PEFORMING UNDER PRESSURE: AN EXAMINATION OF PERFORMANCE, WORKLOAD, AND MEASURES OF ACUTE STRESS

by

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ABSTRACT

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Although many organizations use in-basket simulations as a means of selection and development, empirical guidance regarding the design of in-baskets is lacking. This study sought to fill that gap by examining the relationships between workload, stress, and performance using an in-basket simulation. Workload was manipulated by creating three variations of a task, differing only in quantity of issues to be addressed, to see how people perform under conditions that represent too much work, a moderate amount of work, and not enough work. Salivary cortisol samples were examined to investigate participants' stress levels throughout the simulation. Results revealed that performance was significantly higher and perceived stress was significantly lower for the underload group, compared to the other two groups.

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CHAPTER 1

INTRODUCTION

Identifying and selecting the best employees for particular jobs is an important task for organizations. High-performing workers are ideal since employee performance directly impacts the organization's bottom line. Poor performers can cost their employer money through the loss of production and in the costs of turnover and training (Cooper & Cartwright, 1994). While factors such as cognitive ability and personality have been examined to ascertain what characteristics are associated with poor performance and good performance (Berry, Page, & Sackett, 2007; Hough, 2001; Roberts & Hogan, 2001), other underlying factors related to differences in performance have not been fully explored (Britt, Stetz, & Bliese, 2004; Brown, Jones, & Leigh, 2005).

One factor that often affects employee performance is stress. Stress is a normal part of everyday existence (Costa & McCrae, 1992). Work-related stress is inevitable for most, if not all, employees. Individuals incur varying amounts of stress at their jobs on a daily basis. Reactions to stress, however, differ among individuals. Stress can lead otherwise good performers to work poorly (Liao & Masters, 2002; Whitehead, Butz, Kozar, & Vaughn, 1996) and in some instances may lead poor performers to work well (Lindahl, Theorell, and Lindblad, 2005). Stress is both physical and psychological (Dickerson & Kemeny, 2004; Quick & Tetrick, 2003) and as such, an examination of both aspects of stress is required to fully understand the nature of its impact on individuals.

It is well established that stress can have negative outcomes. Physical conditions such as cardiovascular disease (Dyck & Roithmayr, 2002) and diabetes (Quick, Quick, Nelson, & Hurrell, 1997) have been linked to chronic stress. The impact of stress on individuals can even lead to direct and significant costs for organizations (Sosik & Godshalk, 2000). Direct costs experienced by organizations include absenteeism, reduced productivity, and turnover. Estimated costs in the United States due to these and other factors are between 200 and 300 billion dollars (Le Fevre, Matheny, & Kolt, 2003). Given the estimated billions of dollars lost each year as the result of stress, it behooves an organization to identify employees' reactions to stress and how those reactions affect job performance.

Although the negative effects of stress are more commonly researched and discussed, work-induced stress may also produce positive outcomes. In his study of nurses, Simmons (2000) found that nurses who experienced high amounts of stress at their jobs were also highly engaged in their work. Engaged workers are those who are passionately involved in the demands of the task at hand (Quick & Tetrick, 2003), and thus, likely perform their jobs better than those not as fervently involved. An elevated amount of stress demands the individual's focused attention to the task (Quick & Tetrick, 2003). Quick, et al. (1997) associated stress with high performance. McGaugh, et al. (1995) found a relationship between stress with alertness and memory capacity.

Models of Stress

While many stress researchers have focused on stress from the biological viewpoint, Lazarus and Launier (1978) marked a change in research when they developed a cognitive-phenomenological model of stress. Lazarus and Launier suggested that before stress can take place, the individual must cognitively evaluate the potential stressor. From the evaluation, the individual must then perceive an imbalance between the demand of the stressor and his or her capability to deal with it (Sulsky & Smith, 2005). This model suggests that a specific situation may be perceived as "stressful" to some individuals but not stressful to others, depending on the individuals' cognitive appraisal of the situation.

The cognitive-phenomenological model of stress closely resembles the person-environment fit model (P-E fit). The P-E fit model views stress as the lack of fit between individual characteristics (i.e. abilities) and features of the environment (i.e. demands, supplies; Sulsky & Smith, 2005). P-E fit can be used to explain work stress. For example, an employee with limited interpersonal skills would not fit in well at a job that requires a high amount of interaction with others. In fact, that employee is likely to perceive that type of job as more stressful than would an employee with strong interpersonal skills. Hence, a particular job task may be viewed as stressful to some, but not stressful to others.

Another influential model in the study of work stress is the job demands-job decision latitude model (Karasek, 1979). This model suggests that psychological strain results from the interaction of job demands and the decision latitude available to the employee; where job demands are defined as "psychological (not physical) stressors present in the work environment", and decision latitude is defined as "a measure of discretion in decision making or job control" (Sulsky & Smith, 2005, p. 37). For example, an employee who must contend with customer complaints on a daily basis experiences stress due to job demands, while a person who is routinely forced to choose between which shipping service will best meet each customer's needs is confronted with stress from decision latitude. According to this model, stress occurs when job demands are high and job control (decision latitude) is low. From his research, Karasek concluded that stress levels and productivity are affected by the amount of job control available to workers. The current study manipulated job demand by varying the amount of tasks to be completed within a certain amount of time.

The process model of task performance was developed by McGrath (1976) to explain the stress that is related to job task performance. This model hypothesizes that performance is a function of perceived stress and the overload of the task, where an individual decides what responses are needed to complete the task. These responses lead to the performance process, where the chosen behaviors are evaluated. Finally, the outcome process indicates whether the selected behaviors produce the desired outcome (Sulsky & Smith, 2005).

Work Performance

Information regarding an employee's performance is useful for a variety of reasons. Decisions regarding compensation, career development (i.e. training program assignments), and selection (i.e. hiring decisions, promotions) are often based on the employee's performance on the job (Landy & Farr, 1983; Yammarino & Waldman, 1993). Evaluation of performance is an ongoing activity. Informal evaluation of an employee's performance is constantly conducted by the self, supervisors, peers, and subordinates (Mohrman, Resnick-West, & Lawler, 1989) through mere observation during routine contact. While this general evaluation is inevitable, it is also subjective.

To avoid subjectivity, many organizations use more objective processes to quantify work performance. Formal performance evaluations provide specific data regarding the employee's effectiveness, productivity, and developmental needs which are needed by both the employee and the organization. This type of information is obtained from performance ratings such as an annual appraisal conducted by the employee's direct supervisor. Although this method is popular, these performance evaluations typically measure employees' overall performance in broad terms across time.

The focus of this study is the measurement of performance as a means of selection. When selecting individuals for a particular job, organizations aim to predict who will perform best in the job position (Borman, Hanson, & Hedge, 1997). Predictions of individual performance are often based on personal interviews, cognitive ability tests, personality inventories, or investigation of past performance through reference checks or performance evaluations. While these methods have proved to be predictive of job performance (e.g., Barrick & Mount, 2003; Krajewski, Goffin, McCarthy, Rothstein, & Johnston, 2006; Reilly & Chao, 1982; Schmidt, 2002), specific exercises that resemble real tasks required of the job incumbent are worthy of examination.

Observing relevant samples of behavior are likely to be more valuable in predicting future performance (Wernimont & Campbell, 1968). Work samples that include tasks similar to the job in question are valid predictors of performance on the job (Schmitt, Gooding, Noe, & Kirsch, 1984)

An individual work sample, the in-basket simulation, was the main tool used in the current study. The in-basket simulation is described in detail in the pilot studies section. The key aspect examined in this study is the relationship between stress and person-job fit.

Stress and Performance

Occupational stress has been found to be predictive of work performance. Hourani, Williams, and Kress (2006) found that employees who reported high levels of stress (both occupational and family stress) were more likely to report productivity loss in the form of absenteeism, working below their normal performance level, and being injured on the job than employees who reported low to moderate amounts of stress. Bond and Bunce (2001) found that administrative employees who reported lower levels of stress also rated their job performance higher and reported higher levels of job control than employees who reported higher levels of stress. Studies of university faculty and staff employees found that work stress negatively influenced job performance (Armour, Caffarella, Fuhrmann, & Wergin, 1987; Gillespie, Walsh, Winefield, Dua, & Stough, 2001).

Poor performance may be explained by many factors. Role ambiguity (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), the physical environment such as noise and temperature (Evans & Johnson, 2000; Jensen, 1983), and shift work (Colquhoun & Rutenfranz, 1980) all may bring about poor performance. Tasks that workers deem too stressful are an obvious culprit of poor performance. Work overload has been found to be linked to perceived stress and poor performance (Motowidlo, Packard, & Manning, 1986).

Workload

Work overload is common for many workers across various occupations. Some individuals experience bouts of overload during peak times. Cashiers and store managers often feel overloaded with work demands during the busy holiday shopping season, and accountants are inundated with clients during tax season. Other individuals experience overload at their jobs on a more continuous basis. Emergency room employees (e.g., doctors, nurses, receptionists) are faced with many critical demands daily. This overload of job demands is likely to take a toll on workers.

Work overload has been linked to anxiety, depression, lack of sleep, morale, somatization, and job satisfaction (Britt, et al., 2004). Lundberg and Hellstrom's (2002) study on full-time working women found that those who had high amounts of work overload demonstrated significantly higher levels of a stress-related hormone (cortisol) than those workers with moderate and low amounts of work load. A study examining both men and women workers found that those working in high-strain jobs experienced significantly more stress than those men and women in low-strain jobs (Steptoe, Cropley, Griffith, & Kirschbaum, 2000).

The strain of work overload can lead to serious problems for individuals. For example, in a recent survey of 270 salespeople in various industries, Cummings (2001, p. 46) found that job demands had prevented employees from exercising regularly (72.2%), caused them to gain weight (69.2%), caused them to become ill (58.7%), harmed their marriage or significant relationship (48.8%), contributed to long-term health conditions (36.6%), and caused them to smoke or drink more alcohol (32.9%). Work overload is also likely to impact job performance (Brown, et al. 2005).

In their study of university professors, Boyd and Wylie (1994) found that increased workloads and work stress resulted in poor performance. The professors did not meet their regular duties of conducting research, publishing manuscripts, and attending professional development due to their demanding workload and subsequent stress.

Maslach (1982) emphasized emotional exhaustion, a chronic state of emotional and physical depletion (Cropanzano, Rupp, & Byrne, 2003), as a primary component in his model of burnout. Demerouti, Bakker, Nachreiner, and Schaufeli (2001, p. 499) suggested that "emotional exhaustion closely resembles traditional stress reactions that are studied in occupational stress research." Hence, it is reasonable to view emotional exhaustion as a result of workplace stress. Cropanzano, et al. (2003) found emotional exhaustion to be negatively related to job performance among hospital workers.

While poor performance is often blamed on overstressed workers, under stressed workers must also be examined. Martin and Tesser (1996) proposed that individuals become distracted with off-task thoughts, or daydream, when their environment is not demanding enough. Repetitive, monotonous work is common in industrial factories and plants. The tasks presented in these jobs are relatively simple, do not require innovative thought, and typically do not produce much stress. Intellectual individuals become easily bored in these types of jobs (Fisher, 1993). Workers who find their jobs boring are likely to perform worse than workers who are engaged in their job. While employees working on a low-stress or non-stressful task are likely to be less attentive to the task and more apathetic, those working on tasks which are too stressful often perform poorly due to overload. Fitting individuals with a job that produces the "right" amount of stress is key in employment selection.

The amount of stress that may be tolerated, or the stress "threshold", will vary for each employee. As some workers have a need for high amounts of pressure, others perform best under less stressful situations. This relationship between stress arousal and performance is best described by the Yerkes-Dodson law. This model, illustrated by an inverted-U, states that performance increases as stress increases up to a point. After that point, performance actually decreases with the increase of stress (Yerkes & Dodson, 1908).

It is well established that job performance is related to workload (e.g., Hourani, et al., 2006) and that stress is related to workload (e.g., Lundberg & Hellstrom, 2002). The following models imply that stress may actually mediate the relationship between workload and performance: cognitive-phenomenological model of stress (Lazarus & Launier, 1978), P-E fit model (Sulsky & Smith, 2005), job demands-job decision latitude model (Karasek, 1979), process model of task performance (McGrath, 1976).

Measurement of Stress

Questionnaires, surveys, and interviews are often used in the field of industrial and organizational psychology to gauge an individual's stress level. Although these self-report measures have a great deal of face validity (Sulsky & Smith, 2005), they also have shortcomings.

Individuals may exaggerate or conceal their perceived stress on self-reported responses. Problems may also arise due to the wording of the questionnaires on surveys used and individuals' memories of stressful events may be inaccurate. To circumvent these potential problems, this study used a physiological measure of stress.

Cortisol is the major natural glucocorticoid produced in the adrenal cortex (Bakke, et al. 2004). Cortisol, a widely-studied stress hormone, is considered an important aspect of physiological response during stress in humans (Chan, et al. 2006). As stress levels increase, cortisol secretion also increases (Dahlgren, Akerstedt, & Kecklund, 2004).

Cortisol levels naturally fluctuate throughout the day, with their peak between 5:00 a.m. and 10:00 a.m. and their lowest point between 4:00 p.m. and 8:00 p.m. (Sulsky & Smith, 2005). In contrast to blood and urine samples, cortisol samples collected from saliva are regarded as a noninvasive approach (Bakke, et al. 2004).

Psychological Stress and Cortisol

It has been well proven that physical stressors such as electric shock or intense exercise elicit an increase in cortisol levels in humans (e.g., Bouget, Rouveix, Michaux, Pequignot, & Filaire, 2006). Even tasks considered psychological stressors, such as public speaking, have been known to increase stress as measured by elevated cortisol levels (Kirschbaum, et al. 1995). In their comprehensive meta-analysis, Dickerson and Kemeny (2004) found that uncontrollable events such as time constraints or completing impossible tasks were associated with significantly higher responses in cortisol levels than controllable events.

This study utilized two uncontrollable events. A time limit was imposed to complete an assigned task and an unanticipated task was given half-way through the simulation. These two uncontrollable events were expected to create stress for participants as measured by an increase in cortisol levels. Stress was further manipulated by developing three conditions that differed in the amount of work (workload) expected for the participants to complete. This stress was expected to mediate the participants' performance on the task.

Hypotheses

This study was designed to examine the relationship between work load, stress, and performance.

H1: Self-reports of stress will be significantly higher for participants in the “overload” condition than for participants in the “moderate” condition and for participants in the “underload” condition.

H2: Self-reports of stress will be significantly higher for participants in the “moderate” condition than for participants in the “underload” condition.

H3: Participants in the “overload” condition will show significantly greater increases in cortisol (delta) across time than will participants in the “moderate” condition and participants in the “underload” condition.

H4: Participants in the “moderate” condition will perform significantly better on the in-basket simulation than participants in the other two conditions.

H5: The relationship between workload and performance will be mediated by participants’ overall stress.

CHAPTER 2

METHOD

Pilot Studies

The purpose of the pilot studies was to develop an in-basket simulation and a self-report measure of stress. An in-basket is a “day in the life of” simulation in which participants are presented with realistic tasks and specific problems relating to a target job (Collins, et al., 2003). Typically, the in-basket simulation contains paper memos, phone messages, and letters that have (or might have) accumulated in the “in-tray” on an incumbent’s desk (Thornton & Rupp, 2004). A wide variety of job content can be presented during the in-basket (Schippmann, Prien, & Katz, 1990) in a relatively short amount of time.

Upon receiving the in-basket materials, participants are directed to respond as they see appropriate. Possible actions may include scheduling meetings, delegating tasks to others, writing memos, or directing subordinates (Thornton & Rupp, 2004). The time constraints presented in the in-basket simulation force the participant to set priorities and execute the most crucial decisions first (Thornton, 1992). The participant’s performance on the in-basket simulation is evaluated by trained raters and varies based on the quality and quantity of the participant’s responses.

In-basket simulations subject the participant to time constraints, performance demands, and often ambiguous situations. These factors are likely to induce stress in participants, which may impact their performance on the in-basket task. While organizational researchers have been interested in the relationship between performance and stress, the relationship between job-related stressors (such as workload) and job performance has not been clearly demonstrated. Previous research has been inconclusive and weak.

In workplace settings, Srinivas and Motowidlo (1987) examined the effects of participant stress after completing two different versions of an in-basket simulation. They found that the participants who completed a stressful in-basket simulation were less accurate than those who completed an unstressful in-basket. They suggested that the stress of the in-basket affected the retrieval stage of information processing. These findings are consistent with those suggested in relation to highly stressful events and elevated cortisol levels.

Although in-baskets are used in many U.S. organizations (Spychalshi, Quinones, Gaugler, & Pohley, 1997), instructions regarding how to design in-baskets, specifically how many items to include, is non-existent. Thornton and Mueller-Hanson (2004) suggest that thirty or more items are usually included in an in-basket simulation, but they do not indicate how much time to allow. There is no known research suggesting the number of items per hour to include in an "easy" or "challenging" in-basket. This study seeks to investigate that issue.

Participants

A total of 103 University of Texas at Arlington (UT-Arlington) students, enrolled in undergraduate psychology courses, participated in the pilot studies. The students were recruited from the university experimentation website and received course credit for their participation. Most of the participants ($n = 47$, 45.6%) were women and 36 (35%) were men, while 20 (19.4%) did not report their gender. Most of the participants indicated their race as White/Anglo-American ($n = 29$, 28.2%). The rest of the participants indicated their race as Black/African-American ($n = 18$, 17.5%), Asian ($n = 13$, 12.6%), other or multiracial ($n = 17$, 16.5%), and 26 people (25.2%) did not report their race. Ages of the student sample ranged from 18 to 53 years, with a mean age of 22.09 ($SD = 6.51$) years.

Materials

The Work Performance Lab at UT-Arlington created the SportsDome International (SDI) in-basket simulation. The SDI in-basket simulation is designed around a safety and security director for a fictional sporting arena company called SportsDome International. The in-basket contained 24 items (individual papers that presented issues for the participant to manage). A stack of response forms was provided for participants to handwrite their responses to the issues. Participants were given one hour and fifteen minutes to complete the in-basket.

Pilot Study 1 Results

A team of researchers (undergraduate and graduate students) scored the participants' in-baskets. The raters were trained on how to score in-baskets using the frame of reference (FOR) training method. FOR training is used in practice to align individual perspectives for the task of rating and is shown to be more reliable and more accurate than other training methods (Schleicher, Day, Mayes, & Riggio, 2002). Two in-baskets were used for training; one used as an exemplar of poor performance and the other represented high performance. Raters scored the in-baskets by evaluating each action taken by the participant. Scores ranged from 1 ("Ineffective") to 5 ("Highly Effective"), with an option of "0" ("no action taken").

Participant performance (the dependent variable) was evaluated overall by combining each item scored to produce a mean score. The mean performance was 1.96 (SD = .72), indicating that overall performance on the in-basket was slightly below "Effective". The results of the pilot study helped gauge the amount of items (workload) to include in each of the three conditions for the main study.

Pilot Study 2

While Pilot Study 1 was underway, a self-report measure of stress was developed and included into the process. The custom In-basket Stress Scale (IBSS) asks participants to report their perceptions regarding the in-basket simulation (Appendix A). Example items are "I felt nervous and stressed in the in-basket simulation" and "I felt unable to do everything that I wanted to do in the in-basket". Responses ranged from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Three of the ten items were reverse scored. Reliability for this measure was $\alpha = .85$.

A factor analysis was conducted on the Statistical Package for the Social Sciences (SPSS) to analyze the IBSS. Nine of the ten items emerged as one component with a scale alpha of $\alpha = .867$. The remaining item, "I felt that I effectively coped during the in-basket simulation" did not load onto the component. Mean scores were computed to measure each participant's (N =

60) overall perceived stress. The mean overall stress score was 2.68 (*SD* = .77), indicating that participants felt mildly stressed during the in-basket simulation.

Main Study

Participants

A total of 177 University of Texas at Arlington undergraduate students participated in the main study. Data collected from 25 participants was not included due to incomplete information. Of the remaining sample of 152 participants, 89 (58.6%) were women and 63 (41.4%) were men. Most of the participants indicated their race as White/European/Caucasian (n = 63, 41.4%). The rest of the participants indicated their race as Black/African American (n = 44, 28.9%). Mexican/Mexican American (n = 19, 12.5%), Asian/Asian American (n = 8, 5.3%), or some other race (n = 16, 10.6%). Two participants (1%) did not their report their race. The participants' ages ranged from 18 to 50 years, with an average age of 21.21 (*SD* = 5.06).

Students were recruited to participate through the university experimentation website and received course credit for their involvement in the study. Participants volunteered for the study by signing up for the session most convenient for them. Each session began at 8:00 a.m. and ended at 10:20 a.m. Participants completed the study in groups of up to 8 people. The size of each group depended on how many participants signed up for each particular session and how many participants actually arrived on time.

Materials

In-Basket Simulation. The in-basket simulation used for the pilot studies was also used for the main study. To investigate the proposed hypotheses, the content of the in-basket simulation was altered to develop three versions which differed in regard to the number of issues per unit time ratio. The three in-baskets were designed to represent different workload conditions: "underload", "moderate" workload, and "overload". The number of items in each in-basket included 10 for the underload condition, 20 items for the moderate condition, and 30 for the overload condition. The time provided to complete each in-basket (1 hour) remained constant across conditions. Each group of participants was randomly assigned to one of the three workload conditions upon arrival. According to a priori power analysis conducted on G-Power software, a sample size of 36 participants in each condition is needed for adequate power (.80). The final sample size for each group is as follows: underload (n = 49), moderate (n = 56), overload (n = 47).

In-Basket Stress Scale, Version II. The IBSS-II was comprised of the original ten IBSS items plus 14 additional items were included on a post-exercise survey (Appendix B). The additional items asked questions regarding the participants' motivation and involvement during the in-basket simulation. An example item is "I was actively involved during the in-basket simulation". Responses ranged from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), with higher scores indicating higher motivation.

An exploratory factor analysis for all 24 items was conducted on SPSS. An orthogonal (varimax) rotation was used because the survey items were expected to yield two or more unrelated factors. Analysis of the scree plot, eigenvalues, and component matrix yielded a two-factor model. Most of the items (n = 14) loaded onto the in-basket stress component, with a scale alpha of α = .91. Eight items loaded onto the motivation component, with a scale alpha of α = .84. The two components explained 45% of the total variance. Two items, "I was able to control the way I spent my time during the in-basket" and "One hour was too much time for the in-basket simulation" did not load onto either of the two components. Table 2.1 presents the factor loadings of each item.

Table 2.1 Factor Loadings of IBSS-II

	In-basket Stress Component	Motivation Component
*I felt unable to effectively deal with the important issues and problems during the in-basket simulation.	.83	
*I did not have enough time to do a good job on the in-basket simulation.	.81	
*There were too many items in the in-basket simulation.	.77	

Table 2.1 – Continued

	In-basket Stress Component	Motivation Component
*The amount of items given to me interfered with my performance on the in-basket simulations.	.76	
*I felt that I was on top of thing during the in-basket simulation. (Reverse Scored)	.71	
*I felt unable to do everything I wanted to do during the in-basket simulation.	.70	
*I felt that things did not go my way during the in-basket simulation.	.68	
*I felt nervous and stressed during the in-basket simulation.	.66	
*The in-basket simulation was stressful.	.64	
*I felt that I effectively coped during the in-basket simulation. (Reverse Scored)	.61	
I could have performed better if there had been less work to do during the in-basket simulation.	.58	
All things considered (time and number of issues), I feel that I performed well on the in-basket simulation. (Reverse Scored)	.58	
The in-basket simulation created situations that were outside of my control.	.55	
The urgent mail messages delivered during the in-basket simulation bothered me because they were unexpected.	.53	
I care about my performance on the in-basket simulation.		.83
I would be interested in reading about the results of the in-basket simulation.		.72
I was actively involved during the in-basket simulation.		.71
The work I did during the in-basket simulation is important to me.		.70
The in-basket simulation was a good use of my time.		.65
I worked to the best of my abilities on the in-basket simulation.		.61
I was bored during the in-basket simulation. (Reverse Scored)		.59
I only care about getting my research credits. (Reverse Scored)		.58

*indicates item from original IBSS

Procedure

Prior to arriving for the study, participants received a message via electronic mail requesting that they refrain from the following one hour before the study: food, caffeinated drinks, tobacco, and strenuous exercise. After all participants arrived at the designated location at the assigned time, they were briefed on the procedures of the study and asked to consent to the experimental conditions. Participants were given written instructions outlining the activities of the experiment. Consent forms were distributed, signed, and collected.

Participants were then given two surveys to complete. The purpose of the surveys was to provide “busy work” for a rest period before the baseline sample of cortisol was taken. Participants were given 25 minutes to complete both surveys. A stress level measure was then taken by asking each participant to provide a salivary sample which contained the baseline cortisol secretion (T1 = baseline).

In contrast to blood samples, cortisol samples collected from saliva are less invasive and are widely regarded as a less stressful approach (Bakke, et al. 2004). The administrator collected salivary cortisol samples by having participants place a cotton wedge (Salivette; Sarstedt Corp.) in their mouth.

Participants were then given 15 minutes to review background information regarding the in-basket simulation. After all questions were answered, the simulation began with the delivery of the in-basket contents. Each group of participants was randomly assigned to one of the three in-basket conditions. Participants in the underload condition were given 8 initial items, while those assigned to the moderate condition were given 18 initial items, and participants in the overload condition were given 28 initial items. All participants were then told that they had one hour to complete the in-basket.

Thirty minutes after the start of the in-basket, another sample of salivary cortisol was collected from each participant (T2). This sample is expected to represent the participant’s initial stress level. Participants were then given “urgent messages” and were reminded that they had 30 minutes remaining to finish the simulation. The “urgent messages” contained two more issues that required immediate attention and are presumed to heighten participants’ stress levels. The information presented in the “urgent messages” was consistent across conditions.

When the simulation time limit had been reached, all in-basket materials were collected and two surveys were distributed. One survey was the in-basket Stress Scale Version II (IBSS-II). The other survey was implemented as a filler task before the third cortisol sample was taken. Participants were allowed 15 minutes to complete both surveys. After the 15 minutes passed, a final sample of salivary cortisol was collected (T3). This sample is meant to represent each participant's peak stress level. A total of three samples of salivary cortisol were collected throughout the study at 45 minute intervals. To conclude the study, participants were asked to complete two surveys regarding demographic information and their general perceptions about the experiment. They were then given a debriefing form and general questions regarding the study were answered.

Variables and Analyses

Performance. Although the three versions of the in-basket differed in the amount of items they included, a set of ten items were used in each condition. The ten items that made up the underload condition served as "core" items that were also included in the moderate and overload in-baskets. Performance on each of the core items was measured using a behaviorally anchored rating scale (BARS). Scores ranged from 1 ("Very Ineffective") to 5 ("Very Effective"), with an option of 0 ("No Action Taken"). The scores assigned on these core items were averaged to create a variable representing an objective measurement of in-basket performance ("core performance").

Six undergraduate research assistants scored the participants' in-basket responses. In an effort to reduce potential rater bias, these six raters were chosen because they had no previous in-basket scoring experience. The raters were divided into three teams. Each team consisted of two (one male and one female) raters, and were assigned to score each in-basket in either the underload, moderate, or overload condition. The raters were blind to the experimental conditions. FOR training methods were used, just as was done for the pilot study. Raters scored the in-baskets by evaluating each action taken by the participant on a BARS specifically designed for each condition. Each in-basket was scored by two raters. Their two scores were then averaged together to create a mean score. Means, standard deviations, and correlation coefficients for core performance (and all other study variables) can be found in Appendix C (Tables G.1, G.2, and G.3). Intraclass correlations can be found in Table 2.2. Differences in performance between conditions were measured using Analysis of Variance (ANOVA) in SPSS.

Table 2.2 Intraclass Correlations Between Raters for Each In-basket

Underload Condition		Moderate Condition		Overload Condition	
Participant ID #	ρ_I	Participant ID #	ρ_I	Participant ID #	ρ_I
FA07V2 1018	.74**	FA07V2 1001	.49*	FA07V2 1016	.90**
FA07V2 1025	.97**	FA07V2 1007	.91**	FA07V2 1017	.94**
FA07V2 1026	.79**	FA07V2 1011	.69**	FA07V2 1027	.91**
FA07V2 1028	.75**	FA07V2 1019	.77**	FA07V2 1033	.71**
FA07V2 1029	.79**	FA07V2 1021	.98**	FA07V2 1035	.98**
FA07V2 1030	.79**	SP07V21001	.91**	FA07V2 1036	.81**
FA07V2 1031	.74**	SP07V21002	.83**	FA07V2 1037	.87**
SP08V21006	.74**	SP07V21003	.59**	FA07V2 1038	.88**
SP08V21007	.88**	SP08V21004	.79**	FA07V2 1039	.78**
SP08V21008	.55*	SP08V21005	.94**	FA07V2 1040	.86**
SP08V21011	.63*	SP08V21020	.87**	SP08V21034	.79**
SP08V21012	.93**	SP08V21021	.77**	SP08V21035	.91**
SP08V21013	.64*	SP08V21022	.89**	SP08V21036	.90**
SP08V21014	.89**	SP08V21024	.92**	SP08V21062	.79**
SP08V21015	.93**	SP08V21025	.75**	SP08V21063	.87**
SP08V21016	.90**	SP08V21026	.84**	SP08V21064	.92**
SP08V21017	.63*	SP08V21027	.95**	SP08V21067	.88**
SP08V21018	.69**	SP08V21029	.84**	SP08V21068	.88**

Table 2.2 - Continued

Underload Condition		Moderate Condition		Overload Condition	
Participant ID #	ρ_I	Participant ID #	ρ_I	Participant ID #	ρ_I
SP08V21038	.82**	SP08V21030	.58**	SP08V21069	.78**
SP08V21039	.76**	SP08V21031	.68**	SP08V21070	.97**
SP08V21040	.70**	SP08V21032	.61**	SP08V21071	.89**
SP08V21054	.81**	SP08V21058	.90**	SP08V21072	.78**
SP08V21056	.92**	SP08V21059	.66**	SP08V21073	.74**
SP08V21057	.96**	SP08V21060	.51*	SP08V21074	.97**
SP08V21061	.87**	SP08V21065	.71**	SP08V21075	.70**
SP08V21080	.84**	SP08V21066	.94**	SP08V21076	.90**
SP08V21081	.85**	SP08V21092	.76**	SP08V21077	.91**
SP08V21089	.88**	SP08V21093	.48*	SP08V21078	.82**
SP08V21090	.57*	SP08V21119	.88**	SP08V21079	.94**
SP08V21091	.87**	SP08V21120	.95**	SP08V21082	.73**
SP08V21094	.95**	SP08V21121	.51*	SP08V21083	.97**
SP08V21095	.89**	SP08V21122	.73**	SP08V21084	.97**
SP08V21096	.90**	SP08V21123	.83**	SP08V21085	.50*
SP08V21097	.82**	SP08V21124	.78**	SP08V21087	.87**
SP08V21098	.76**	SP08V21125	.46*	SP08V21088	.91**
SP08V21105	.91**	SP08V21126	.83**	SP08V21099	.87**
SP08V21106	.79**	SP08V21127	.87**	SP08V21100	.87**
SP08V21107	.95**	SP08V21128	.96**	SP08V21101	.86**
SP08V21108	.96**	SP08V21129	.95**	SP08V21102	.99**
SP08V21109	.77**	SP08V21130	.95**	SP08V21103	.97**
SP08V21110	.56*	SP08V21131	.95**	SP08V21104	.70**

Table 2.2 – Continued

Underload Condition		Moderate Condition		Overload Condition	
Participant ID #	ρ_I	Participant ID #	ρ_I	Participant ID #	ρ_I
SP08V21111	.58*	SP08V21132	.77**	SP08V21147	.44*
SP08V21112	.61*	SP08V21133	.88**	SP08V21148	.96**
SP08V21113	.66*	SP08V21134	.94**	SP08V21149	.97**
SP08V21114	.70**	SP08V21135	.97**	SP08V21150	.99**
SP08V21115	.73**	SP08V21136	.92**	SP08V21151	.89**
SP08V21116	.92**	SP08V21137	.95**	SP08V21152	.91**
SP08V21117	.92**	SP08V21138	.91**		
SP08V21118	.85**	SP08V21139	.93**		
		SP08V21140	.93**		
		SP08V21141	.91**		
		SP08V21142	.94**		
		SP08V21143	.96**		
		SP08V21144	.92**		
		SP08V21145	.98**		
		SP08V21146	.83**		

*p < .05. **p < .01.

Stress. Two measures of stress were used, one physiological measure and one measure of perceived stress. The three salivary cortisol samples were the measures of physiological stress. The cortisol concentrations were determined using ELISA kits (Salimetrics; State College, PA). Cortisol concentrations ranged from .019 μg/mL to 1.417 μg/mL. A 3 (condition) X 3 (time) ANOVA was performed to examine change in cortisol levels across conditions.

Responses on the IBSS-II were averaged to measure each participants' overall perceived stress during the in-basket. The 14 items that emerged as the in-basket stress component from the factor analysis were used to compute the overall perceived stress variable. Responses ranged from 1 to 5, with high scores indicating high levels of stress. To determine possible differences in perceived stress between conditions, a one-way between-subjects ANOVA was conducted in SPSS.

CHAPTER 3

RESULTS

ANOVA results revealed a main effect for condition on perceived stress, F (2, 149) = 5.04, $p < .01$, partial $\eta^2 = .06$. Participants in the underload condition reported significantly lower levels of stress than did participants in the moderate condition and participants in the overload condition. There was no significant difference in perceived stress for the moderate condition compared to the overload condition. The means and standard deviations of each IBSS-II item may be found in Table 3.1.

Table 3.1 Means and Standard Deviations for Each IBSS- II Item

	M	*SD*
The urgent mail messages delivered during the in-basket simulation bothered me because they were unexpected.		
Underload Condition	2.49	1.12
Moderate Condition	2.64	1.10
Overload Condition	2.19	1.08
I felt unable to effectively deal with the important issues and problems during the in-basket simulation.		
Underload Condition	2.04	1.10
Moderate Condition	2.59	1.28
Overload Condition	2.47	1.10
I felt nervous and stressed during the in-basket simulation.		
Underload Condition	2.43	1.04
Moderate Condition	2.68	1.22
Overload Condition	2.81	1.19
I felt that things did not go my way during the in-basket simulation.		
Underload Condition	2.06	.80
Moderate Condition	2.50	1.04
Overload Condition	2.49	1.00
I felt unable to do everything I wanted to do during the in-basket simulation.		
Underload Condition	2.69	1.33
Moderate Condition	3.34	1.31
Overload Condition	3.45	1.18

Table 3.1 – Continued

		M	*SD*
I felt that I was on top of things during the in-basket simulation. (Reverse Scored)			
	Underload Condition	2.27	.93
	Moderate Condition	2.66	1.15
	Overload Condition	2.38	1.03
The in-basket simulation created situations that were outside of my control.			
	Underload Condition	2.82	1.22
	Moderate Condition	3.11	1.28
	Overload Condition	3.38	1.11
I was able to control the way I spent my time during the in-basket simulation. (Reverse Scored)			
	Underload Condition	2.63	1.35
	Moderate Condition	2.73	1.26
	Overload Condition	2.74	1.28
The in-basket simulation was stressful.			
	Underload Condition	2.67	1.13
	Moderate Condition	3.13	1.20
	Overload Condition	3.30	1.21

These results partially support Hypothesis 1, which predicted that participants in the overload condition would report significantly more stress than would participants in the underload and the moderate conditions. These results do, however, fully support Hypothesis 2, which predicted that participants in the moderate condition would report more stress than would participants in the underload condition. These results indicate that people who were given 20 items and people who were given 30 items to complete in a one-hour in-basket simulation felt significantly more stressed than those people who were given only 10 items to complete in the same amount of time. The results also indicate that there was no substantial difference in the stress levels of people given 20 items and people given 30 items.

The third hypothesis predicted that participants in the overload condition would exhibit the greatest increases in cortisol levels throughout the in-basket because they were given the most amount of work to complete compared to participants in the other two conditions. To evaluate change in cortisol levels throughout the in-basket, a 3 (workload condition) X 3 (time) ANOVA, with cortisol collection time as a within-subjects effect and workload condition as a between-subjects effect, was performed. Although there was a main effect for time, F (2, 148) = 83.34, p < .001, partial η^2 = .53, the changes decreased at each collection for all three conditions (Figure 3.1).

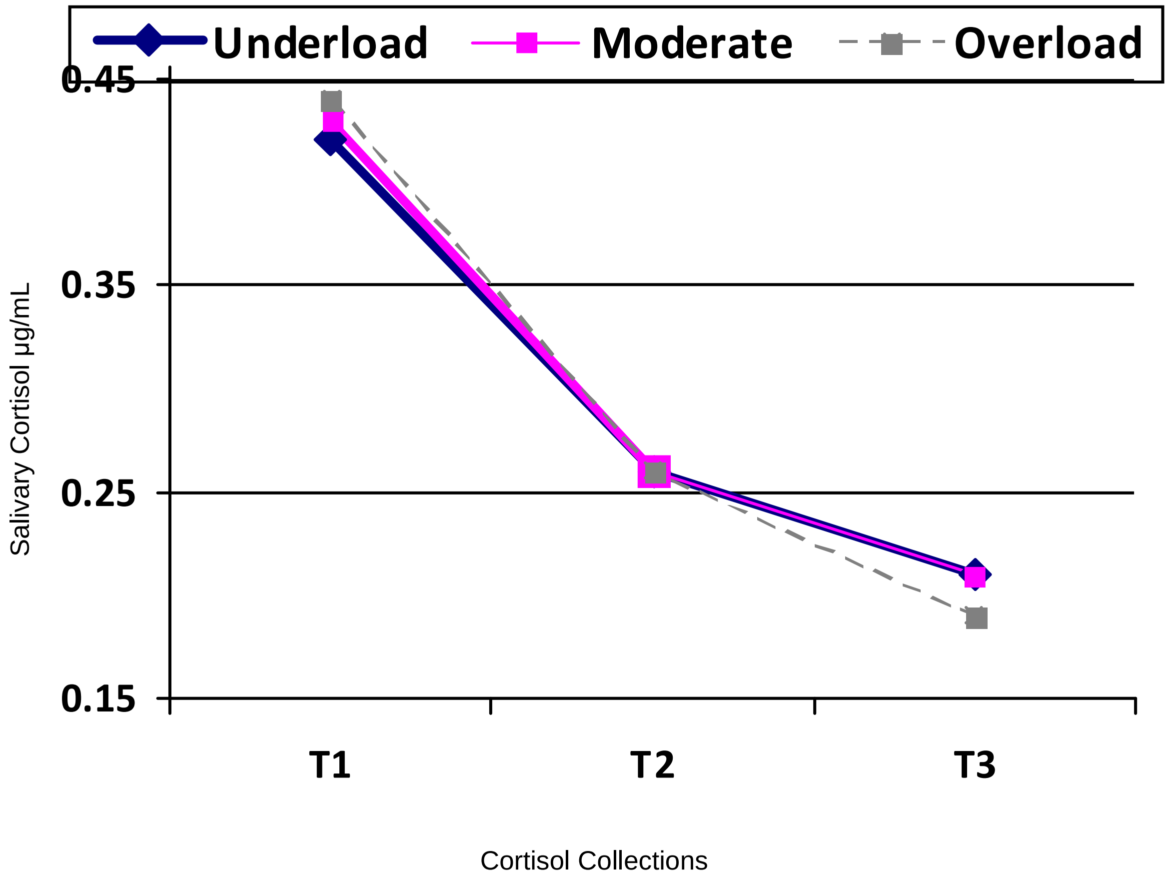

Figure 3.1. Group Differences in Cortisol Levels.

Time 3 cortisol samples were significantly lower than Time 2 samples and Time 2 samples were significantly lower than Time 1 samples, for all conditions. These results are in the opposite direction of what was predicted of the overload condition, thus Hypothesis 3 was not supported. Furthermore, there was no main effect for condition, F (2, 149) = .01, p = *n.s.*, nor was there a significant time X condition interaction, F (4, 296) = .41, p = *n.s*.

These findings indicate that the three variations of the in-basket (representing underload, moderate workload, and overload) did not elicit significant differences in changes in cortisol levels. In other words, the physiological experience of stress did not differ for participants between workload conditions. While cortisol levels changed across time within each condition, the changes reflected a decrease in cortisol throughout the in-basket, suggesting that participants in all conditions felt less stressed as they completed the in-basket simulation.

Based on the Yerkes-Dodson Law, Hypothesis 4 predicted that participants in the moderate workload condition would outperform participants in both the underload and overload conditions. A one-way between-subjects ANOVA was conducted with core performance entered as the dependent variable and workload condition as the independent variable. A main effect for condition was found, F (2, 149) = 14.80, $p < .001$, partial $\eta^2 = .17$. Participants in the underload condition performed significantly better than those in the moderate condition and those in the overload condition. The difference in performance for the moderate and overload conditions was not significant. These results do not support Hypothesis 4.

Hypothesis 5 predicted that perceived stress would serve a meditational role between workload and performance. Methods used for mediation analysis were based on the guidelines set forth by Sobel (1982). First, a regression was conducted with the independent variable (workload) predicting the mediator (perceived stress). Next, a regression was conducted with the independent variable (workload) and the mediator (perceived stress) predicting the dependent variable (performance). The Sobel Test (1982) was then conducted by inserting the unstandardized regression coefficients and standard errors into the model. Results revealed a non-significant relationship, $t = .89$, $p = .37$. This indicates that stress did not serve as a mediator between workload and performance on the in-basket simulation for this study.

A series of regressions were performed in an effort to learn what, if anything, was associated with performance on the in-basket. It was predicted that people who were motivated to perform well on the in-basket would in fact score higher than those not as motivated. Therefore, a mean motivation score was derived from the 8- item motivation scale and was entered in the regression model as an independent variable. Core performance was entered as the dependent variable on this and subsequent regression models. Across the three conditions, motivation was not significantly associated with performance, F (1, 150) = 2.44, p = *n.s*.

Motivation and performance were then examined for each condition separately. Motivation was significantly associated with in-basket performance for the underload condition only, F (1, 47) = 19.59, $p < .001$, $R^2 = .29$, $\beta = .54$. This indicates that performance was affected by motivation for the people who had the least amount of work to do. Those who were highly motivated performed better than those who were less motivated on a relatively “easy” or “boring” task.

Motivation was not significantly associated with performance for the moderate condition, F (1, 54) = .01, p = *n.s*., or for the overload condition, F (1, 45) = .64, p = *n.s*. Although non-significant, the people assigned to the moderate and overload conditions were reportedly more motivated to work on the in-basket than the people assigned to the underload condition, yet they still performed worse. While these results should be interpreted with caution, this indicates that 20 items and 30 items just might be too much for a one-hour in-basket simulation, even for highly motivated people.

While differences in perceived stress were examined between each condition for the main analysis, perceived stress was later investigated within each condition. Regression analyses were performed for each condition with perceived stress as the independent variable and core performance as the dependent variable. The only significant regression model resulted from the underload condition, F (1, 47) = 8.96, $p < .01$, $R^2 = .16$, $\beta = -.40$, indicating that the more stress felt by participants who were given 10 items in an hour-long in-basket, the worse they performed, and that the less stress people experienced, the better they performed. There were no significant relationships for perceived stress and in-basket performance for those participants given 20 items, F (1, 54) = .25, p = *n.s*., or for those given 30 items, F (1, 45) = .51, p = *n.s*. Although these results were non-significant, it is interesting to note that the relationship between perceived stress and performance is a negative one. This indicates that as stress increases, performance decreases.

Other variables (change in cortisol, years of work experience, hours currently worked each week, race, and gender) were also examined. None of these variables were significantly associated with performance on the in-basket.

CHAPTER 4

DISCUSSION

Karasek (1979) explained in his demands-control model that worker performance is affected by perceived stress and perceived control of the task. Participants in the overload version of the in-basket were given more tasks to complete than those in the other two versions, but were not given any more time in which to complete the additional tasks. This manipulation was expected to provoke high levels of both perceived stress and physiological stress, and to produce low levels of performance. Unfortunately, these predictions were not supported in this study.

Although participants in the overload condition reported feeling more stressed than the participants in the underload condition, there was no significant difference in their feelings of stress than that of participants in the moderate condition. One explanation for these findings relates to the cognitive-phenomenological model of stress (Lazarus & Launier, 1978). As the participants in the overload condition cognitively evaluated their task (to complete 30 items within one hour), it is possible that they deemed the task so unreasonable that they decided not to "stress out" about it and they may have actually "given up" on completing the task. This could explain why participants in the overload condition performed poorly, even though they did not claim to be stressed.

The results relating to our measurement of physiological stress were also disappointing. While cortisol levels for the overload condition were expected to increase throughout the in-basket simulation, they actually declined throughout the task. In fact, cortisol levels declined for all three workload conditions. The first sample of cortisol was significantly higher than the other two samples for all groups. This could be explained by the activities involved in arriving to the study. Participants were told that the study would begin at 8:00 a.m. Sleeping late, traffic congestion, finding a parking spot, and finding the laboratory on time are potential stressors that could have affected participants' initial sample of cortisol. Although the first sample of cortisol was taken 45 minutes after the participants had arrived, perhaps a longer rest period could have been used.

Our findings also highlight the possibility that using cortisol as a measure of acute stress may have potential problems in experimental research. Previous research which used salivary cortisol to assess physiological stress differed from the present study in that the settings were more contrived and designed to elicit stress specifically (Dickerson & Kemeny 2004; Kirschbaum, et al. 1995). The present study sought to determine if these same research methods could be used in high fidelity research settings (e.g., an in-basket simulation). While our findings in this respect are not conclusive, they are not encouraging.

The cognitive-phenomenological model may also be used to explain the results from the other two conditions. The participants in the underload condition reported low levels of perceived stress. Perhaps they evaluated the 10 items to be completed in one hour as a non-stressful, easy task. Participants given 20 items to complete in one hour reported the highest levels of perceived stress (when compared with the other two conditions), indicating that they viewed the task as reasonable, yet challenging.

The moderate condition was presumed to represent the "right" amount of workload to elicit just enough stress to yield peak performance. While the moderate condition was expected to yield the highest scores on in-basket performance, participants in the underload condition actually performed the best. In the underload condition, participants were given 10 items to complete in one hour. According to Karasek's (1979) outlook, these participants were given more control over the task than the participants in the other conditions. This potential sense of control might explain why they outperformed participants that were given more items to complete within the same amount of time. This also suggests that our prediction regarding the “right” amount of workload was incorrect. According to these results, what we considered an “underload” of work (10 items) actually seems to represent a “moderate” amount of workload.

Implications

The current study set out to answer important scientific questions about workload, stress, and performance. It is well established that experiences on the job impact individuals differently (Hackman & Oldham, 1980). While some workers perceive a particular job to be mundane and boring, others may deem it stimulating, while still others view it as too demanding and stressful.

Organizations go to great lengths to teach employees how to manage their work stress. A great deal of money and time is often consumed to develop, implement, and evaluate employee assistant programs (EAPs) that are designed to reduce the symptoms of stress (Murphy & Sauter, 2003). To avoid the need for these costly programs altogether, organizations should hire employees that perform well under stressful situations. On the other hand, organizations needing to fill positions that involve routine, relatively simple tasks (such as factory work) need to identify employees that perform well under those conditions. Ideally, employees should be placed in job positions that they find stimulating and motivating. The current study set out to offer a tool for organizations to use in examining how potential employees perceive particular jobs, while also assessing their work performance.

Limitations and Future Research

The in-basket used for this study asked participants to assume the role of a safety and security director for a fictional sporting arena company. The content presented in the in-basket, therefore, might have seemed unfamiliar to the participant sample of college students. While the majority of participants (66.4%) indicated that they were working, none of them held a job in the security industry. Perhaps a future study could implement an in-basket designed around a job position more familiar to the average college student (e.g., retail, customer service).

Another problem with using a student sample as participants is their potential lack of motivation to perform to the best of their abilities. While students received required course credit for merely *completing* the in-basket experiment, they did not have an incentive to perform well on the task. People completing in-baskets to obtain a job or to advance their careers, however, are more likely to be highly motivated to do their best. For example, the participants who were given 30 items to complete in one hour appeared to have "given up" because the task seemed too daunting. It is unlikely that the same results would be found in a real workplace setting. Applicants who desire a particular job position are more likely to persevere through the 30 items rather than "give up" on the task. Future research could, therefore, examine the perceived and physiological stress, as well as performance, of actual job applicants and incumbents completing in-basket simulations.

The participants in this study were required to arrive at 8:00 a.m. As previously mentioned, this early meeting time could be to blame for the unexpected decline in cortisol levels throughout the simulation. While the 8:00 a.m. meeting time is realistic of the "real world" workplace, future studies could examine in-basket simulations and cortisol levels at later times during the day.

Finally, this study predicted that 10 items represent an underload of work, 20 items represent a moderate workload, and 30 items represent overload. The evidence from this study suggests that 10 items might actually represent moderate workload for this population (i.e. undergraduate students), while 20 items represent overload, and 30 items is *extreme* overload. Future studies should examine different variations in regard to the number of issues per unit time ratio. For example, a study could be conducted where 5, 10, and 15 items are assigned to represent underload, moderate, and overload conditions, respectively.

Conclusion

The present study clearly demonstrates that the workload involved in an in-basket simulation may elicit perceived stress in participants. We have also demonstrated that when perceived stress is high, performance may suffer. This leads us to again contend with the nature and purpose of in-basket simulations in Industrial/Organizational Psychology. If the purpose of the in-basket simulation is to evaluate how a participant performs under stressful conditions, then an overload condition would be most diagnostic. If, however, the purpose of the in-basket simulation is to identify the level of performance a participant may be capable of in a typical situation (or less/moderate stress level), then an underload condition may be the most useful.

From a more pragmatic viewpoint, the present study offers practitioners and researchers some guidance in the design of in-basket simulations. While many practitioners currently use in-baskets as a means of selection and/or career development, they have received no guidance from empirical research regarding the number of issues to include in relation to the amount of time allowed. This study represents the first step in providing direction for in-basket design. The results of this study suggest that 10 in-basket items per hour is perceived as less stressful, compared to the stress perceived from 20 and 30 in-basket items per hour. More research should be conducted in both the laboratory and workplace settings to further develop the usefulness and appropriateness of the in-basket exercise.

APPENDIX A

IN-BASKET STRESS SCALE, PILOT STUDY

In-Basket Stress Scale

Below are several statements pertaining to your feelings and thoughts about the in-basket simulation you have just completed. Although some of the questions are similar, there are differences between them and we ask that you treat each one as a separate question. Using the scale to the right, mark the one circle that best represents your level of agreement to each of the following statements:

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. The afternoon mail memos in the in-basket simulation made me upset because they were unexpected.	□	□	□	□	□
2. I felt unable to effectively deal with the important issues and problems in the in-basket simulation.	□	□	□	□	□
3. I felt nervous and stressed in the in-basket simulation.	□	□	□	□	□
4. I felt that I effectively coped during the in-basket simulation.	□	□	□	□	□
5. I felt that things did not go my way in the in-basket simulation.	□	□	□	□	□
6. I felt unable to do everything I wanted to do in the in-basket simulation.	□	□	□	□	□
7. I felt that I was on top of things during the in-basket simulation.	□	□	□	□	□
8. The in-basket simulation created situations that were outside of my control.	□	□	□	□	□
9. I was able to control the way I spent my time during the in-basket simulation.	□	□	□	□	□
10. The in-basket simulation was stressful	□	□	□	□	□

APPENDIX B

IN-BASKET STRESS SCALE- II, MAIN STUDY

IBSS

Below are several statements pertaining to your feelings and thoughts about the **<u>in-basket simulation</u>** you just completed. Although some of the questions are similar, there are differences between them and we ask that you treat each one as a separate question. Using the scale to the right, mark the one circle that best represents your level of agreement to each of the following statements:

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. The urgent mail messages delivered during the in-basket simulation bothered me because they were unexpected.	☐	☐	☐	☐	☐
2. I felt unable to effectively deal with the important issues and problems during the in-basket simulation.	☐	☐	☐	☐	☐
3. I felt nervous and stressed during the in-basket simulation.	☐	☐	☐	☐	☐
4. I felt that I effectively coped during the in-basket simulation.	☐	☐	☐	☐	☐
5. I felt that things did not go my way during the in-basket simulation.	☐	☐	☐	☐	☐
6. I felt unable to do everything I wanted to do during the in-basket simulation.	☐	☐	☐	☐	☐
7. I felt that I was on top of things during the in-basket simulation.	☐	☐	☐	☐	☐
8. The in-basket simulation created situations that were outside of my control.	☐	☐	☐	☐	☐
9. I was able to control the way I spent my time during the in-basket simulation.	☐	☐	☐	☐	☐
10. The in-basket simulation was stressful	☐	☐	☐	☐	☐
11. The amount of items given to me interfered with my performance on the in-basket simulation.	☐	☐	☐	☐	☐
12. I did not have enough time to do a good job on the in-basket simulation.	☐	☐	☐	☐	☐
13. There were too many items in the in-basket simulation.	☐	☐	☐	☐	☐
14. I only care about getting my research credits.	☐	☐	☐	☐	☐
15. I could have performed better if there had been less work to do during the in-basket simulation.	☐	☐	☐	☐	☐
16. One hour was too much time for the in-basket simulation.	☐	☐	☐	☐	☐
17. I was bored during the in-basket simulation.	☐	☐	☐	☐	☐
18. The in-basket simulation was a good use of my time.	☐	☐	☐	☐	☐
19. I was actively involved during the in-basket simulation.	☐	☐	☐	☐	☐
20. I worked to the best of my abilities on the in-basket simulation.	☐	☐	☐	☐	☐
21. I care about my performance on the in-basket simulation.	☐	☐	☐	☐	☐
22. I would be interested in reading about the results of the in-basket simulation.	☐	☐	☐	☐	☐
23. The work I did during the in-basket simulation is important to me.	☐	☐	☐	☐	☐

APPENDIX C

CORRELATION TABLES

Table G.1 Means, Standard Deviations, and Correlations for Condition 1

	M	*SD*	1	2	3	4	5	6
Underload Condition (n= 49)								
1. Perceived Stress	2.45	.70	-					
2. Motivation	3.69	.59	-.41**	-				
3. Core in-basket Performance	2.07	.62	-.40**	.54**	-			
4. T1 Cortisol Concentration µg/mL	.42	.21	.22	.09	-.04	-		
5. T2 Cortisol Concentration µg/mL	.26	.13	.02	-.01	-.23	.55**	-	
6. T3 Cortisol Concentration µg/mL	.21	.14	.11	-.06	-.01	.31*	.49**	-

*$p < .05$. **$p < .01$.

Table G.2 Means, Standard Deviations, and Correlations for Condition 2

	M	*SD*	1	2	3	4	5	6
Moderate Condition (n= 56)								
1. Perceived Stress	2.87	.87	-					
2. Motivation	3.72	.67	.14	-				
3. Core in-basket Performance	1.59	.56	-.06	.01	-			
4. T1 Cortisol Concentration µg/mL	.43	.27	-.03	-.25	-.12	-		
5. T2 Cortisol Concentration µg/mL	.26	.14	.01	-.02	.10	.82**	-	
6. T3 Cortisol Concentration µg/mL	.21	.13	.04	.12	-.12	.49**	.76**	-

*$p < .05$. **$p < .01$.

Table G.3 Means, Standard Deviations, and Correlations for Condition 3

	M	*SD*	1	2	3	4	5	6
Overload Condition (n= 47)								
1. Perceived Stress	2.84	.60	-					
2. Motivation	3.76	.61	.26	-				
3. Core in-basket Performance	1.51	.48	-.10	-.11	-			
4. T1 Cortisol Concentration µg/mL	.44	.28	.07	.05	.15	-		
5. T2 Cortisol Concentration µg/mL	.26	.18	.10	.03	.06	.85**	-	
6. T3 Cortisol Concentration µg/mL	.19	.09	.04	.18	-.09	.51**	.69**	-

*$p < .05$. **$p < .01$.

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