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Fitting Flow: An Analysis of the Role of Flow Within a Model of Occupational Stress

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Running head: THE ROLE OF FLOW IN A MODEL OF OCCUPATIONAL STRESS

Fitting Flow: An Analysis of the Role of Flow Within a Model of Occupational Stress

By

Jeffrey Alan Dahlke

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THE ROLE OF FLOW IN A MODEL OF OCCUPATIONAL STRESS

Fitting Flow: An Analysis of the Role of Flow Within a Model of Occupational Stress

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THE ROLE OF FLOW IN A MODEL OF OCCUPATIONAL STRESS

FITTING FLOW: AN ANALYSIS OF THE ROLE OF FLOW WITHIN A MODEL OF OCCUPATIONAL STRESS

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Abstract

Positive psychologists and occupational health psychologists have been studying similar topics for many years, but only recently has the construct of flow been incorporated into stress research. There is a great deal of overlap between the theories on stress and flow, with flow seeming to fit very nicely within the domain of stress as an analogue to eustress. In the limited studies in which stress and flow have been investigated together, researchers' results have shown promise for the integration of these topics into a common model. In this study, survey responses from 509 adult workers were analyzed to test how flow might fit within a model of occupational stress. The survey included measures of flow, job resources, challenge job demands, hindrance job demands, and occupational strains. The results supported bivariate relationships between flow and the other categories of measured variables. Flow moderated the relationship between workload and burnout, partially mediated the relationships between job resources and the strain outcomes of burnout and job satisfaction, and partially mediated the relationships between hindrance demands and the strain outcomes of burnout and satisfaction. Flow did not function as a moderator or as a mediator in predicting physical symptoms. The findings, implications, and strengths and limitations of this study are described and suggestions for future research are discussed.

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CHAPTER I

Introduction

In the latter part of the 20th century, two new areas of focus emerged within psychology: occupational health psychology (OHP) and positive psychology. While these sub-disciplines developed separately, they are highly compatible with one another due to their common focus on human well-being. In many ways, OHP and positive psychology can be viewed as opposite approaches to studying the same set of outcomes. On the one hand, OHP has its roots in the traditional medical approach to disease, focusing on the negative health outcomes of work as symptoms to be prevented or treated, preferably through the use of primary preventions in which the causes of strains are eliminated (NIOSH, 1988). On the other hand, positive psychologists have argued that well-being is more than just the simple absence of ailments or threats to one's health. Researchers in this camp have focused on optimal experiences and the factors that contribute to a fulfilling life. In doing so, positive psychologists have gone beyond studying the avoidance of negative psychological states and, instead, have explored the nature of positive psychological states (Seligman & Csikszentmihalyi, 2000). One of the most widely known positive states is called *flow*. Flow, in its most basic conceptualization, occurs when one is completely absorbed in an activity and is intrinsically motivated by that activity

(Csikszentmihalyi, 1975). Flow is a pleasant experience in leisure activities and creative endeavors, but also has relevance to job design and the study of workers' enjoyment, satisfaction, and engagement on the job (Csikszentmihalyi, 2004).

Both OHP and positive psychology deal with demands and resources. The state of flow represents a balance of high challenge and high skill (Csikszentmihalyi, 1998) and the experience of stress represents an excess of demands relative to the resources available for dealing with those demands (Bakker & Demerouti, 2007; Hobfoll, 1989). Flow and stress also have similar underlying physiological processes in terms of the nervous system activity and hormones involved during the experience of each (Peifer, 2012). This complementarity between the two topics has been manifested in recent studies in which researchers examined flow as a contributor to the relationship between stressors and strains. This new stream of research combining stress and flow serves as the inspiration for the present study and is the primary area of research to which this investigation is meant to contribute.

In introducing the topics of interest in the present study, this review begins with treatments of job stress and flow as separate research areas before examining the literature that unites them. The relevant theoretical and empirical research on both job stress and flow will be summarized in order to describe the relationship and similarities between the two. The combined research literature on stress and flow will then be synthesized in order to lay the foundation for the present study.

Job Stress

The job stress theory that forms the basis for the present study is the job demands-resources model (JD-R). Demerouti, Bakker, Nachreiner, and Schaufeli (2001) originally proposed the JD-R model as a way to flexibly examine the work-related factors that predict strain outcomes. The JD-R model has been gaining popularity in the occupational stress literature and has been applied to the explanation of such varied outcomes as burnout (e.g., Bakker & Demerouti, 2007; Brauchli, Schaufeli, Jenny, Füllermann, & Bauer, 2013; Demerouti et al., 2001), job engagement (e.g., Brauchli et al., 2013; Brough, Timms, Siu, Kalliath, O'Driscoll, Sit, Lo, & Lu, 2013), withdrawal behaviors (e.g., Knudsen, Ducharme, & Roman, 2009), and musculoskeletal symptoms (e.g., Pekkarinen, Elovainio, Sinervo, Heponiemi, Aalto, Noro, & Finne-Soveri, 2013). The three primary classes of variables in the model (i.e., job resources, job demands, and strains) will be introduced in turn before reintegrating them into their overarching theoretical framework.

Job resources. Job resources have been a component within models of occupational stress for several decades, going back at least as far as Karasek's demand-control model (DCM; 1979). In the DCM, Karasek proposed that the amount of decision latitude—or autonomy, as it is more commonly known—available to a worker is a key factor in understanding how strain outcomes develop and also how learning and growth occur on the job. The DCM became a popular model, but its focus on a single resource was the primary impetus for researchers to create the JD-R model.

In the context of the JD-R model, Bakker and Demerouti (2007) defined job resources as the “physical, psychological, social, or organizational aspects” of one’s job that have a function in achieving job goals, negating job demands, reducing the stress-related costs of the job, and/or are conducive to “personal growth, learning, and development” (p. 312). Thus, resources include anything that contributes to one’s work experience in a beneficial way. These job resources are critical to the *motivational process* proposed in the JD-R model (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004; Schaufeli & Taris, 2014; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). The motivational process is the proposed means by which job resources lead to positive outcomes (e.g., better performance and greater satisfaction) through the intervening experiences of less strain and greater well-being (Schaufeli & Taris, 2014).

Resources have been of particular interest in stress research since Hobfoll introduced the Conservation of Resources model (COR; 1989). Within the COR model, resources are defined as “those objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions, or energies” (Hobfoll, 1989, p. 516). With these resources in mind, Hobfoll theorized that psychological stress could be described in terms of net loss of resources, threat of losing resources, or lack of gains following the investment of resources. Individuals try to “spend” as few of their resources as possible and will strive to preserve these resources in the face of a potential loss. In the COR model, when resources are threatened or a loss actually occurs, the experience of stress begins.

In both the COR and JD-R models, greater amounts of resources predict more favorable stress outcomes (i.e., fewer strains) for the individual. Before moving on to the discussion of job demands, it is worth noting that in the COR model, Hobfoll did not necessarily include the concept of demands and, instead, discussed similar ideas with reference only to resources (1989). The threat of loss or actual loss of resources in the COR model is analogous to the presence of greater job demands, fewer resources, or a combination of both in the JD-R model.

Job demands. In Karasek's DCM (1979), job demands were defined as purely psychological factors of a work environment (Sulsky & Smith, 2005). His limitation of demands to the psychological aspects of work is somewhat odd, given that the DCM was meant to study a broad range of outcomes, psychological or otherwise. He did, however, include physical demands in his Job Content Questionnaire (Karasek, Brisson, Kawakami, Houtman, Bongers, & Amick, 1998). To correct for this narrow distinction in certain iterations of the DCM, the definition of demands was broadened in the JD-R model. In the JD-R model, job demands are "physical, psychological, social, or organizational aspects that require sustained physical and/or psychological effort or skills and are therefore associated with certain physiological and/or psychological costs" (Bakker & Demerouti, 2007, p. 312). Because of the sustained exertion or effort-consuming hassles that characterize job demands, these aspects of work can have negative impacts on well-being and can increase the degree to which strains are experienced. This is known as the *health impairment process* within the JD-R model, which is the counterpart to the motivational process (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004;

Schaufeli & Taris, 2014; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). The health impairment process describes how job demands can lead to negative outcomes (e.g., health problems) through the intervening experience of greater strain (Schaufeli & Taris, 2014).

Job demands are often stressors, but not always – whether or not they are perceived as stressful depends largely on the perceptions of the experiencing individual. In this way, job demands can be viewed through the lens of Lazarus and Folkman’s transactional model of stress and coping (1984; 1987), where a given experience is appraised as a *harm*, *threat*, *challenge*, or *benefit*, depending on the individual. When an individual appraises a job demand as a harm or threat, it takes on the qualities of a stressor and poses risks to one’s well-being. Demands that are appraised as challenges, however, do not seem to necessarily function as stressors. In fact, while indeed demanding, challenges represent opportunities for mastery, which is a positive and rewarding experience (Lazarus & Folkman, 1987).

Beyond the four appraisals identified by Lazarus and Folkman (1984; 1987), a broader distinction exists in which stressors are assigned to one of two categories based on the type of appraisal that an individual makes: *hindrances* and *challenges* (LePine, Podsakoff, & LePine, 2005). Hindrances include harms and threats and, because of their potential for detrimental impacts, function as stressors in the more commonly used sense of the word. Hindrance stressors are negatively related to performance (LePine et al., 2005), job satisfaction, and organizational commitment, but positively related to turnover intentions, turnover, and withdrawal behaviors (Podsakoff, LePine, & LePine, 2007). Challenge stressors, on the other hand, have

the opposite relationships with the aforementioned constructs and appear to be beneficial (LePine et al., 2005; Podsakoff et al., 2007); challenges in this categorization are the same as challenges in Lazarus and Folkman's (1987) transactional model. Those aspects of a job that are not appraised as harms, threats, or challenges would, by principle of exclusion, be considered benefits. At worst, these "benefits" could simply be benign; however, at their best, they could be job resources.

Taking a COR-model perspective, one can imagine job demands as the aspects of work that threaten or drain an individual's resources. Demands may be differentially present or problematic depending on one's conditions (e.g., role in organization and seniority level), they may be experienced differently or have different amounts of impact depending on personal characteristics (e.g., hardiness and resilience), and may drain or be offset by different types of energies (e.g., time and skill; Hobfoll, 1989). This interplay between demands and resources is well captured by the JD-R model, which can largely accommodate the propositions of the COR model.

Strains. Strains represent a category of variables that includes the cognitive, affective, physiological, and behavioral outcomes of the stress process (Karasek, 1979). Stated more simply, strains are undesirable changes that take place in an individual as the result of exposure to stressors (Sulsky & Smith, 2005). Job strains occur most often when job demands are high and/or job resources are low – and sometimes when there is an interaction between the two (Bakker & Demerouti, 2007; Karasek, 1979). Some of the most commonly measured strain variables

include burnout, happiness, organizational commitment, physical health, psychological health, and performance (Schaufeli & Taris, 2014). In addition to greater levels of negatively valenced constructs (e.g., burnout), low levels of positively valenced constructs (e.g., happiness and performance) are also considered strains.

The job demands-resources model. Because of the versatility and flexibility of the categories of variables used in the JD-R model, the model is widely applicable across diverse positions and occupations (Schaufeli & Taris, 2014). The JD-R model is an expansion upon the DCM proposed by Karasek (1979). In the DCM, job demands were treated much as they are in the JD-R model (i.e., as a collection of variables representing a latent construct), but there was only one job resource of interest: autonomy (Karasek, 1979). The JD-R model increases the applicability of Karasek's framework by broadening the scope of job resources to include other variables that assist with the achievement of work. This broader usage of job resources in the JD-R model allows researchers to more accurately model the complexities of stress in a given work environment. Rather than restricting their research focus to a finite group of variables, the JD-R model permits researchers to include any relevant resources (Bakker & Demerouti, 2007; Bakker, van Veldhoven, & Xanthopoulou, 2010; Schaufeli & Taris, 2014). Because job demands and resources can be common across jobs or specific to a particular type of job, they provide a great deal of flexibility in building relevant models of stress for different contexts. In their critical review of the JD-R model, Schaufeli and Taris (2014) pointed out that this flexibility is not always a benefit of the model. The freedom for

researchers to include whichever demands and resources they deem important has resulted in a lack of standardization for the JD-R model. There is a great deal of inconsistency in the number and types of variables measured in studies based on the same underlying framework.

The JD-R model is also flexible from an analytical standpoint. It allows for testing the direct effects of job demands and job resources on strains, while also permitting the examination of buffering effects (Bakker & Demerouti, 2007) or mediated relationships (Schaufeli & Bakker, 2004; Schaufeli & Taris, 2014). When tested, interactions are often the relationships of primary interest in a study, but the JD-R model can also be used without moderated analyses – and it often is. For instance, in the first usage of the model by Demerouti et al. (2001), the researchers used the JD-R framework to test for direct effects of job demands and job resources on exhaustion and disengagement, respectively. Demerouti et al. (2001) used the JD-R model to test different predictors of the exhaustion and disengagement factors of burnout and their proposed model fit the data well. They found that job demands were positively related to exhaustion, while job resources were negatively related to disengagement. The choice to not test interaction effects between demands and resources was a deliberate one by Demerouti et al. (2001) due to the lack of previous evidence for such interactions in predicting burnout. Researchers of subsequent studies, however, have investigated these interactions and found significant results.

One example of these interactive effects comes from Bakker, Demerouti, and Euwema (2005), who tested interactions between job demands and job resources in

predicting workers' scores on burnout's three dimensions of emotional exhaustion, cynicism, and professional efficacy. Rather than modeling job demands and job resources as latent variables, the authors tested specific pairings of demands and resources in separate multiple regression models. Bakker et al. (2005) found support for interactions between job demands and resources in predicting emotional exhaustion and cynicism, but not in predicting professional efficacy. The use of moderated analyses in the JD-R model allows researchers to detect buffering effects of job resources in the relationships between job demands and strains, above and beyond main effects (Bakker et al., 2005; Bakker & Demerouti, 2007). Scholars have used these types of interactions to reach a more nuanced understanding of how demands and resources function as predictors of strains.

The differences in research strategies between the studies by Demerouti et al. (2001) and Bakker et al. (2005), which were otherwise conceptually similar, are demonstrative of the flexibility of the JD-R model. First, as mentioned earlier, it allows for the use of whichever job demands, job resources, and strains are relevant to the occupational group being studied and/or the context of the research study. Second, it allows for demands, resources, and strains to be modeled either collectively as latent variables (i.e., in structural equation models) or separately as different observed variables (i.e., by creating a separate regression model for each strain-based dependent variable). Third, it allows for testing main effects, interactions, and/or indirect effects, as called for by the particular hypotheses being tested. Fourth, the structural flexibility of models tested using the JD-R framework permits the inclusion of other variables that are of interest to the researcher, such as

mediators or moderators that were not specified in other applications of the model. While both of the example studies described above were cross-sectional in nature, a fifth aspect of flexibility is the possibility for using the JD-R model as the basis for multi-wave longitudinal studies. Together, these advantages of the JD-R model make it highly adaptable and suitable for use in a variety of different circumstances.

The JD-R model underwent a conceptual revision by Schaufeli and Bakker (2004) for use in one of their studies. It was in this study that the model's motivational and health impairment processes were described for the first time. The JD-R model was also expanded and the linkages between its components were elaborated. This revision clarified the model's proposed mediated relationships and also gave the JD-R model a positive psychological orientation by including the motivational process, which predicts that resources lead to positive outcomes through lower burnout and greater well-being (Schaufeli & Taris, 2014). It is worth mentioning that interaction effects were not explicitly included in this rendition of the model. Schaufeli and Taris (2014), in their review of the JD-R, noted that significant interactions between demands and resources (i.e., a buffering effect) have not been detected consistently, so moderated relationships are not as squarely at the heart of the JD-R model as they were for the DCM. Following this revision, however, researchers have continued to test for moderated relationships and have found them (e.g., Bakker et al., 2005). For this investigation, the JD-R's dual-process orientation provides a way in which to combine both strain outcomes and positive psychological experiences into a single framework.

Researchers have found the JD-R model to be useful in studying many different samples from different countries, cultures, and job types (Schaufeli & Taris, 2014). Results have been consistent across these samples, with job demands and job resources functioning as predictors of similar outcomes across settings.

Flow

Flow as a general construct. Flow is a psychological state that represents an *optimal* or *peak* experience – a situation in which one is completely immersed in an enjoyable activity in which one’s actions seem to occur effortlessly (Bakker, 2008; Csikszentmihalyi 1975; Csikszentmihalyi, 1998). The authors of many studies have identified several characteristics of the subjective experience of flow. These characteristics include (a) intense focus, (b) merging of one’s actions and one’s awareness of the situation (i.e., effortlessness), (c) refraining from self-consciously reflecting on one’s performance during the activity, (d) a sense of personal control over the activity and/or situation, (e) distortion of the way in which one experiences the passage of time, and (f) intrinsic motivation (Nakamura & Csikszentmihalyi, 2005). The intrinsically rewarding aspect of flow is often described using the term *autotelic*, which is derived from Greek and literally means *self-goal* (Csikszentmihalyi, 1975; Csikszentmihalyi, 2008). This term quite succinctly captures the nature of intrinsic motivation: A flow-promoting activity is often done for its own sake, so it is truly a goal in and of itself, without the pursuit of goals that exist outside of the activity.

There are three important facilitating factors of flow: (a) a personally challenging activity, (b) clear goals, and (c) immediate feedback about progress

(Nakamura & Csikszentmihalyi, 2005). The challenge element of flow-promoting activities includes both the perceived challenge level of the task (i.e., the personal level of difficulty for the individual) and one's perceived skill at performing the task (Csikszentmihalyi, 1998). Together, the levels of perceived challenge level and perceived skill predict an individual's psychological state while performing the activity in question. In particular, the combination of high challenge and high skill is associated with the experience of flow. The facilitating conditions of clear goals and feedback, combined with the autotelic experience, help to align flow with other models of intrinsic motivation – particularly Ryan and Deci's (2000) cognitive evaluation theory (CET). According to CET, intrinsic motivation is fostered by the combination of intrinsic interest in an activity and the receipt of feedback that communicates competence information. Extrinsic rewards can wreck the autotelic experience by undermining intrinsic motivation, supplanting intrinsic interest as the driver of behavior and replacing it with the pursuit of outcomes external to the activity (Ryan & Deci, 2000).

Work-related flow. As a psychological state associated with high performance and task absorption, the value of experiencing flow at work should be apparent to employees and employers alike. At the individual level, flow is, by definition, enjoyable, promotes the experience of personal growth, and is intrinsically motivating (Csikszentmihalyi & LeFevre, 1987; Nakamura & Csikszentmihalyi, 2008). These characteristics provide substantial benefits in making work more enjoyable and rewarding. Meanwhile, at the organizational level, flow is associated with high performance. This means that organization members

who are experiencing flow with greater regularity are likely working more efficiently, being more productive, and experiencing greater happiness on the job than they otherwise would (Csikszentmihalyi, 2004). Bakker (2008) found that the enjoyment component of flow was predictive of greater in-role performance, while the intrinsic motivation component was predictive of greater extra-role performance. As such, there is some empirical evidence to support the theoretical assertions that flow is associated with better performance on the job.

Some research exists to suggest that flow might be more commonly experienced while working than while engaging in leisure activities. This is a counterintuitive finding, given flow's linkage to enjoyment and intrinsic motivation. Csikszentmihalyi and LeFevre (1989) used the experience sampling method (ESM) to collect self-report data from 107 workers throughout their daily experiences over the course of an entire week. These participants carried electronic pagers, which, when activated, would cue them to note the activity they were performing, to record their perceived levels of challenges and skills at that moment, and to rate the quality of their experience. The dimensions of experience measured were motivation, affect, potency, concentration, creativity, satisfaction, and relaxation. The results of this study indicated that flow-like experiences occurred 3 times as often at work as they did during leisure. The types of work activities that promoted flow varied across occupational groups, but there were few differences in the flow-promoting leisure activities. Workers who reported greater motivation while in flow also tended to report a higher-quality experience; they reported greater happiness, potency, satisfaction, and relaxation than their less-motivated counterparts. The researchers

noted a rather odd pattern in their results: Even though workers experienced more positive feelings at work than during their leisure activities, all occupational groups indicated that they would rather be doing something other than working. This suggests that the quality of experience might be related to the social definitions and connotations of *leisure* and *work*, rather than the realities of what people actually experience during those activities.

Rodríguez-Sánchez, Schaufeli, Salanova, Cifre, and Sonnenschein (2011) found a similar trend in their study. They used ESM to collect data about their participants' experiences of flow over the course of two weeks. The participants reported greater absorption in work tasks and greater enjoyment in non-work tasks. However, the participants reported more experiences of flow on the weekend than during the workweek. Because weekends represent time away from work for the majority of people, these findings appear to be somewhat inconsistent with the previously discussed trends in people's experiences of flow, which have indicated more flow experience at work than during free time. This incongruity merits further study, but, regardless of comparisons with leisure, the general trend indicates that flow is quite common at work.

Llorens, Salanova, and Rodriguez (2013) studied two distinctly different samples of employees in an attempt to identify the factor structure of work-related flow. In particular, they investigated whether flow fit a three-factor model consisting of enjoyment, absorption, and intrinsic interest in a sample of tile workers and a sample of secondary school teachers. They also tested whether workers who experienced both high challenge and high skill also experienced flow more often

than their counterparts whose challenges and skills were not well balanced. They compared the occupational groups, as well, to see whether secondary school teachers experienced flow more frequently than tile workers. Rather than a three-factor model, Llorens, Salanova and Rodriguez found that a two-factor model consisting of enjoyment and absorption fit the data best; intrinsic interest did not fit into the model as a factor of flow. The authors found that workers with a combination of high challenge and high skill scored significantly higher on the Work-Related Flow Inventory (WOLF) than the other three groups: *low challenge-high skill*, *low challenge-low skill*, and *high challenge-low skill*. The researchers also found that the *low challenge-low skill* group scored significantly lower on the WOLF than the other groups. These groups represented approximations the psychological states that Csikszentmihalyi (1975; 2008) proposed as the results of various combinations of challenge and skill (i.e., anxiety, relaxation, apathy, and flow). Because of this, Llorens, Salanova, and Rodriguez's (2013) method of identifying these post-hoc groups was highly relevant to the theory being tested. When occupation was treated as the independent variable, the researchers found that secondary school teachers experienced both enjoyment and absorption with significantly greater frequency than tile workers. The authors of this study provided evidence for the applicability of flow theory to the workplace. Not only did workers with balanced challenges and skills experience flow more often regardless of their occupation, but workers in the occupational group with a more enriched job (i.e., teachers) experienced flow more frequently than workers with a less enriched job (i.e., tile workers).

Flow as an extension of the Job Characteristics Model. The construct of flow includes a more specific type of intrinsic motivation than other theories because flow defines intrinsic motivation in terms of a particular type of experience. Despite this more specific definition of intrinsic motivation, there are clear parallels between flow and other models of motivation. Perhaps the most prominent among these similar models is Hackman and Oldman's (1975) job characteristics model (JCM). Flow has many aspects in common with the JCM, but also addresses aspects of the work experience that the JCM does not.

The JCM was created as a method for assessing the degree to which jobs are enriched (Hackman & Oldham, 1976). The JCM consists of five job characteristics: (a) skill variety, the number of different skills utilized in a position; (b) task identity, the degree to which a position is responsible for the completion of a complete process or product; (c) task significance, the importance of a position with regard to the amount of impact it has on the lives of others; (d) autonomy, the level of decision latitude given to the worker; and (e) feedback from the job itself, the extent to which the workers are able to understand how well they are doing from simply performing their duties (Hackman & Oldham, 1975). These five characteristics are linked with three critical psychological states that result from the job: (a) experienced meaningfulness, the result of skill variety, task identity, and task significance; (b) experienced responsibility, the result of autonomy; and (c) knowledge of results, the result of feedback (Hackman & Oldham, 1975). Hackman and Oldham argued that a stronger presence of each of these job characteristics leads to stronger experiences of the critical psychological states, which, in turn, are presumed to correspond to

greater overall work motivation. These characteristics represent the components of jobs that provide employees with a more rewarding and meaningful experience at work.

All of these aspects of the JCM are quantifiable through the use of the Job Diagnostic Survey (JDS; Hackman & Oldham, 1974; Hackman & Oldham, 1975). In its brief form, the JDS consists of 15 items – three items for each of the five job characteristics. An individual's responses to these items can be used to calculate a motivating potential score (MPS), which summarizes the degree to which the job is already motivating and/or how ready the job is for an enrichment-focused redesign. Because of their motivating potential at work, Hackman and Oldham's job characteristics have sometimes been used as job resources by occupational stress researchers.

The parallels between the JCM and flow are generally fairly clear and have been previously described by Maeran and Cangiano (2013). Whereas the JCM emphasizes the importance of task identity, flow is facilitated by the existence of clear goals in an activity. Because goals are inherent in tasks that have a complete identity, these characteristics are highly similar. Both the JCM and flow theory describe the importance of receiving feedback from the job itself in such a way that the characteristic of feedback is an area of complete overlap between the two theories. Autonomy in the JCM, as a representation of one's freedom to decide how and/or when to perform work, is analogous to flow's component of personal control over an activity. Finally, an individual's perceived skill in Csikszentmihalyi's model of activity-related psychological states is not much different from the job

characteristic of skill variety. The usage of a greater variety of skills in which the individual has competence permits more challenging tasks to be performed, which, stretches the individual to grow and further develop those skills. These correspondences between the JCM and flow are summarized in Table 1.

Table 1

Summary of construct similarities between the Job Characteristics Model and flow (created based on material from Maeran and Cangiano, 2013)

Job Characteristics from JCM		Characteristics and Correlates of Flow
Skill variety	↔	Perceived skill
Task identity	↔	Goals exist in activity (<i>autotelic</i>)
Autonomy	↔	Personal control
Feedback	↔	Feedback

Maeran and Cangiano (2013) studied whether Hackman and Oldham's job characteristics were predictive of the frequency with which workers experience flow on the job. With a sample of 105 Italian workers, they administered a questionnaire that included the JDS and the Dispositional Flow Scale-2. The researchers found that higher scores on the job characteristics did, in fact, predict a greater tendency to experience flow. A hierarchical regression also indicated that propensity to experience flow explained a significant amount of unique variance after accounting for the three critical psychological states described in the JCM when predicting workers' levels of job satisfaction (as measured by a subscale of the JDS). Therefore, despite the similarities between the JCM and flow, flow explains unique variance in job satisfaction after accounting for job characteristics. As such, it seems that work-related flow is likely more than just a proxy for the degree to which a job is enriched.

Demerouti (2006) also found a linkage between the MPS and experiences of flow at work. She tested a model in which flow was predicted by the MPS and in which extra-role performance and in-role performance were predicted by flow and conscientiousness. She discovered that there was a very strong positive relationship between the MPS and flow. Frequency of flow experiences was positively related to both in-role and extra-role performance, but only for participants who were high in conscientiousness. Therefore, it seems that flow is not only closely related to presence of motivating job characteristics, but also predicts self- and colleague-reported job performance for conscientious workers. Because one of the anticipated outcomes of enriched job is high-quality work performance (Hackman & Oldham, 1975), flow appears to correspond quite closely to the JCM in this regard.

The combined results of Maeran and Cangiano (2013) and Demerouti (2006) demonstrate that there are indeed relationships between the characteristics of one's job, the frequency with which one experiences flow at work, and the outcomes of interest to job enrichment theories. An enriched job seems to promote the experience of flow at work, but flow is also empirically distinguishable from a job's motivating potential. This close relationship with job resource variables suggests a theoretical linkage between flow and job stress through the resources identified in job enrichment models like the JCM.

Flow and Stress

The fact that flow and stress have much in common did not gain much traction in the research literature until recently. Peifer (2012) illustrated the interrelatedness of stress and flow when she wrote about the similarities between

Lazarus and Folkman's (1987) transactional stress model and the psychological states that Csikszentmihalyi (2008) identified as the result of the combination of one's perceived challenge and skill. In the transactional stress model, stress is triggered by appraisals made by an individual in situations in which the demands are greater than the individual can handle (Lazarus & Folkman, 1987). With flow theory, however, there exists an essentially equivalent state to the transactional model's concept of stress: anxiety. According to Csikszentmihalyi (2008), anxiety occurs when the challenge level of an activity is high, but the individual has low skill at the task. In both cases, the individual lacks the resources to meet the demands and experiences a psychological state that reflects this incongruity. According to the transactional model, the state resulting from an appraisal is likely to be aversive if the situation has been labeled as a harm or a threat, but has the potential for a positive interpretation if the situation is appraised as a challenge or a benefit (Lazarus & Folkman, 1987).

When challenges are interpreted positively, they represent an opportunity for personal growth and development through increased mastery. This mastery occurs by stretching oneself to one's limits, or, in many cases, slightly beyond those limits (Csikszentmihalyi, 2008). This stretch-related growth was also captured by the DCM, in which Karasek theorized that learning occurs in jobs where one has both high decision latitude and high demands (Karasek et al., 1998). Like stress, the concept of growth through challenge in the transactional model has a direct analog in flow theory. Given that flow occurs when perceptions of high challenge are matched by perceptions of high skill, when one experiences flow, one is being

stretched to or beyond one's current abilities while performing the activity. This stretching of abilities is the basis behind growth and mastery and exemplifies flow's relationship with optimal experiences and high levels of performance. As one develops skill at a flow-promoting task, increasing levels of challenge must be pursued in order to continue perceiving the amount of challenge necessary to experience flow (Csikszentmihalyi, 2008). In situations in which task difficulty can be increased gradually over time, one can theoretically continue to grow until a plateau is reached; that is, one's skills can grow until one's personal limit of skill development has been reached or the task difficulty cannot be increased any further.

Peifer (2012) alluded to the inherent presence of stress during flow in her working definition of the construct: "Flow is a positively valenced state resulting from an activity that has been appraised as an optimal challenge characterized by optimized physiological activation for full concentration on coping with environmental/task demands" (p 148). By these criteria, flow is described using key terms and phrases, such as *appraisal*, *challenge*, *physiological activation*, and *coping*, all of which also have very strong traditions in the stress literature. Flow represents the mobilization of skill-based resources to actively cope with situational demands.

Physiological similarities between flow and stress. While physiological measures will not be employed in the present study, a brief glance at the literature on the physiologies of flow and stress will help to substantiate their theoretical and phenomenological commonalities using objective data. In addition to the theoretical and definitional similarities between flow and stress, there is also evidence to

suggest that flow can be described with reference to such variables as autonomic nervous system tone, cortisol levels, and cardiovascular activity (Peifer, 2012), all of which are also closely linked to the stress response. The sympathetic nervous system (SNS)—a branch of the autonomic nervous system (ANS)—is the mechanism behind the classic fight or flight response. Meanwhile, cortisol is the end product of activation of the hypothalamic-pituitary-adrenal (HPA) axis and a commonly measured physiological marker of stress (Sapolsky, 2004). There exists a growing body of literature in which researchers describe the correspondences between flow and stress in terms of their respective physiological characteristics, indicating that there is a component of *eustress* (i.e., “good stress”; see the *Eustress* section for more) inherent in flow.

So far, researchers have found that flow is associated with increased HPA-axis activity (Keller, Bless, Blomann, & Kleinböhl, 2011; Peifer, Schulz, Schächinger, Baumann, & Antoni, 2014), SNS activity (de Manzano Theorell, Harmat, & Ullén, 2010; Keller et al., 2011; Peifer et al., 2014), and parasympathetic nervous system activity (Peifer et al., 2014). According to Peifer et al. (2014), the co-activation of both branches of the ANS might be a defining characteristic of flow, but more research is needed to corroborate this idea. This body of research on the physiological correlates of flow lends further support to flow’s theoretical linkage with stress and demonstrates the relevance of its inclusion in models of the stress process. Based on what is known about its physiological nature, flow can be described, in part, by its commonalities with the physiological stress response.

Work-related flow and job stress. A relatively new stream of research has emerged in which researchers combine both flow and job stress into a single theoretical framework and examine flow's benefits to well-being in the presence of stressors. For instance, the broaden-and-build model, proposed by Frederickson (1998), can provide a foothold for understanding the benefits of flow in a stress-related context. Frederickson suggests that positive emotions (e.g., joy, interest, contentment, and love) help to build up the personal resources of the individual experiencing them after first broadening the individual's *thought-action repertoire*. This repertoire theoretically consists of different thought-action tendencies, which, as their name implies, are ways of thinking and acting that are associated with particular emotional states. The basis of the theory is that by experiencing positive emotions, an individual is broadening the thought-action tendencies available to them from their repertoire. Because of the increase in thought-action tendencies, the person is able to respond to situations differently when he or she experiences the emotional states that make those tendencies accessible. The outcomes of these tendencies build an individual's resources through such activities as exploring, playing, savoring, and socializing (Frederickson, 1998). Because flow is a positive psychological state and the types of activities that Frederickson identified have the characteristics associated with flow, the broaden-and-build model could be used to describe how experiences of flow are related to greater amounts of job resources over time.

As a test of the broaden-and-build model, Salanova, Bakker, and Llorens (2006) studied a sample of secondary school teachers over the course of eight

months, sending out identical surveys at the beginning and end of the academic year. The surveys assessed personal resources, organizational resources (i.e., job resources), and flow in order to test a set of reciprocal hypotheses. The researchers hypothesized that personal and organizational resources at time one would predict flow at time two and that flow at time one would predict personal and organizational resources at time two. The researchers used these hypotheses as the basis for testing whether resources and flow could function together in an upward spiral of resources. They identified the presence of the anticipated positive reciprocal relationships and found initial support for the upward spiral. Because these data were only correlational in nature, however, reciprocal causality cannot be determined. These interrelationships between flow and the availability of both personal and organizational resources is a promising step in the direction of understanding the nature and benefits of flow.

In order to more closely examine the relationship between levels of job resources and experiences of flow, Mäkikangas, Baker, Aunola, and Demerouti (2010) collected data from workers at an employment agency at three points in time, with six weeks between administrations. The survey consisted of items related to job resources, flow, and exhaustion. Using latent growth curve analysis and growth mixture modeling—both of which are variants of structural equation modeling—Mäkikangas et al. (2010) found support for most of their predictions. The authors discovered that job resources were indeed positively correlated with flow and that mean changes in job resources were also correlated with mean changes in flow. Exhaustion was related negatively related to flow and resources,

but it did not function as a moderator. Four developmental trajectories of flow and resources were identified: high levels of both constructs that remained stable over time, moderate levels remained stable over time, low levels that remains stable over time, and moderate levels that declined over time. Mäkikangas et al. (2010) expanded on research from Salanova, Bakker, and Llorens (2006) by showing that not only are levels of flow and job resources reciprocally related, but that changes in their levels are also related. Additionally, the developmental trajectories identified by Mäkikangas et al. (2010) are evidence of longitudinal relationships between resources and flow, supporting the findings by Salanova et al. (2006) and the applicability of the broaden-and-build model to the study of flow.

Flow is also associated with many outcomes of work, both negative and positive. Bakker and Geurts (2004) examined work-home interference (WHI), an inter-role stressor, using the job demands-resources model with flow and both positive and negative WHI. Negative WHI refers to conflict between one's responsibilities at work and at home, such that one does not have enough resources to fulfill one's home obligations due to the costs of meeting work obligations. Positive WHI refers to being energized, motivated, and/or experiencing positive emotions after leaving work and taking those positive feelings home (this is perhaps a misnomer, as interference tends to carry a negative connotation). To study these two varieties of WHI, Bakker and Geurts used a dual-process model in which job resources were expected to have a positive direct effect on positive WHI, as well as a positive indirect effect through flow. The researchers also expected that job demands would have a negative direct effect on negative WHI, as well as a negative

indirect effect through emotional exhaustion. Using structural equation modeling, they found that the proposed model demonstrated a good fit to the data. Bakker and Geurts (2004) showed that job resources are important predictors of flow and that flow is an important piece of the puzzle when it comes to explaining the spillover of positive work emotions into one's personal life.

Similarly to Bakker and Geurts' (2004) study of flow's relationships with positive and negative post-work experiences, Demerouti, Bakker, Sonnentag, and Fullagar (2012) examined whether frequency of flow experiences could function as a moderator in the prediction of levels of vigor and exhaustion, both at work and at home. They investigated whether experiences of flow on the job interact with one's level of recovery to predict exhaustion and vigor at work. The researchers also studied whether flow interacts with one's level of detachment to predict exhaustion and vigor at home. They hypothesized that more experiences of flow would be associated with higher levels of vigor and lower levels of exhaustion for participants who reported low levels of recovery during the workday. The basis of these predictions is that flow helps to preserve energetic resources; for those who have not been able to recover energy during breaks, flow plays an important role in preserving one's remaining energy and fending off exhaustion. The hypotheses for detachment and post-work levels of vigor and exhaustion were similar. When one has greater detachment, the researchers expected flow to be positively related to vigor and negatively related to exhaustion at bedtime. All of these predicted relationships were supported by the data, but only for the enjoyment dimension of flow, not for absorption or intrinsic motivation. Thus, the enjoyment that one

experiences during flow seems to be related to one's level of energy both at work and at home, but only in combination with moderators. The constructs of vigor and exhaustion are rather similar to Bakker and Geurts' (2004) conceptualizations of positive WHI and negative WHI, respectively. As such, Demerouti et al. (2012) and Bakker and Geurts (2004) collectively demonstrated that flow could function as either a moderator or a mediator in models with similar dependent variables.

Because flow has been found to predict levels of energy at work (Bakker & Geurts, 2004) and after work (Demerouti et al., 2012), Debus, Sonnentag, Deutsch, and Nussbeck (2014) studied whether one's level of recovery (e.g., energy level and feelings of being properly rested) can predict subsequent levels of flow. They collected self-report data from participants over the course of a workweek, measuring levels of recovery each morning and levels of flow at three points during each workday. The researchers found that although flow experiences did not occur in a U-shaped pattern throughout the day as hypothesized, those who were highly recovered at the beginning of the day did exhibit a U-shaped trend. Individuals with low levels of recovery, however, had gradually declining levels of flow throughout the day. Furthermore, participants' levels of recovery predicted day-level experiences of flow; individuals who reported higher levels of recovery also reported higher levels of flow during that same day. Debus et al. (2014) found that in addition to flow predicting energy levels, energy levels in the morning and one's degree of recovery can also predict flow during the day.

Given the established importance of job resources in predicting flow, Fagerlind, Gustavsson, Johansson, and Ekberg (2013) used the DCM to explore

which particular combination of job characteristics is the most effective at predicting flow experiences at work. To do this, they categorized their participants' jobs by the combination of decision latitude and demands found in the job, the amount of social capital available, and the degree of innovative learning climate present in the employing organization (Fagerlind et al., 2013). Social capital refers to the amount of social interconnectedness and idea sharing that exists in the workplace. Innovative learning climate refers to employees' freedom to break conventions, explore new ways of working, and express opinions (Fagerlind et al., 2013). Social capital and innovative learning climate were included as a way to expand upon the DCM by including more job resources than just decision latitude. Based on Karasek's (1979) DCM, Fagerlind et al. (2013) identified jobs as being *active* (high demands and high control), *high strain* (high demands and low control), *low strain* (low demands and high control), or *passive* (low demands and low control). Innovative learning climate and social capital were both divided into quartiles that were labeled as low, medium low, medium high, and high. Using logistic regression, the researchers found that those with *low strain* and *active* jobs had significantly higher odds of experiencing flow at work compared to those with *passive* or *high strain* jobs. Social capital and innovative learning climate both interacted with job category – each of them further increased the odds of experiencing flow in *active* or *low strain* jobs. Similarly to Bakker and Geurts (2004), Fagerlind et al. (2013) demonstrated the importance of job resources in predicting workers' experiences of flow on the job; however, unlike Bakker and Geurts, they used interactive effects to show the importance of one's job demands in

combination with one's job resources in predicting flow. Fagerlind et al. (2013) showed that the combination of high autonomy and job resources (i.e., high social capital or a highly innovative learning climate) predicted much higher levels of flow at work, regardless of the amount of job demands.

Using two distinct samples of participants—one consisting of “healthy” individuals and the other consisting of individuals who were clinically burned-out—Rodríguez-Sánchez et al. (2011) used ESM to collect data about people's daily experiences of flow over the course of two weeks. As hypothesized, they found that burned-out individuals reported significantly lower levels of flow than healthy individuals; however, the overall daily pattern of flow experiences did not differ between these two samples. Regardless of participants' level of burnout, experiences of flow formed a U-shaped curve, indicating that the lowest daily level of flow typically occurs around mid-day. Because this study followed individuals with markedly different levels of burnout, one of the most commonly measured strain variables in the occupational stress literature, the findings have a unique value to researchers' understanding of flow. It seems that even those who have severe levels of burnout still experience a normal-shaped pattern of flow experiences, albeit at an overall lower level than healthy individuals. These findings by Rodríguez-Sánchez et al. (2011) are important for understanding the relationship between flow and burnout, as well as for understanding flow itself. Burnout, as a construct representing exhaustion and disengagement, is both an outcome of the stress process for which flow might function as a predictor and also something that may hinder or restrict workers' subsequent experiences of flow.

Eustress. Stress, as it has been discussed thus far, has been characterized as a generally negative and undesirable process with detrimental outcomes. However, this is not true of all stress. While the term *stress* has the modern connotation of something harmful, it was originally a non-specific term meant to encompass a response that was neither implicitly good nor bad (Hargrove, Nelson, & Cooper, 2013; Le Fevre, Matheny, & Kolt, 2003; McGowan, Gardner, & Fletcher, 2006; Selye, 1974; Selye, 1985). Stress, with the negative connotation it has today, was once described using the term *distress* (i.e., harmful stress) in order to distinguish it from *eustress* (i.e., beneficial stress; Selye, 1974; Selye, 1985). According to Selye's (1974) classic view of stress, a greater amount of stress in an activity that provokes positively-valenced emotional arousal is associated with a very pleasant quality of experience. Because the positive aspects of stress are closely related to the characteristics of enriched jobs and the experience of flow, this distinction is very important for the present study. Work-related flow, as an experience that stretches one's skills through appropriate levels of challenge, will be treated in this study as a state of eustress that can contribute positively to one's work experience and personal outcomes.

To empirically test the theory that stressors can be either challenging (i.e., eustress) or hindering (i.e., distress), Cavanaugh, Boswell, Roehling, and Boudreau (2000) identified several stressors that belonged to each category and included items about them in a survey, which was completed by 1,886 managers. The survey also included items assessing job satisfaction and job search behaviors, with a separate survey being sent out one year after the first survey in order to find out

whether the managers had voluntarily turned over from their position. The researchers found that challenge-related stress was positively related to job satisfaction, negatively related to job search behaviors, and unrelated to voluntary turnover, while hindrance-related stress was negatively related to job satisfaction, positively related to job search behaviors, and positively related to voluntary turnover. With these results, Cavanaugh et al. (2000) lent support to the notion that stress is not a unidimensional construct and that challenge-related job characteristics (e.g., autonomy and responsibility) can be empirically differentiated from job characteristics that represent hindrances or frustrations (e.g., ambiguity). As discussed earlier, flow most certainly fits the definition of a challenge and is a state that, while stressful in some respects, still represents a positive and rewarding experience. Therefore, flow-promoting work tasks should theoretically fit within Cavanaugh et al.'s (2000) challenge-related stress category and, as "eustressors," should be positively related to desirable work outcomes – an assertion that will be explored in the present study.

The Present Study

Researchers have found that flow is related to job characteristics, job resources, job demands, and strains. Specifically, there exists documentation of flow's reciprocal association with resources (Salanova, Bakker, & Llorens, 2006), negative association with job demands (Bakker & Geurts, 2004), and negative association with strain variables such as burnout (e.g., Demerouti et al., 2001). Researchers who have used objective measures have also reported that flow and stress are similar in terms of their physiological markers, lending support to the

theoretical assertions of their relatedness (Peifer, 2012). Because flow is related to important stress constructs, it seems to be an appropriate variable to include in a comprehensive model of the stress process. In fact, because of the similarities between flow and stress, I believe it could be argued that flow is a specific type of stress-related experience. More specifically, I believe that there is evidence to support the assertion that flow is a way to describe the experience of eustress. In the current study, I investigate the role of flow in a model of job stress and clarify its relationship with the occupational stress constructs from the JD-R model.

The preceding review of the literature included discussions of studies in which researchers demonstrated that flow is associated with the types of variables included in models of job stress. Based on the existing literature, the following bivariate relationships are hypothesized:

- H1a.* Job resources will be positively associated with flow.
- H1b.* Challenge job demands will be positively associated with flow.
- H1c.* Hindrance job demands will be negatively associated with flow.
- H1d.* Flow will be negatively associated with strains.

Based on inspiration from the results reported by Cavanaugh et al. (2000), who found challenge job demands to be positively related to job satisfaction and negatively related to withdrawal behaviors, the role of challenges will be explored. In this study, I will consider challenges as demands that represent a necessary condition for flow/eustress. To examine the function of challenges in predicting strains, the following moderated relationship is hypothesized:

H2. Flow will moderate the relationship between challenge job demands and strains, with lower levels of flow being associated with a stronger positive relationship (see Figure 1).

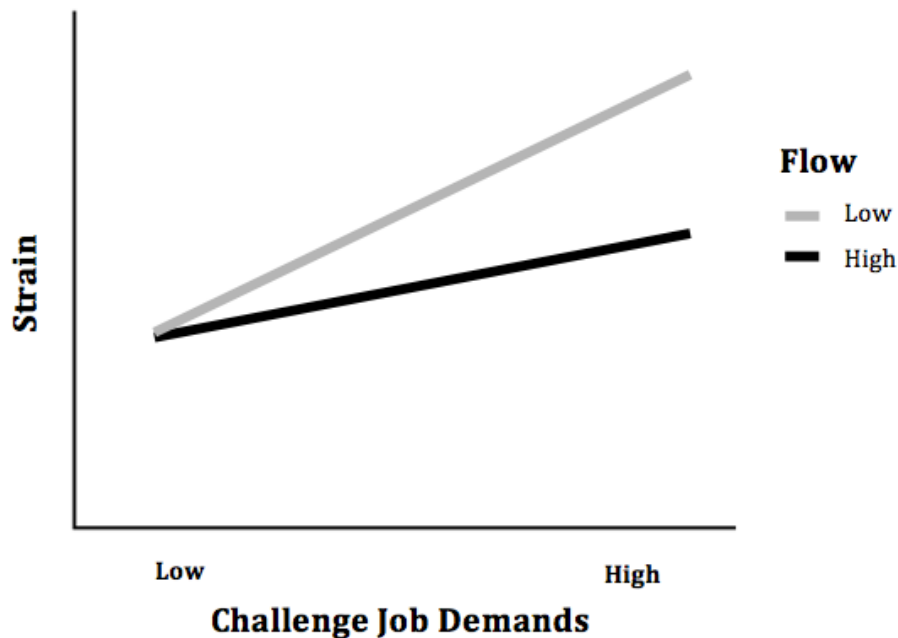


Figure 1. Proposed relationship between challenge job demands and strains with flow as a moderator.

In addition to direct relationships and interactions, flow has functioned as a mediator between job characteristics and strains in previous research. Because of its similarities with the stress response, flow represents a potential way to explain the effects that job characteristics appear to have on strain outcomes and well-being. To test flow's role as an intervening variable, the following mediated relationships are hypothesized:

H3. Flow will partially mediate the relationship between job resources and strains (see Figure 2).

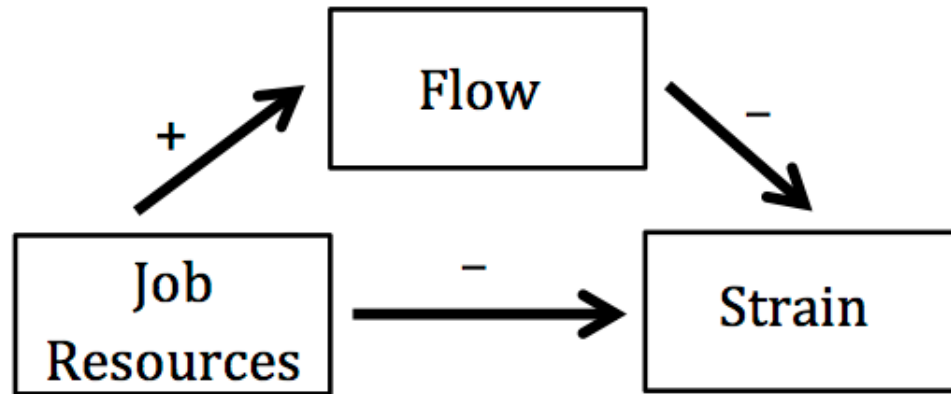


Figure 2. Proposed relationship between job resources and strains with flow as a mediator.

- H4. Flow will partially mediate the relationship between hindrance job demands and strains (see Figure 3).

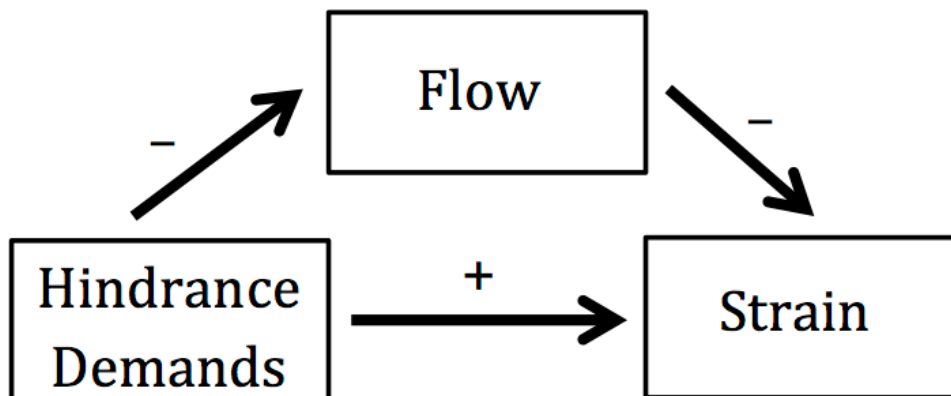


Figure 3. Proposed relationship between hindrance job demands and strains with flow as a mediator.

CHAPTER II

Method

Participants

Participants were 516 adult workers from across the United States. Data from seven cases were excluded from analyses, for an eventual sample of 509 people. Of these individuals, 266 were male (52%) and 253 were female (48%). The mean age of participants in this sample was 45.28 years old ($SD = 11.04$). The mean organizational tenure was 11.41 years ($SD = 9.13$) and participants had been in their current positions for an average of 8.15 years ($SD = 7.14$). Participants reported working in a wide variety of industries, such as information technology, pharmaceuticals, healthcare, education, finance, insurance, manufacturing, and retail.

Procedure

Participants were recruited through the use of Qualtrics' panel services. Qualtrics' panel department identified potential participants who were (a) adults, (b) currently employed, and (c) worked primarily in an office setting. The office setting criterion was used in order to avoid confounds regarding the type of work performed on the job (e.g., physical labor vs. knowledge-based work). These individuals were sent email invitations with personal electronic links to the online

survey used in this study. After opening the link, participants were presented with a consent statement and indicated their informed consent before being allowed to continue responding to the survey. All data were completely anonymous.

Measures

The data collection tools used in this study consisted of a battery of measures that assessed flow, job demands, job resources, and job strains. All survey materials except for the flow measure are provided in their entirety in Appendix A.

Flow. Flow was assessed using the Flow in Occupational Contexts Inventory (FOCI; Dahlke & Sachau, 2014), a novel measure developed by researchers at Minnesota State University, Mankato. This measure consists of a single scale comprised of 10 items. A sample item from this measure is “I am usually confident in my ability to do my job.” An alternate wording of this item was also included in this study; this alternate item was “I usually feel very confident while I am working.” Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). During its validation, this measure demonstrated good reliability (Cronbach’s alpha = .88; Dahlke & Sachau, 2014). Mean scores on the FOCI correlate highly with mean scores on Arnold Bakker’s (2008) WOLF measure ($r = .72, p < .001$). During the validation of the FOCI, a confirmatory factor analysis provided additional evidence of construct validity; a single-factor model of flow demonstrated good fit to the data obtained from sample of 251 sales professionals (CFI = .96, RMSEA = .06, SRMR = .04).

Job resources. Six job resources were assessed in this study: skill variety, task identity, task significance, autonomy, feedback, and opportunities for growth.

Fifteen items from the Job Diagnostic Survey (Hackman & Oldham, 1974) were used to measure skill variety, task identity, task significance, autonomy, and feedback. Participants responded to three items for each of the job characteristics. To simplify the administration of the items, the five items from this measure that originally had extensively descriptive anchors were re-worded so that responses to all items could be on the same rating scale. For this investigation, a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) was used. Sample items from this measure include “The job requires me to use a number of complex or high-level skills” (skill variety) and “The job gives me considerable opportunity for independence and freedom in how I do the work” (autonomy).

Growth opportunities at work were measured with five items that were written for this study and a sixth that was taken from Kopelman, Greenhaus, and Connolly’s (1983) Work Conflict and Interrole Conflict scales. Sample items include “I learn new things on my job” and “I grow professionally while performing my job.” The item from Kopelman, Greenhaus, and Connolly (1983) is “My Job offers too little opportunity to acquire new knowledge and skills.” Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Job demands. Job demands were assessed in two groups of variables intended to distinguish between two types of demanding experiences: hindrances and challenges.

Hindrances. Two hindrance demands were assessed in this study: role ambiguity and work conflict.

Role ambiguity was measured with four items from Beehr, Walsh, and Taber's (1976) Role Stress Measures. A sample item included in this measure is "I know what performance standards are expected of me." Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). These four items were each slightly modified to either (a) reflect modern conventions for the construction of negatively-worded items or (b) omit references to supervisors to make the items applicable to autonomous and self-supervised individuals.

Work conflict was measured using seven items from Kopelman, Greenhaus, and Connolly's (1983) Work Conflict and Interrole Conflict scales. A sample item included in this measure is "At work I have to do things that should be done differently." Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Challenges. Three challenge stressors were assessed in this study: workload, time urgency, and pressure.

Workload, time urgency, and pressure were measured with items that were written for this study (two items, three items, and two items, respectively). Sample items include "I often have a large amount of work to do" (workload), "I have to work very quickly on my job" (time urgency), and "Others in my organization have very high expectations for my performance" (pressure). Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Strains. Three strain variables were included in this study: job satisfaction, physical symptoms, and burnout.

Because low job satisfaction will be treated as a strain in this study, job satisfaction was assessed using six items taken from Iverson, Olekans, and Erwin's (1998) Job Satisfaction Scale. A sample item from this measure is "I find real enjoyment in my job." Participants responded to these items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Physical symptoms were assessed using Spector and Jex's (2011) Physical Symptoms Inventory (PSI). Participants were asked to report the frequency with which they experienced each of 12 physical symptoms in response to the question, "Over the past month, how often have you experienced each of the following symptoms?" Sample symptoms include "an upset stomach or nausea," "headache," and "eye strain." The response scale for these items ranged from 1 (*Not at all*) to 5 (*Every day*). Because this research was conducted during flu season, an item asking whether participants had had the cold or flu during the past month was also included. This item will be used as a covariate in any analyses in which physical symptoms is the dependent variable in order to control for physical ailments attributable to the cold or flu.

Burnout was assessed using Demerouti's (1999) Oldenburg Burnout Inventory (OLBI). The OLBI consists of 16 items, with eight items for each of its two subscales: disengagement and exhaustion. Sample items from this measure include "It happens more and more often that I talk about my work in a negative way" (disengagement) and "During my work, I often feel emotionally drained"

(exhaustion). Participants responded to these items on a 5-point scale, ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

CHAPTER III

Results

Preparation of the Data

Upon downloading the survey responses from Qualtrics, I identified participants who did not meet the following requirements: giving consent to participate, being employed in an office setting, passing two attention-check items, and completing the survey (i.e., progressing all the way through and submitting their responses). Any cases not meeting these qualifying criteria were removed from the data set. Following this initial screening, I reviewed participants' responses regarding the industries in which they work and the titles of their current positions. Five participants were removed due to nonsensical responses to these items and two more cases were removed because they appeared to be taken by the same individual (i.e., they contained the same exact responses to the demographic items and the responses were recorded within a span of four minutes). In the case of the nonsensical responses, it seemed likely that those individuals might not have taken the rest of the survey seriously and their responses were therefore eliminated as a precaution. From the 516 cases that met the initial screening criteria, 509 cases were retained. Finally, before proceeding to the analysis stage, responses to the

reverse-worded items were re-coded to match the directions of their respective scales.

Preliminary Analyses

Because an alternatively-worded item for the FOCI measure was piloted in this study, this item was evaluated to determine its appropriateness for use in the scale. The Cronbach's alpha reliability of the original scale in this sample was .90, but the reliability of the scale with the new item was .91. The corrected item-total correlation for the old item was .52 compared to .64 for the new item. Because these statistics indicated that the new item functioned appropriately within the measure, it was included in the scale for this study.

Cronbach's alpha reliability coefficients were calculated for all of the scales from the survey. Descriptive statistics, reliabilities, and intercorrelations between all scales from the survey are displayed in Appendix B. All of these scales had acceptable internal consistency reliabilities with the exception of the 2 two-item scales: pressure and workload. These low reliabilities were likely an artifact of the brevity of the scales. Because it seemed that these reliabilities did not indicate actual problems with the items, these scales were retained for normal treatment in the analyses. Next, all items proposed to represent job resources, hindrance demands, challenge demands, and burnout were also submitted to reliability analyses. The job resources, hindrance demands, challenge demands, and burnout scales all demonstrated good reliability. Mean scores were calculated for all scales mentioned above to create new composite variables for use in the hypothesis tests. The means,

standard deviations, reliabilities, and intercorrelations between the scales included in the regression analyses are displayed in Table 2.

Table 2

Means, Standard Deviations, Reliabilities, and Bivariate Correlations for All Scales Included in Regression Analyses

Scale Name	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. FOCI	3.86	.67	(.91)								
2. Job Resources	3.91	.60	.75**	(.93)							
3. Time Urgency	3.29	.80	.10*	.08	(.70)						
4. Workload	3.70	.88	.20**	.31**	.21**	(.55)					
5. Pressure	3.64	.77	.14*	.24**	.50**	.33**	(.46)				
6. Hindrance Demands	2.41	.78	-.34**	-.41**	.42**	-.10*	.28**	(.86)			
7. Burnout	2.63	.65	-.63**	-.59**	.29**	-.12*	.16**	.64**	(.88)		
8. Job Satisfaction	3.59	.88	.76**	.72**	.03	.12*	.06	-.39**	-.70**	(.90)	
9. Physical Symptoms	1.78	.75	-.02	-.03	.30**	-.11*	.17**	.38**	.38**	-.03	(.92)

Note. * $p < .05$; ** $p < .001$

Hypothesis Tests

Hypothesis 1. To test Hypothesis 1, bivariate correlations between flow and the other scale means were computed. Please refer to Appendix B for correlations between FOCI scores and all other scales. Flow correlated positively with job resources (skill variety, task identity, task significance, autonomy, feedback, and growth), positively with challenge demands (time urgency, workload, and pressure), negatively with hindrance demands (work conflict and role ambiguity), negatively with burnout, and positively with job satisfaction. Flow did not correlate significantly with physical symptoms. Therefore, Hypotheses 1a, 1b, and 1c were fully supported and Hypothesis 1d was partially supported.

Hypothesis 2. To test Hypothesis 2, hierarchical regression analyses were conducted. In the first step of these analyses, burnout, job satisfaction, and physical symptoms were regressed on mean-centered versions of the flow, time urgency, workload, and pressure variables. In the second step of these analyses, the products of the mean-centered versions of flow and time urgency, flow and workload, and flow and pressure were added to the model. Plots of any significant interactions were generated using the plotting data produced by the PROCESS macro for SPSS (Hayes, 2014), but the moderated regressions were conducted manually in order to obtain standardized regression weights.

In the regression analysis with burnout serving as the dependent variable, the first step of the model was significant ($R^2 = .54, p < .001$). Flow, time urgency, workload, and pressure were all significant predictors in this model. In the second step, the interaction terms were entered. The addition of the interactions made a significant but small improvement over the first step ($\Delta R^2 = .01, p < .01$). Flow, time urgency, workload, pressure, and the workload X flow interaction were significant predictors in this model; the time urgency X flow and pressure X flow interactions were not significant. All beta weights are shown in Table 3. The nature of the interaction between workload and flow in predicting burnout is such that there was a slight positive relationship between workload and burnout for participants who reported low levels of flow; however, for participants who reported high levels of flow, there was a slight negative relationship between workload and burnout. This interaction is depicted graphically in Figure 4.

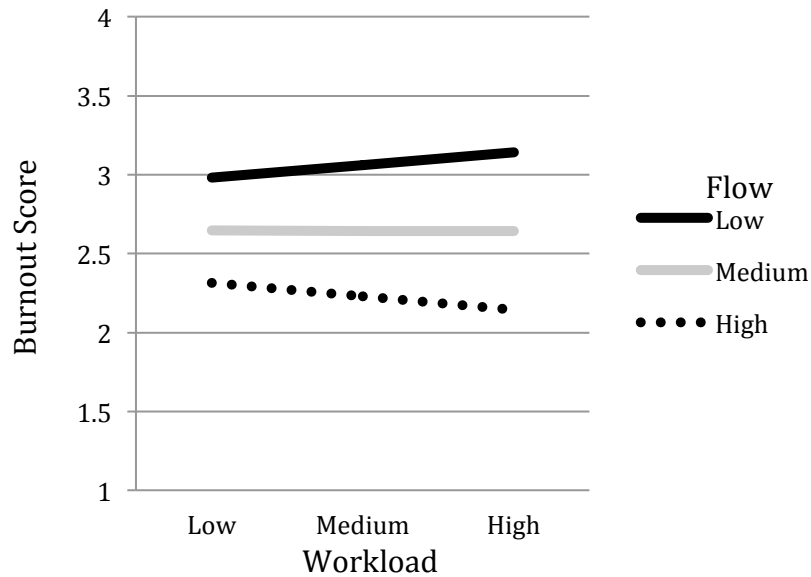


Figure 4. Relationship between workload and burnout with flow as a moderator.

In the regression analysis with job satisfaction as the dependent variable, the first step of the model was significant ($R^2 = .58, p < .001$). Flow was the only predictor that significantly predicted job satisfaction; time urgency, workload, and pressure all had non-significant effects. The interaction terms were entered in the second step and did not make a significant improvement over the first model ($\Delta R^2 = .00, p = .91$). Once again, only flow significantly predicted job satisfaction; time urgency, workload, pressure, and the interaction terms all had non-significant effects. All beta weights are shown in Table 3.

In the regression analysis with physical symptoms as the dependent variable, a slightly different approach was taken than in the other analyses. The first step of this analysis (denoted as “Step 0” in Table 3) was to regress physical symptoms on whether or not participants had the cold or flu in the past month in order to control for the effect of these common seasonal viruses. This model was significant ($R^2 = .20, p < .001$). Having had the cold or flu significantly predicted physical symptoms and

explained 20% of the variability in physical symptoms scores. In the second step of the analysis (denoted as “Step 1” in Table 3), time urgency, workload, and pressure were entered and made a significant improvement over the first model ($\Delta R^2 = .13$, $p < .001$). Flow, time urgency, workload, pressure, and the cold/flu were all significant predictors of physical symptoms scores. The interaction terms were entered in the third step (denoted as “Step 2” in Table 3) and did not make a significant improvement over the second model ($\Delta R^2 = .01$, $p = .20$). Flow, time urgency, workload, pressure, and the cold/flu were all significant predictors of flow, but none of the interactions were significant. All beta weights are shown in Table 3.

Table 3

Beta Values for Hierarchical Moderated Regression Models

Step and Variables Entered	Dependent: Burnout		Dependent: Job Satisfaction		Dependent: Physical Symptoms		
	β^1	β^2	β^1	β^2	β^0	β^1	β^2
Step 0							
Cold/Flu	---	---	---	---	.44***	.41***	.41***
Step 1							
Flow	-.66***	-.66***	.77***	.77***		-.08*	-.08*
Time Urgency	.32***	.28***	-.03	-.03		.18***	.15**
Workload	-.09**	-.07*	-.02	-.02		-.14**	-.13**
Pressure	.10**	.11**	-.02	-.03		.15**	.15**
Step 2							
Time Urgency X Flow		.06		.01			.08
Workload X Flow		-.11**		-.01			-.06
Pressure X Flow		.06		.02			-.05

Note. * $p < .05$; ** $p < .005$; *** $p < .001$

β^0 values are beta values from step 0; β^1 values are beta weights from step 1; β^2 values are beta weights from step 2

Hypothesis 3. To test Hypothesis 3, mediated regression analyses were conducted with burnout, job satisfaction, and physical symptoms regressed on the composite mean for job resources (the independent variable) and mean flow scores (the mediating variable). These mediation analyses were performed using the

procedure recommended by Judd and Kenny (1981). In this method, the first step of the analysis is to regress the mediator on the independent variable. Next, the dependent variable is regressed on the independent variable. Finally, the dependent variable is regressed on both the mediator and the independent variable. If the mediator is a significant predictor of the dependent variable when included with the independent variable and the beta value for the independent variable decreases when the mediator is added, it is possible that mediation has occurred. If the independent variable becomes non-significant, then full mediation could have occurred. In this study, only partial mediations were hypothesized, in which case the independent variable should still have a significant effect once the mediator is added. In the event that partial mediation is indicated by the pattern of beta weights and significance values, indices of indirect effects will be consulted to determine whether the indirect effect through flow is statistically significant. Indices of indirect effects were computed using the PROCESS macro for SPSS (Hayes, 2014), but the mediated regressions were conducted manually in order to obtain standardized regression weights.

The first step of all three mediated regressions for Hypothesis 3 was the same: Flow was regressed on job resources. This model was significant ($R^2 = .56, p < .001$). Job resources significantly predicted scores on the flow measure ($\beta = .75, p < .001$) and accounted for 56% of the variability in flow scores.

For the burnout model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In the first block of this regression, burnout was regressed on job resources. This regression model was

significant ($R^2 = .35, p < .001$). Job resources significantly predicted burnout ($\beta = -.59, p < .001$) and accounted for 35% of the variability in burnout scores. In the second block of the regression, flow was added as a predictor of burnout. This model was a significant improvement over the first model ($\Delta R^2 = .08, p < .001$), with both flow ($\beta = -.27, p < .001$) and job resources ($\beta = -.43, p < .001$) significantly predicting burnout and accounting for 43% of the variability in burnout scores. Because both flow and job resources were significant predictors in this final model and the beta weight for job resources shrank when flow was added, there was initial evidence to support partial mediation. To test whether partial mediation actually occurred, a Sobel test was performed and Preacher and Kelley's κ^2 statistic was calculated. The Sobel test was significant ($z = -7.98, p < .001$) and the bootstrapped 95% confidence interval for κ^2 did not include zero ($\kappa^2 = .26, 95\% \text{ CI } [.21, .32]$). These statistics provide evidence for a significant indirect effect of job resources on burnout through flow, which supports partial mediation. This relationship is depicted in Figure 5.

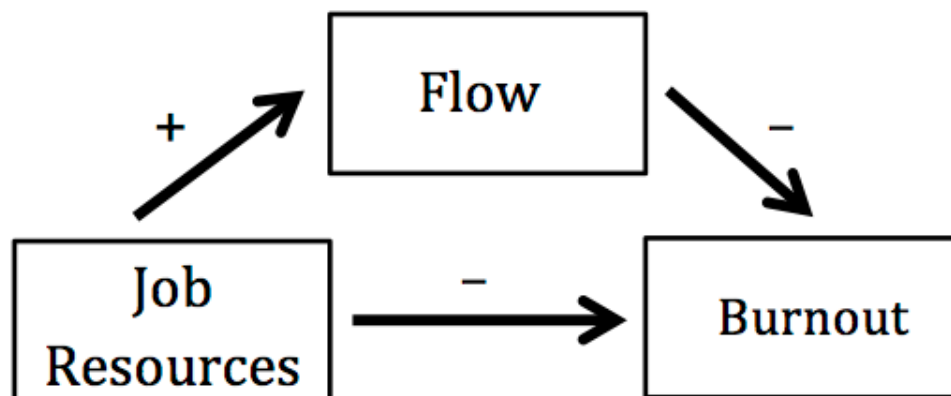


Figure 5. Relationship between job resources and burnout with flow as a mediator.

For the job satisfaction model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In the first block of this regression, job satisfaction was regressed on job resources. This regression model was significant ($R^2 = .52, p < .001$). Job resources significantly predicted job satisfaction ($\beta = .72, p < .001$) and accounted for 52% of the variability in job satisfaction scores. In the second block of the regression, flow was added as a predictor of job satisfaction. This model was a significant improvement over the first model ($\Delta R^2 = .11, p < .001$), with both flow ($\beta = .49, p < .001$) and job resources ($\beta = .35, p < .001$) significantly predicting job satisfaction and accounting for 63% of the variability in job satisfaction scores. Because both flow and job resources were significant predictors in this final model and the beta weight for job resources shrank when flow was added, there was initial evidence to support partial mediation. To test whether partial mediation actually occurred, a Sobel test was performed and Preacher and Kelley's κ^2 statistic was calculated. The Sobel test was significant ($z = 10.92, p < .001$) and the bootstrapped 95% confidence interval for κ^2 did not include zero ($\kappa^2 = .36, 95\% \text{ CI } [.29, .42]$). These statistics provide evidence for a significant indirect effect of job resources on job satisfaction through flow, which supports partial mediation. This relationship is depicted in Figure 6.

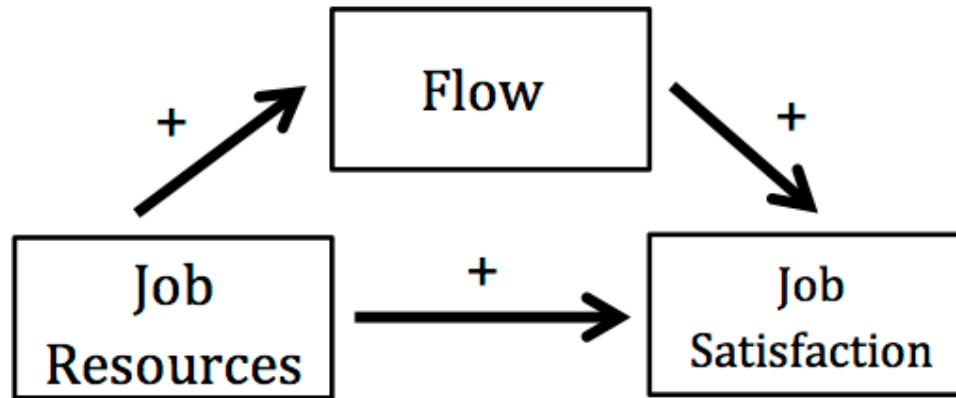


Figure 6. Relationship between job resources and job satisfaction with flow as a mediator.

For the physical symptoms model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In addition to testing the hypothesized partial mediation, whether or not participants had had the cold or flu in the past month was included as a covariate in the model. In the first block of this regression, physical symptoms scores were regressed on job resources. This regression model was significant ($R^2 = .20, p < .001$). However, only the cold/flu variable was a significant predictor of physical symptoms ($\beta = .45, p < .001$); job resources did not have a significant effect ($\beta = -.08, p = .06$). Because job resources did not make a significant contribution to the model, the analysis ended here and partial mediation was ruled out as a possibility.

Flow partially mediated the relationships between job resources and burnout and between job resources and job satisfaction, but did not partially mediate the relationship between job resources and physical symptoms. Because of this pattern of results, Hypothesis 3 was partially supported.

Hypothesis 4. To test Hypothesis 4, mediated regression analyses were performed using the same procedure as for Hypothesis 3. In these regressions, burnout, job satisfaction, and physical symptoms were regressed on the composite mean for hindrance job demands (the independent variable) and mean flow scores (the mediating variable).

The first step of all three mediated regressions in Hypothesis 3 was the same: Flow was regressed on hindrance demands. This model was significant ($R^2 = .12, p < .001$). Hindrance demands significantly predicted scores on the flow measure ($\beta = -.34, p < .001$) and accounted for 12% of the variability in flow scores.

For the burnout model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In the first block of this regression, burnout was regressed on hindrance demands. This regression model was significant ($R^2 = .41, p < .001$). Hindrance demands significantly predicted burnout ($\beta = .64, p < .001$) and accounted for 41% of the variability in burnout scores. In the second block of the regression, flow was added as a predictor of burnout. This model was a significant improvement over the first model ($\Delta R^2 = .19, p < .001$), with both flow ($\beta = -.47, p < .001$) and hindrance demands ($\beta = .48, p < .001$) significantly predicting burnout and accounting for 60% of the variability in burnout scores. Because both flow and hindrance demands were significant predictors in this final model and the beta weight for hindrance demands shrank when flow was added, there was initial evidence to support partial mediation. To test whether partial mediation actually occurred, a Sobel test was performed and Preacher and Kelley's κ^2 statistic was calculated. The Sobel test was significant ($z =$

7.30, $p < .001$) and the bootstrapped 95% confidence interval for κ^2 did not include zero ($\kappa^2 = .20$, 95% CI [.15, .25]). These statistics provide evidence for a significant indirect effect of hindrance demands on burnout through flow, which supports partial mediation. This relationship is depicted in Figure 7.

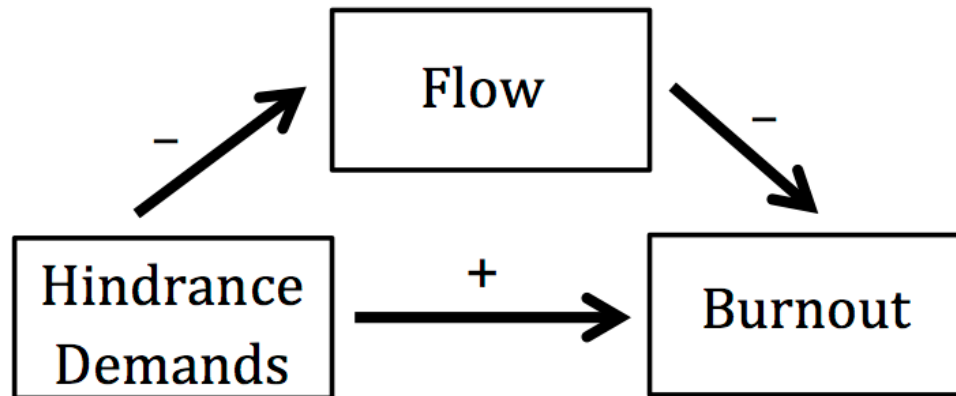


Figure 7. Relationship between hindrance demands and burnout with flow as a mediator.

For the job satisfaction model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In the first block of this regression, job satisfaction was regressed on hindrance demands. This regression model was significant ($R^2 = .15$, $p < .001$). Hindrance demands significantly predicted job satisfaction ($\beta = -.39$, $p < .001$) and accounted for 15% of the variability in job satisfaction scores. In the second block of the regression, flow was added as a predictor of job satisfaction. This model was a significant improvement over the first model ($\Delta R^2 = .44$, $p < .001$), with both flow ($\beta = .71$, $p < .001$) and hindrance demands ($\beta = -.14$, $p < .001$) significantly predicting job satisfaction and accounting for 60% of the variability in job satisfaction scores. Because both flow and hindrance demands were significant predictors in this final model and the beta

weight for hindrance demands shrank when flow was added, there was initial evidence to support partial mediation. To test whether partial mediation actually occurred, a Sobel test was performed and Preacher and Kelley's κ^2 statistic was calculated. The Sobel test was significant ($z = 7.80, p < .001$) and the bootstrapped 95% confidence interval for κ^2 did not include zero ($\kappa^2 = .28, 95\% \text{ CI } [.22, .34]$). These statistics provide evidence for a significant indirect effect of hindrance demands on job satisfaction through flow, which supports partial mediation. This relationship is depicted in Figure 8.

For the physical symptoms model, a hierarchical regression analysis was used to test the second and third steps of the mediation procedure. In addition to testing the hypothesized partial mediation, whether or not participants had had the cold or flu in the past month was included as a covariate in the model. In the first block of this regression, physical symptoms were regressed on hindrance demands. This regression model was significant ($R^2 = .33, p < .001$). Hindrance demands ($\beta = .33, p < .001$) and the cold/flu ($\beta = .41, p < .001$) significantly predicted physical symptoms and accounted for 30% of the variability in physical symptoms scores. In the second block of the hierarchical regression, flow was added as a predictor of physical symptoms. This model was not a significant improvement over the first model ($\Delta R^2 = .00, p = .31$). Hindrance demands ($\beta = .34, p < .001$) and the cold/flu ($\beta = .40, p < .001$) significantly predicted physical symptoms, but flow did not ($\beta = .04, p = .31$). Because flow was not a significant predictor in the final model, partial mediation was ruled out as a possibility.

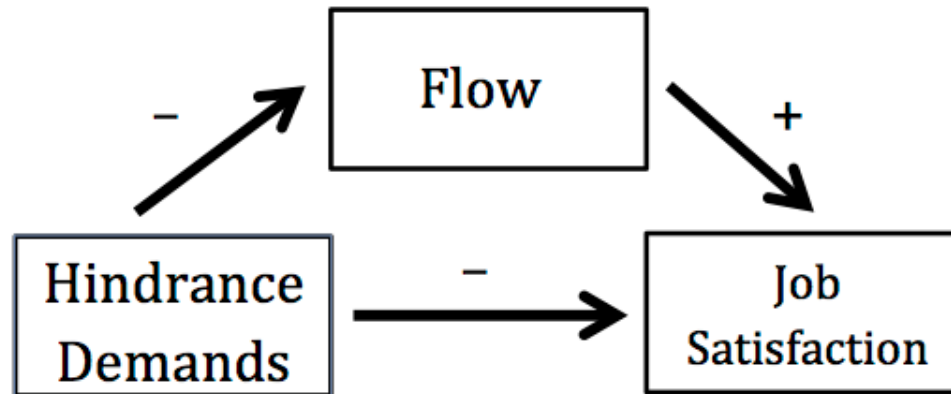


Figure 8. Relationship between hindrance demands and job satisfaction with flow as a mediator.

Flow partially mediated the relationships between hindrance demands and burnout and between hindrance demands and job satisfaction, but did not partially mediate the relationship between hindrance demands and physical symptoms.

Because of this pattern of results, Hypothesis 4 was partially supported.

CHAPTER IV

Discussion

The purpose of this study was to test whether flow could be integrated into a model of occupational stress and to clarify the role of flow in such a model. Based on previous successful attempts at differentiating hindrances and challenges (e.g., Cavanaugh et al., 2000; LePine et al., 2005; Podsakoff et al., 2007), I also tested different roles for these two types of job demands in predicting strains, with flow as a mediator of hindrances and strain and as a moderator of challenges and strain. By making this distinction between hindrances and challenges rather than treating job demands as a unidimensional construct, I sought to explore possibilities that had not previously been included in the JD-R model. I also aimed to support flow as a potentially stress-relevant experience. Specifically, I wanted to explore flow as an experience of eustress that could help to explain the relationships between job characteristics and strains.

Findings

Intercorrelations between constructs. Before discussing the results of my hypothesis tests, I would like to make note of the very high intercorrelations between flow, job resources, burnout, and job satisfaction (see Table 2). With the exceptions of burnout's correlations with flow and job resources, all of the above-

mentioned correlations reached an effect size of .70 or greater. Because of these high correlation coefficients, it is questionable whether these constructs are truly distinct from one another. These constructs do indeed have theoretical similarities, but it seems strange that they should be quite so highly correlated. In addition to these scales potentially representing the same superordinate construct, it is also possible that these high correlations were due the wording of items and/or common method variance. Of the problematic constructs, only burnout was assessed using a combination of both negatively and positively keyed items. Flow, job resources, and job satisfaction were measured using only positively keyed items; because these constructs had the highest intercorrelations, the wording of the items seems to be a likely contributor to the inflated correlation coefficients. It is difficult to account for the effect of common method variance, but this also likely played a role in inflating the correlations computed in this study given that all data were collected using a survey.

Hypothesis 1. I predicted that flow would be positively correlated with job resources (Hypothesis 1a) and challenge demands (Hypothesis 1b) and negatively correlated with hindrance demands (Hypothesis 1c) and strains (Hypothesis 1d). The predictions for Hypotheses 1a, 1b, and 1c were fully supported: Flow was significantly related to each of the job resources, challenge demands, and hindrance demands in the anticipated directions. Hypothesis 1d was partially supported: Flow was negatively correlated with burnout and positively correlated with job satisfaction, but was not associated with physical symptoms. Because the low end of the job satisfaction scale is considered to indicate greater strain, this positive

relationship with flow was consistent with the hypothesized direction of association. These results show that flow is more commonly experienced when individuals' work settings provide them with greater resources and challenges, but less commonly experienced when hindrances exist in the job. Those who reported experiencing greater flow also tended to report lower burnout and greater job satisfaction.

Hypothesis 2. I predicted that flow would moderate the relationship between challenge demands and strains, such that there would be a stronger positive relationship between challenge demands and strains for those who reported less flow. None of the challenge demands interacted with flow in predicting job satisfaction or physical symptoms, but workload interacted with flow in predicting burnout. This interaction was consistent with the hypothesized relationship: Those reporting low flow exhibited a positive relationship between challenge demands and burnout, but those reporting high flow actually exhibited a negative relationship between workload and burnout. Therefore, flow seems to buffer the detrimental effect of workload on burnout. The specific combination of high flow and high workload was associated with the lowest burnout scores.

Hypothesis 3. I predicted that flow would partially mediate the relationship between job resources and strains. Specifically, this hypothesis specified that greater job resources would predict lower strain through higher flow scores, while job resources would still have a direct negative effect on strains. This hypothesis was supported for burnout and job satisfaction; however, job resources were not significantly related to physical symptoms and, because of this, that mediated

relationship was not supported. Greater job resources predicted greater flow, which was related to lower burnout and greater job satisfaction. After accounting for flow, job resources still had a direct negative effect on burnout and a direct positive effect on job satisfaction. The indirect effect on job satisfaction was consistent with the motivational process in the JD-R model in which job resources predict positive outcomes through well-being (Bakker & Geurts, 2004; Schaufeli & Taris, 2014). The indirect effect on burnout was also consistent with other paths identified in the JD-R model. The revised version of the model specified that job resources predict flow and burnout and the model also indicated a reciprocal relationship between flow and burnout (Bakker & Geurts, 2004; Schaufeli & Taris, 2014). From the combination of burnout-related predictions, the JD-R model covered all of the paths that were necessary to test flow's partial mediation of the relationship between job resources and burnout.

Hypothesis 4. I predicted that flow would partially mediate the relationship between hindrance demands and strains. Specifically, this hypothesis specified that greater hindrance demands would predict greater strain through lower flow scores, while hindrance demands would still have a direct positive effect on strains. To the best of my knowledge, other researchers have not previously tested these paths and these predictions were new to the JD-R model. Authors of other studies of flow within the JD-R framework (e.g., Bakker & Geurts, 2004) have analyzed job demands as a unidimensional construct; however, in this study, hindrance demands were separated from other demands that were thought to be challenges. The predictions in Hypothesis 4 were intended to expand the JD-R model by testing whether

hindrance demands could function in a contrary manner to job resources. As such, the paths tested in Hypothesis 4 were the same ones as in Hypothesis 3, but with a different initial predictor variable. This hypothesis was supported for burnout and job satisfaction, but not for physical symptoms. Hindrance demands were negatively related to flow, which, in turn, was negatively associated with burnout and positively associated with job satisfaction. Hindrance demands also had direct positive and negative effects on burnout and job satisfaction, respectively. These findings supported my prediction that hindrances would function in a way that is contrary to job resources in predicting strains.

Limitations of this Study

This study was limited in that data were collected in a cross-sectional fashion rather than longitudinally. Because all the data were collected at the same point in time, it is unclear whether the relationships detected in this study would hold true over time. In the case of the mediation analyses, it is impossible to tell whether job resources or hindrance demands at one point in time can predict strains at a later point in time through experiences of flow during the intermediate time period.

Due to the nature of appraisals as individual evaluations, it is unclear whether participants actually perceived the challenge and hindrance demands differently. Although the existing literature has provided guidance about which types of job demands are challenges and which are hindrances, these distinctions may not hold true for all people. For example, while greater workload might be a challenge for one individual, another individual may view more work as a hindrance – we cannot be sure that all participants perceived the demands in a consistent way.

The high correlations between flow, job resources, burnout, and job satisfaction that I mentioned earlier are potentially indicative of measurement issues in this study. Except for burnout, all of these constructs were measured using only positively worded items, which means that participants' response sets could have inflated the correlations between these constructs. Because all data were collected using a survey, common method variance is also a limitation of this study.

The mediated analyses were conducted in such a way that it is difficult to determine which job resources and hindrance demands might be driving the significant indirect effects on strains. Job resources and hindrance demands were tested as composite means of the scales that comprise them rather than as means of individual scales. This was done in order to reduce the number of regression analyses that would have to be performed and to reduce the likelihood of obtaining spurious results. Future studies should attempt to separate the effects of individual resources and hindrances to reach a more nuanced understanding of these mediated relationships.

The workload and pressure scales used in this study each only contained two items and demonstrated rather low reliabilities. While this did not appear to hinder their usefulness given the fact that workload was able to function as a moderator, these scales should have been longer to ensure acceptable internal consistencies.

Using the full physical symptoms scale may have been inappropriate for this type of study. Some symptoms on the scale seem more likely to be impacted by work stress (e.g., headaches), while others are less attributable to job demands (e.g., ringing in the ears and constipation). Rather than using the entire list of symptoms,

a limited number of physical symptoms should have been selected based on the likelihood that those symptoms could be manifestations of job-related stress.

Strengths of this Study

Despite the limitations of this study, it also benefitted from a number of strengths. The survey used for data collection contained a large variety of items, scales, and constructs and therefore was useful in collecting rich data. I included items assessing many different types of job resources, job demands, and strains and was able to obtain high reliability coefficients when the scales for similar constructs were merged into higher-order scales (i.e., scales representing all job resources, challenges, hindrances, and strains).

I was successful in recruiting a large sample of workers from diverse industries. Because of this, my participants were likely more representative of working Americans than if I had surveyed employees within any one organization or industry.

I was able to find limited evidence that hindrance demands and challenge demands are distinguishable from each other. This evidence comes from the correlations between the job demands scales and the positively valenced constructs of flow and job satisfaction. Time urgency, workload, and pressure (i.e., the challenge demands) were significantly positively correlated with flow, while work conflict and role ambiguity (i.e., hindrances) were significantly negatively correlated with flow. Work conflict and role ambiguity were also negatively correlated with job satisfaction, but only workload was significantly positively correlated with job satisfaction. This seems to indicate that the challenges and hindrances measured in

this study are empirically distinguishable from each other, as previous researchers have also reported. Despite the correlations with flow, however, time urgency and pressure tended to be positively associated with strains. Workload seems to have been the only true challenge variable in this study. Not only was workload positively correlated with flow and job satisfaction, but it also tended to be negatively associated with strain variables.

Finally, I employed a well-established model of occupational stress as the foundation of this study and used the limited existing research on stress and flow as a basis, while still developing original hypotheses and making distinctions between different types of job demands. This study fills some gaps in our understanding about how work-related flow and occupation stress are related to each other, but also serves as a starting place for future research due to the results of those novel hypotheses.

Recommendations for Future Research

To correct for the shortcomings of this study's cross-sectional design, researchers could use a longitudinal data collection methodology and assess flow, job resources, job demands, and strains at different points in time. After collecting the initial data and letting several weeks or months pass, researchers could assess flow experiences and strain variables during the second data collection. By also measuring flow and strain at time one, those initial measures could be included as covariates in the prediction model to get a more complete idea of how flow and job characteristics impact strains. In such a research design, the instructions for the flow measure could specifically ask participants to rate their experiences of flow

during the time that elapsed between data collections. Alternatively, using ESM to collect data on flow between the scheduled data collections would provide rich data about flow experiences as they occur. This would help to eliminate the problems with using retrospective inventories to measure flow and would provide more representative daily data about flow experiences that are less contaminated by memory failures or recall biases. Researchers should also ensure that their scales include a number of negatively keyed items to help minimize the effect of response sets – especially when measuring theoretically similar constructs.

Because flow is not purely a byproduct of the job context, individual difference variables could have been included in this research. Personality and positive and negative affectivity could help to elaborate this model by accounting for person-level differences in addition to the characteristics of participants' jobs. Because of the number of constructs already measured in this study, including measures of individual differences was not feasible. The study of job characteristics in both the motivation and OHP literatures made job resources and job demands more important elements to include in this research, at the cost of leaving out individual difference variables. Flow researchers have used measures of personality constructs such as trait intrinsic motivation (Moneta, 2012), need for achievement (Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005), and Big Five personality traits (Bakker, Boyd, Dollard, Gillespie, Winefield, & Stough, 2010; Demerouti, 2006; Ross & Kaiser, 2014) to explain the propensity to experience flow. In future studies like this one, researchers should include variables such as autotelic

personality, the Big Five, negative affectivity, and positive affectivity in order to expand upon the understanding of stress and flow.

In the future, researchers should consider methods for obtaining data regarding participants' appraisals of different job demands. Ratings of this type could help to determine whether individuals perceive the proposed challenges and hindrances differently. This would provide an indication of whether the appraisals are actually different (i.e., distinguishable to the experiencing individuals), or whether the difference is simply a statistical distinction. Researchers should also study workload in greater detail and try to identify other viable challenge demands. For example, differentiating between quantitative workload (i.e., the amount of work to be done) and qualitative workload (i.e., amount of difficulty inherent in the work) could be an interesting next step to study the effect of workload on the relationship between stress and flow.

Researchers should continue to investigate the relationships between job characteristics, flow, and physical symptoms to determine whether flow truly does not play a role in predicting physical symptoms. None of the analyses with physical symptoms as the dependent variable supported the hypotheses, but it is possible that other job characteristics not measured in this study could interact with flow or have an indirect effect through flow in predicting physical symptoms. Researchers should also perhaps be more selective in which physical symptoms they use as strain variables rather than using composites of entire physical symptoms scales. More research is needed to explore these possibilities.

Implications

In this study, I have contributed to the research literature on occupational stress and work-related flow, demonstrating that flow can indeed be included in a model of occupational stress. In terms of practical value, these findings could be used to justify methods for modifying jobs to promote engagement and reduce the extent to which employees experience strain. Because the resource variables used in this study are aligned with previous occupational stress models as well as job enrichment theories, these results support job enrichment as a method for realizing goals regarding workers' motivation and their occupational health. By designing jobs to include more of Hackman and Oldham's (1974) job characteristics and more opportunities for growth, organizations could increase the extent to which employees experience flow and engagement, decrease experiences of burnout, and increase job satisfaction.

Job demands classified as hindrances can have a detrimental impact on flow, burnout, and job satisfaction. By working to reduce the number of hindrance demands encountered on the job, organizations could promote more flow experiences and reduce the strains experienced by their employees. Reducing role ambiguity and work conflict could lead to beneficial outcomes in terms of both work-related flow and occupational strains.

The results of this study also indicate that flow could be leveraged to potentially decrease the degree to which workers experience strains. Flow was negatively associated with burnout and buffered the effect of workload on burnout scores. Workers who reported high flow actually showed a slight negative

correlation between workload and burnout, while this same relationship was slightly positive for those reporting low flow. After intervening to create jobs and work contexts that promote flow, giving workers a challenging amount of work could also lead to less burnout.

Conclusion

This study represents the successful integration of constructs from positive psychology and OHP into the same research framework. Building upon the limited number of published articles in which researchers have included flow and stress in the same investigation, I attempted to clarify the role that flow might play in predicting occupational strain outcomes. Depending on the independent variable, flow functioned as both a moderator and a mediator in regression models predicting burnout and job satisfaction, but did not function as expected in predicting physical symptoms. Just as flow has been studied as the next step in workplace engagement research, it may also hold promise as a construct of interest to organizational health psychologists. Flow represents a potential way to promote well-being and mitigate strains through increasing people's engagement with their work activities.

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Appendix A: Contents of Survey

Consent Statement

A Study of Work Characteristics, Job Stress, and Well-being

You are requested to participate in a research study by researchers at Minnesota State University, Mankato regarding how job characteristics and experiences at work impact workers' well-being. This survey should take approximately 15 minutes to complete. This research aims to increase understanding of how the characteristics of jobs and the experiences of workers are related to occupational stress and well-being. Information obtained from you during the course of your participation will remain anonymous and will be used solely for research purposes. The risks of participating are minimal - no greater than are experienced in daily life.

Participation is voluntary. You have the option not to respond to any of the questions. You may stop taking the survey at any time (by closing your web browser) without experiencing any penalty or prejudice. Participation or nonparticipation will not impact your relationship with Minnesota State University, Mankato, nor will a refusal to participate result in a penalty or loss of benefits. If you have questions about the treatment of human participants and Minnesota State University, Mankato, contact Dean Barry J. Ries (Associate Vice President of Research, Dean of Graduate Studies, and IRB Administrator) at 507-389-2321 or barry.ries@mnsu.edu.

Responses will be anonymous: Your name will not be tied to your questionnaire responses. However, whenever one works with online technology, there is always the risk of compromising privacy, confidentiality, and/or anonymity. If you would like more information about the specific privacy and anonymity risks posed by online surveys, please contact the Minnesota State University, Mankato Information and Technology Services Help Desk (507-389-6654) and ask to speak to the Information Security Manager.

Your responses will be held in strict confidence and will be entirely anonymous. The results of this study may appear in an academic journal, blog, business magazine, or other media. Your participation will help us better understand the aspects of jobs that are the most beneficial for the well-being of workers. There are no direct

benefits to you for your participation, but society may benefit from the results of this research.

Selecting “Yes, I agree to participate” below will indicate your informed consent to participate, your assurance that you are at least 18 years of age, and your understanding of the above information.

If you have any questions about the survey please feel free to contact the investigator in this research, Dr. Daniel Sachau, at daniel.sachau@mnsu.edu or 507-389-5829.

MNSU IRBNet ID#653323-2

Date of MNSU IRB approval: September 8, 2014

Do you agree to participate in this research?
(Please print a copy of this page for your records)

Yes, I agree to participate.

No, I do not agree to participate.

Flow

Flow in Occupational Contexts Inventory (FOCI; Dahlke & Sachau, 2014)

This measure cannot be disseminated due to contractual obligations.

Job Resources

Skill Variety (JDS; Hackman & Oldham, 1974 [slightly modified])

- There is a lot of variety in my job.
- The job requires me to use a number of complex or high-level skills.
- The job is complex and requires me use a variety of skills.

Task Identity (JDS; Hackman & Oldham, 1974 [slightly modified])

- My job involves doing a "whole" and identifiable piece of work from beginning to end.
- The job provides me the chance to completely finish the piece of work I begin.
- The job is arranged so that I can do an entire piece of work from beginning to end.

Task Significance (JDS; Hackman & Oldham, 1974 [slightly modified])

- The results of my work are of high importance to others.
- The job is one where a lot of other people can be affected by how well the work gets done.
- The job itself is very significant and important in the broader scheme of things.

Autonomy (JDS; Hackman & Oldham, 1974 [slightly modified])

- I am able to decide how I do my work.
- The job gives me considerable opportunity for independence and freedom in how I do the work.
- The job gives me a chance to use my personal initiative and judgment in carrying out the work.

Feedback (JDS; Hackman & Oldham, 1974 [slightly modified])

- My work tasks themselves give a good indication of how well I am doing.
- Just doing the work required by the job provides many chances for me to figure out how well I am doing.
- After I finish a job, I know whether I performed well.

Skill Development and Professional Growth

- I learn new things on my job.
- I develop many skills on my job.
- My job utilizes my creativity.
- I grow professionally while performing my job.
- While doing my work, I build competence in things that I value.
- My job offers too few opportunities to acquire new knowledge and skills. (R; Kopelman, Greenhaus, & Connolly, 1983)

Job Demands**Hindrances****Work Conflict** (Kopelman, Greenhaus, & Connolly, 1983)

- At work I have to do things that should be done differently.
- I work under incompatible policies and guidelines at my job.
- At work I receive assignments without adequate resources to complete them properly.
- At work I receive incompatible requests from two or more people.

Role Ambiguity (Beehr, Walsh, & Taber, 1976 [slightly modified])

- I have clear goals to achieve on my job. (R)
 - o Original wording: My supervisor makes sure his people have clear goals to achieve.
- It is clear how I should do my work. (R)
 - o Original wording: My supervisor makes it clear how I should do my work.
- I know what performance standards are expected of me. (R)
 - o Original wording: I don't know what performance standards are expected of me.
- It is unclear what is expected of me on my job.
 - o Original wording: It is clear what is expected of me on my job.

Challenges

Workload

- The workload on my job is low. (R)
- I often have a large amount of work to do.

Time Urgency

- I have little time to accomplish my work tasks.
- I am given short deadlines for my work tasks.
- I have to work very quickly on my job.

Pressure

- Others in my organization have very high expectations for my performance.
- I am under high pressure from others to perform well on my job.

Strains

Physical Symptoms Inventory (PSI; Spector & Jex, 2011)

- Over the past month, how often have you experienced each of the following symptoms? (1 = Not at all; 2 = Once or twice; 3 = Once or twice per week; 4 = Most days; 5 = Every day)
 - An upset stomach or nausea
 - Trouble sleeping
 - Headache
 - Acid indigestion or heartburn
 - Eye strain
 - Diarrhea
 - Stomach cramps (not menstrual)
 - Constipation
 - Ringing in the ears
 - Loss of appetite
 - Dizziness
 - Tiredness or fatigue
- The following question was also asked: "Have you had the cold or flu within the past month?" (No = 0, Yes = 1)

Job Satisfaction (Iverson, Olekans, & Erwin, 1998)

- I find real enjoyment in my job.
- I like my job better than the average person does.
- I am seldom bored with my job.
- I would not consider taking another kind of job.
- Most days I am enthusiastic about my job.
- I feel fairly well satisfied with my job.

Oldenburg Burnout Inventory (OLBI; Demerouti, 1999)

- Exhaustion
 - There are days when I feel tired before I arrive at work.
 - After work, I tend to need more time than in the past in order to relax and feel better.
 - I can tolerate the pressure of my work very well. (R)
 - During my work, I often feel emotionally drained.
 - After working, I have enough energy for my leisure activities. (R)
 - After my work, I usually feel worn-out and weary.
 - Usually, I can manage the amount of work well. (R)
 - When I work, I usually feel energized. (R)
- Disengagement
 - I always find new and interesting aspects in my work. (R)
 - It happens more and more often that I talk about my work in a negative way.
 - Lately, I tend to think less at work and do my job almost mechanically.
 - I find my work to be a positive challenge. (R)
 - Over time, one can become disconnected from this type of work.
 - Sometimes I feel sickened by my work tasks.
 - This is the only type of work that I can imagine myself doing. (R)
 - I feel more and more engaged in my work. (R)

Demographic Items

- What is your current age in years?
- What is your sex (biological)?
 - Male
 - Female
 - Other
- What is the highest level of education that you have completed?
 - Less than high school
 - Some high school
 - High school graduate
 - Some college

- Associate's degree
- Bachelor's degree
- Some postgraduate/professional studies
- Postgraduate/professional degree
- In which industry do you currently work? (Open response)
- What is your current job title? (Open response)

Appendix B: Means, Standard Deviations, Reliabilities, and Bivariate

Correlations for All Scales Included in the Survey

Scale Name	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. FOCI	3.86	.67	(.91)															
2. Skill Variety	3.88	.83	.56**	(.80)														
3. Task Identity	3.87	.82	.48**	.41**	(.82)													
4. Task Significance	4.17	.69	.57**	.64**	.44**	(.78)												
5. Autonomy	4.05	.76	.58**	.55**	.45**	.55**	(.82)											
6. Feedback	4.02	.70	.66**	.57**	.55**	.67**	.65**	(.80)										
7. Growth	3.69	.74	.67**	.65**	.38**	.55**	.58**	.58**	(.84)									
8. Time Urgency	3.29	.80	.10*	.22**	.04	.15**	-.10*	.06	.03	(.70)								
9. Workload	3.70	.88	.20**	.34**	.11*	.36**	.18**	.24**	.23**	.21**	(.55)							
10. Pressure	3.64	.77	.14*	.33**	.12*	.36**	.10*	.17**	.14*	.50**	.33**	(.46)						
11. Work Conflict	2.80	1.01	-.15*	-.01	-.12*	-.10*	-.26**	-.20**	-.24**	.53**	-.03	.42**	(.87)					
12. Role Ambiguity	2.01	.77	-.50**	-.27**	-.40**	-.42**	-.48**	-.56**	-.49**	.15*	-.16**	.01	.51**	(.80)				
13. Exhaustion	2.65	.69	-.52**	-.22**	-.29**	-.26**	-.39**	-.39**	-.46**	.38**	.03	.24**	.56**	.50**	(.82)			
14. Disengagement	2.60	.72	-.64**	-.49**	-.34**	-.44**	-.51**	-.48**	-.69**	.17**	-.25**	.06	.49**	.52**	.71**	(.80)		
15. Job Satisfaction	3.59	.88	.76**	.56**	.44**	.49**	.53**	.56**	.73**	.03	.12*	.06	-.24**	-.47**	-.54**	-.75**	(.90)	
16. Physical Symptoms	1.78	.75	-.02	.04	.01	-.03	-.09	-.03	-.05	.30**	-.11*	.17**	.40**	.24**	.35**	.26**	-.04	(.92)

Note. *p < .05; **p < .001