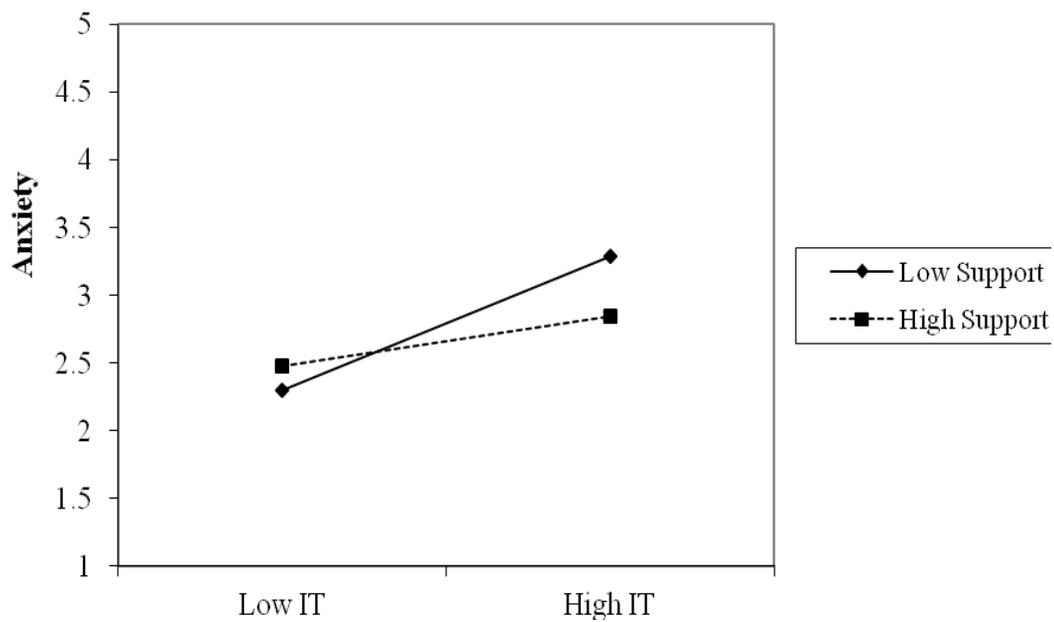


Figure 5. Interaction between perceived illegitimate tasks and instructor support on anxiety

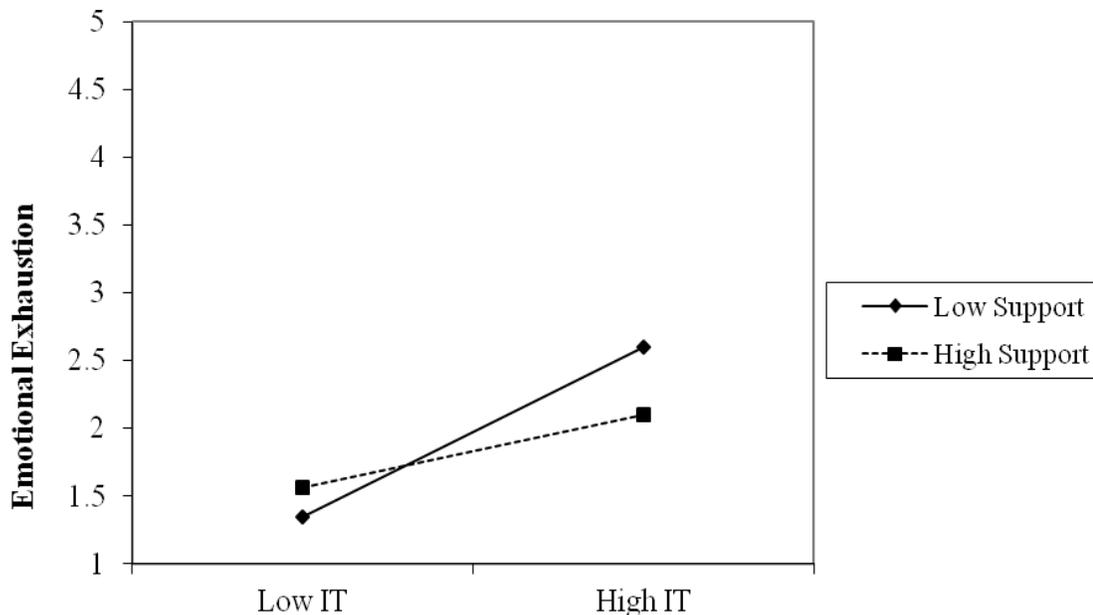


Figure 6. Interaction between perceived illegitimate tasks and instructor support on emotional exhaustion

Discussion

The primary aims of this study were two-fold. The first was to broaden existing knowledge on illegitimate tasks beyond workplace contexts by exploring whether this stressor was also negatively related to psychological well-being in higher education students. The second aim was to align the concept of illegitimate tasks with the JDC(S) model (Karasek & Theorell, 1990) by repositioning illegitimate tasks as the demand stressor and examining possible moderating effects of control and support on the linkage with strain.

Results indicated that perceptions of illegitimate tasks in students are related to degradations in student satisfaction, and increases in anxiety and emotional exhaustion. These results are in line with the SOS framework and previous work on illegitimate tasks

in employee samples (Eatough et al., 2015; Semmer et al., 2010; Semmer et al., 2015), suggesting that illegitimate tasks may also be a relevant stressor that affects the college student population. Furthermore, this lends support for the broader theoretical notion of illegitimate tasks as an identity-threatening stressor which may be translatable to various life-roles (e.g., beyond the workplace).

In addition to finding illegitimate tasks to be related to satisfaction, anxiety, and emotional exhaustion in higher education students, our results speak to two interesting new findings regarding the role of control and support resources as possible mitigators of strain associated with illegitimate tasks. First, we hypothesized that control would buffer relationships between illegitimate tasks and the three outcomes of interest. However, our findings did not support this expectation. The absence of interactive effects of control for *any* of the three outcomes of interest (e.g., anxiety, emotional exhaustion, and student satisfaction) suggests that if students perceive assigned tasks to be illegitimate, affording control over how to complete them may not increase satisfaction, or reduce the possible onset of anxiety or emotional exhaustion. One explanation for our findings may be that the unique identity threatening nature of illegitimate tasks is not congruent with conceptualizations of role-related demands which dominate research on the JDC(S) model (e.g., role overload, Karasek, 1979). As such, control resources that are hypothesized by its creators to buffer stress from highly demanding work may not in fact be beneficial to tasks that are perceived to be *illegitimate*, as opposed to simply additional workload. Specifically, in the context of college students, stress from assigned tasks which are perceived to be illegitimate (e.g., in the context of stated higher education learning outcomes) might not be alleviated if students are offered control over how to accomplish these tasks. That is, students may simply believe that they should not have to

complete them, so control over how to do so may be of little benefit. A second possibility is that multiplicative effects of control weren't found because in over published studies of the JDC(S) model, only a fraction have found buffering effects of control on relationships between role-related demands and strain (see Häusser et al., 2010; Kain & Jex, 2010; Van der Doef & Maes, 1999). However, further examinations of possible moderating effects of control on illegitimate task-strain relationships in higher education student settings are necessary to forming recommendations.

A second interesting finding relates to the role of instructor support as a buffer of illegitimate task relationships with strain. As with control, we expected that support from supervisors would buffer the negative effects of stress on student well-being, as put forth in the JDC(S) model. Results supported this notion with respect to anxiety and emotional exhaustion. Specifically, levels of anxiety and emotional exhaustion in students were buffered under conditions of high instructor support. This indicates that exhibiting support as an instructor may be effective to at least prevent an increase in anxiety and emotional exhaustion for students, should illegitimate tasks be unavoidable. On the other hand, if a student doesn't feel supported, they may more likely just see the illegitimate task as a barrier, hurdle, or purposeful challenge that they are left to navigate independently. In this case, a sense of helplessness might contribute to heightened anxiety and emotional exhaustion. Therefore, in contrast to our findings regarding control, the assertions made by Karasek and Theorell (1990), and others (e.g., Kain & Jex, 2010) that support within the environment acts as a mitigator to strains, was supported in regards to illegitimate tasks and negative affective states of anxiety and emotional exhaustion in this study.

In contrast to these expected results for anxiety and emotional exhaustion, we found an unexpected pattern for interactive effects between task illegitimacy and support from instructors on student satisfaction. Specifically, our findings suggest that positive effects of high levels of instructor support on student satisfaction depart when tasks are perceived to be illegitimate. Thus, steps to create a positive, supportive atmosphere may amount to nothing if the instructor also frequently assigns tasks which are perceived to be illegitimate. This finding is notable as it indicates the power of illegitimate task assignments to permeate and override positive aspects of a student's experience with a supportive instructor support. Again, further research is needed to better understand this relationship, especially given that as this finding was contradictory to expectations. However, as a starting point, our findings indicate a more complex dynamic between illegitimate tasks, support, and student satisfaction than previously thought.

Implications for Higher Education Student Settings

We believe that our results have a number of implications for higher education student settings. First, task illegitimacy appears to be a legitimate stressor in higher education settings. Thus, attempting to identify whether such tasks exist (or may be perceived to exist by students) could be worthwhile for student well-being. Second, resources may be called upon to ameliorate negative the effects of illegitimate tasks (e.g., Hofoll, 2001). However, there appear to be distinctive qualities of different resources in doing so. Illegitimate tasks are stressful because of the social messages contained within a task assignment that threaten the identity of an individual in a given role or position (Semmer et al., 2015; Semmer et al., 2007). Thus, we suspect that *social* signals that counter such negative messages, such as feeling supported by supervisory figures (in this

case, instructors), are a more effective buffer than resources which do not necessarily carry any social value information, such as perceived control.

To illustrate this point, if a student feels they have been given “busy work” which is a waste of their time and they should not have to do, the actual task itself is not stressful; rather it is the principal of the task, the message that task assignment sends, that can degrade well-being. It is a signal of a lack of consideration or respect on the part of the instructor that makes this task capable of creating negative affective states. Thus, having control over a due date or whether to work in a group or independently on this example of a “busy work” task would not relieve the sense of degradation. However, our data suggest that if the student feels supported by their instructor, this resource can indeed make a meaningful difference—at least for anxiety and emotional exhaustion. We suspect the reason for this is because support from the instructor carries counteractive social information that allows the student to feel they have a voice, to feel cared about, to seek information and assistance, and to have reliance on their instructor, which is incompatible with --and thus counter to-- the message of an illegitimate task. Conversely, support from instructors did not mitigate detriments to student satisfaction. This suggests that the resource of support, while clearly more helpful than control, is not a ubiquitous buffer against illegitimate tasks; and may be more helpful for affective (rather than cognitive) aspects of student well-being.

Limitations and Future Research

We acknowledge several limitations of the present study. First, our study is cross-sectional, which limits inferences. Cross-sectional studies have been widely criticized in organizational literature for allowing reverse- or reciprocal-causation (e.g., Spector, 2006; Spector & Brannick, 1995). Moreover, an inherent danger of reciprocal causation

is that impaired psychological well-being can impact an individual's perception of the environment (cf. Dalgard et al., 2009). Although this cannot be ruled out in the present study, evidence of interactive effects of illegitimate tasks with support, and a lack thereof for control, generalize across all three outcomes, lending support for the notion that our findings cannot be purely attributed to reverse- or reciprocal-causation. Future research will benefit from using longitudinal or experience sampling designs.

Second, all measurements were self-reported thus, some concerns of common method variance are reasonable. However, as described in Spector (2006), common method variance can be overstated and study design should be based primarily on its purpose and the researcher's desired inference. Self-report is arguably the most appropriate source for measuring illegitimate tasks, as they are based in individual perception, and thus largely inaccessible to an outside observer. Self-report is appropriately matched to the measure of subjective well-being for a similar reason.

Third, the measures used in this study were adapted for the specific purposes of this study as we were using an unusual sample of college students to explore constructs typically described in employee samples. Because of this, it can only be assumed that construct validity has been preserved. However, all measures did demonstrate adequate internal consistency reliability.

Conclusion

This study examined illegitimate tasks in relation to college student satisfaction, anxiety, and emotional exhaustion. Illegitimate tasks are potentially harmful to student well-being, especially under conditions of low support from instructors. Thus, instructors and administrators are advised to be aware of such tasks in individual teaching and

broader curriculum planning as the consequence may be undesirable negative outcomes for students.

Instructor support may be an effective protective factor against the damage to emotions illegitimate tasks are linked to. As such, high levels of support through open-door policies, solicitation of feedback, and rapport building may be valuable efforts to prevent increase in anxiety and emotional exhaustion if and when illegitimate tasks are unavoidable. However, instructor support will not prevent decrements to student satisfaction with college if students perceived illegitimate tasks. Thus, if illegitimate tasks are unavoidable, support from instructors may be more of a measure to band-aid affective damage, than to protect satisfaction levels.

Moreover, our findings suggest that strain from illegitimate tasks in higher education settings cannot be combated by offering students control over how to complete them, because college students generally have associated anxiety, emotional exhaustion, and reduced satisfaction with school regardless of perceived control over the situation. Thus, efforts to increase control for the purposes of alleviating the negative effects of illegitimate tasks may be a poor investment of resources.

In sum, illegitimate tasks may be important to recognize not only in employee samples, but also in the student population, given the identity threatening nature of such tasks (Semmer et al., 2015; Thoits, 1991). Our research has taken the first step to broaden understanding of task illegitimacy and its relationships with negative outcomes beyond the workplace, to other life roles. Specifically, a better understanding of the effects of illegitimate tasks on students is meaningful for the protection of their individual well-being, and to furthering understanding of the context of task assignment in higher education settings.

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CHAPTER V: OVERALL CONCLUSION

The purpose of this dissertation was to provide a review, analysis, and extension of the jobs demands-control (-support (JDC(S)) model. A three-article format was chosen in order to separately provide an updated review of literature on the model, and two specific extensions to previous research.

Article one summarized the history of the model, and provided an up-to-date review of literature due to progression in research on the model since the last published reviews (see Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Kain & Jex, 2010). Specifically, the article summarized recent research since the aforementioned previous reviews that has attempted to address several criticisms of the model, such as using different types of measures (e.g., subjective *and* objective) in a single study; adopting an experimental or quasi-experimental (versus non-experimental) design; adopting a longitudinal rather than cross-sectional design; and accounting for individual difference variables. Finally, the need to examine the model's major hypotheses with new or alternative conceptualizations of demands, as well as several additional issues to be addressed in future research were outlined.

Article two meta-analyzed 141 studies ($N_{\text{(Individuals)}} = 145,424$) of the JDC(S) model from its 1979 inception to present. This study added to previous meta-analytic investigation of demand-control-support interrelationships (see Luchman & González-Morales, 2013) by examining gender, national culture, and occupation as moderators of these interrelationships, and also relationships between each of these three dimensions of the model and job satisfaction and emotional exhaustion, which are the most examined forms of well-being and strain throughout the history of the model (Häusser et al., 2010). Results showed that gender moderated the demand-control relationship, such that on

average women had a stronger negative demands-control relationship than men. Additionally, a marginally significant moderating effect was found whereby males had a smaller negative demands-job satisfaction relationship than females. Furthermore, some form of significant moderation effects of national culture and occupation were found for every DCS interrelationship, and relationship with job satisfaction and emotional exhaustion.

Finally, article three examined whether moderating effects of control and support resources on demand relationships with well-being and strain -- as hypothesized by the JDC(S) model (Karasek, 1979; Karasek & Theorell, 1990) -- were applicable to *illegitimate tasks*, which is a relatively new concept of job demands (Semmer, Tschan, Meier, Facchin, & Jacobshagen, 2010). Reports from 473 US college students showed that perceived control did not moderate relationships with well-being. However, perceptions of support from instructors buffered negative effects of illegitimate tasks on anxiety and emotional exhaustion, with students perceiving higher levels of support reporting lower levels of these strains. Additionally, contrary to expectations results showed that positive effects of high levels of instructor support on student satisfaction departed when tasks were perceived to be illegitimate. Thus, more research is needed to fully comprehend the nature of illegitimate tasks as an alternative conceptualization of job demands in the JDC(S) model.

Links between the Three Articles

The three articles that comprise this dissertation are directly linked together in so far that each one addresses concerns or calls for future research made by Kain and Jex (2010) in their comprehensive review of the model. Article one updates this review by detailing studies that have addressed their concerns. Articles two and three offer new

empirical research based on their calls (and those of others, e.g., Häusser et al., 2010) for meta-analytic investigation of the model and for new conceptualizations of job demands to be examined, respectively.

Beyond response to Kain and Jex's (2010) calls for future research, the three articles are linked by their shared focus on the need to extend the JDC(S) model beyond its traditional dimensions. Specifically, article one reviews recently findings that individual difference variables such as proactive personality, self-efficacy, active coping, external locus of control, hardiness, emotional stability, and personal initiative, all moderate possible interactive effects between demands, control, and support as they relate to well-being and strain outcomes. Moreover, findings of moderation for gender, national culture, and occupation in DCS interrelationships, and relationships with well-being and strain in article two further highlight the need to consider the role individual and/or environmental differences in research of the model. Finally, moderation effects of support on relationships between illegitimate tasks and well-being and strain outcomes in article three suggests that scholars and practitioners should be aware of such possible effects beyond traditional dimensions of demands. That is, moderating effects could be missed, or overlooked, in a study that fails to account for alternative conceptualizations of job demands.

Conclusion

In summary, stress is not a single event but a process involving appraisal, response, and attempts to cope with and manage stressors in order to meet goals (Sulsky & Smith, 2005). Throughout the history of work stress research, over a hundred stress theories have been used to model relationships between stressors and various physiological and psychological strains. Many of these theories share a common focus on

employees' desire for homeostasis with the work environment in order to facilitate manageable work (Griffin & Clarke, 2011). Specifically, concepts of fit and discrepancy between job demands and coping resources have been central to conveying this homeostasis (or lack thereof). Within this paradigm, the JDC(S) model (Karasek & Theorell, 1990) with its emphasis on main and multiplicative effects of demands, control, and support on well-being and strain has been dominant for nearly four decades. However, although traditional conceptualizations of demands, control, and support appear to be synonymous with work stress (Griffin & Clarke, 2011; Sulsky & Smith, 2005), they arguably represent manifest kernels of this broad and complex phenomenon, rather than exhaustive explanations of it.

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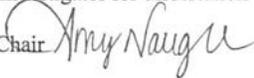
WESTERN MICHIGAN UNIVERSITY



Human Subjects Institutional Review Board

Date: November 24, 2015

To: Joseph Kretovics, Principal Investigator
Marcus Fila, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair 

Re: HSIRB Project Number 15-11-31

This letter will serve as confirmation that your research project titled "Psychological Well-being in Higher Education Students: The Role of Perceived Illegitimate Tasks" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., ***you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study."*** Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: November 23, 2016

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