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Self-Determination, Control, and Reactions to Changes in Workload: A Work Simulation

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The objective of this experimental study is to capture the dynamic temporal processes that occur in changing work settings and to test how work control and individuals' motivational predispositions interact to predict reactions to these changes. To this aim, we examine the moderating effects of global self-determined and non-self-determined motivation, at different levels of work control, on participants' adaptation and stress reactivity to changes in workload during four trials of an inbox activity. Workload was increased or decreased at Trial 3, and adaptation to this change was examined via fluctuations in anxiety, coping, motivation, and performance. In support of the hypotheses, results revealed that, for non-self-determined individuals, low work control was stress-buffering and high work control was stress-exacerbating when predicting anxiety and intrinsic motivation. In contrast, for self-determined individuals, high work control facilitated the adaptive use of planning coping in response to a change in workload. Overall, this pattern of results demonstrates that, while high work control was anxiety-provoking and demotivating for non-self-determined individuals, self-determined individuals used high work control to implement an adaptive antecedent-focused emotion regulation strategy (i.e., planning coping) to meet situational demands. Other interactive effects of global motivation emerged on anxiety, active coping, and task performance. These results and their practical implications are discussed.

Keywords: workload, control, autonomy, self-determination, coping

High workloads have been linked to increased employee strain (Örtqvist & Wincent, 2006) and reduced performance (Gilboa, Shirom, Fried, & Cooper, 2008). Unlike other role stressors (e.g., role ambiguity and role conflict), role overload (i.e., having too much to do in the time available) can be appraised as a challenge rather than a hindrance (LePine, Podsakoff, & LePine, 2005). In contrast, some research suggests that underutilization or monotonous work can be just as debilitating as high workloads; increasing risk of completed suicide (Schneider et al., 2011), increasing musculoskeletal problems (Lang, Ochsmann, Kraus, & Lang, 2012), as well as decreasing job satisfaction and increasing psychological distress and sickness absence (Melamed, Ben-Avi, Luz, & Green, 1995). Ostensibly, the effect of too little or excessive workloads on employee outcomes will depend on other factors, such as characteristics of the work environment and individual differences that might determine individuals' capacity to cope with such demands.

The demand-control model (D-CM) is an early and influential account of how high work control offsets the negative consequences of high job demands (i.e., jobs with chronically high workloads) on employee's strain and motivation outcomes (Karasek, 1979; Karasek & Theorell, 1990). However, after 30 years of investigation into the stress-buffering effects of work control, there is inconsistent support for this stress-alleviating role of work control, despite the use of varied methodologies and indicators of employee strain (for reviews, see de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010). Several researchers have since proposed that the effectiveness of work control as a stress-buffer depends on traits that determine whether an individual will be able to use high control opportunities to their advantage (i.e., as a resource for stress reduction).

Indeed, research demonstrates that individual differences related to control preferences (e.g., desire for control; Parker, Jimmieson, & Amiot, 2009), beliefs (e.g., locus of control; Meier, Semmer, Elfering, & Jacobshagen, 2008), or capabilities (e.g., self-efficacy; Meier et al., 2008; Schaubroeck & Merritt, 1997) determine whether work control alleviates the detrimental effects of high workloads. Global self-determination is one trait that has particular theoretical relevance to the D-CM, given that it captures an individual's chronic motivation toward autonomy and personal choice (i.e., the degree to which they are self-determined) as opposed to being controlled by external contingencies and demands (i.e., the degree to which they are non-self-determined). In support of this idea, researchers have demonstrated that self-determination moderates the stress-buffering effects of work control on strain (i.e., burnout; Fernet,

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Guay, & Senecal, 2004) and work engagement (Parker et al., 2010).

This prior research has taken an entirely between-participants perspective by comparing how individuals react to a specific work situation at one point in time, and how these reactions are moderated by their global self-determination. Given the dynamic nature of most work tasks, a significant gap in the literature is the examination of employee reactions to changes in the work environment. As a first objective, the experiment presented here uses a work simulation to examine the extent to which the stress-buffering effects of high work control depend on individuals' global self-determination (i.e., a between-participants perspective). As a second objective, using a process approach (see Larsen, 1989), we test whether global motivation (i.e., self-determined or non-self-determined) and work control moderate participants' reactions to changes in workload (i.e., a within-participants perspective). In this experiment, it is expected that high control will assist (and low control hamper) self-determined individuals' ability to deal with changes in workload, whereas low control will assist (and high control hamper) non-self-determined individuals' ability to deal with changes in workload. To examine these dynamic temporal effects, workload was increased or decreased during the third trial of a work simulation using an inbox activity. Participants' ability to cope with their work conditions during the task was examined via fluctuations in anxiety, coping, motivation, and performance.

Between-Participants Approach: Global Motivation and the Stress-Buffering Effects of Control

To directly capture for whom high work control is beneficial, Person-Environment Fit (P-E Fit) theory proposes that adaptive (or maladaptive) employee outcomes are the result of a compatibility (or incompatibility) of the individual with their environment (French, Caplan, & Harrison, 1982; Kristof-Brown, Zimmerman, & Johnson, 2005; Pervin, 1968). Research confirms that the extent to which the person's needs and abilities fit with the characteristics of the job (i.e., in terms of its demands and supplies) is a particularly important type of fit for protecting employees from the development of strain (Kristof-Brown et al., 2005). Theoretically, when applying P-E fit theory to the D-CM, we argue that different people will have different levels of comfort with work control potentially because of varied prior experiences in using work control opportunities to their advantage.

Self-determination theory (SDT) provides one account of how individuals may be more or less comfortable (and experienced) with using control opportunities available in the environment to their advantage. Many theories outline the potential for negative effects, such as fatigue or resource depletion, when people have control or are exposed to environments that afford control (see Muraven & Baumeister, 2000; Shapiro, Schwartz, & Astin, 1996). Indeed, Jones (2010) argues that there are unintended consequences of "high scope" jobs (i.e., jobs with high work autonomy), including emotional exhaustion when there is too much discretion and no structure. However, according to SDT, everyone needs autonomy; every individual has a built-in preference for autonomy-supportive environments and will benefit from exposure to such environments (Deci & Ryan, 1987; Ryan & Deci, 2006). We argue that the consequences derived from having high levels of work control (i.e., being beneficial or detrimental) will depend on the individual's capacity to take advantage of high autonomy environments.

SDT describes two distinct types of motivational tendencies: self-determined and non-self-determined motivation. The theory posits that self-determined individuals, compared with non-self-determined individuals, are likely to have had the basic psychological need for autonomy satisfied during their development (Deci & Ryan, 1985, 1987, 2000; Ryan & Deci, 2000). As a result, they are more likely to have experience using autonomy-supportive opportunities to their advantage and also will feel comfortable in environments that afford opportunities to act autonomously (i.e., such as in jobs that provide high work control). The process that underlies the development of self-determined motivation is referred to as internalization, which involves the processes by which individuals acquire beliefs, attitudes, or behavioral regulations from external sources and transform these external regulations into personal attributes, values, or regulatory styles (Grolnick, Deci, & Ryan, 1997). In contrast, individuals with a non-self-determined motivation are likely to have had their need for autonomy thwarted, resulting in possible discomfort with opportunities to act autonomously. This discomfort could be because of low internalization and a lack of experience with having control or negative prior experiences of failing at using opportunities to act autonomously to their advantage (see Burger, 1989).

We argue that global motivations reflect the development of chronic regulatory orientations through need satisfaction and need thwarting; people come to be self-determined or non-self-determined based on exposure to need satisfying or thwarting environments during their development. However, a lack of exposure to high work control environments or prior experiences of failure at using high control environments to one's advantage may have resulted in non-self-determined individuals being ill-equip to benefit from the affordances high control environments provide. As such, self-determination at the trait-level reflects the individual's global tendency to seek out and employ control and results from an accumulation of prior experiences with being autonomous. In this way, self-determination is distinct from other control-related constructs like self-efficacy (Bandura, 1977) or desire for control (Burger & Cooper, 1979); self-determination is more than just confidence or simply a preference for control. At the trait level, self-determination reflects a chronic desire to act autonomously and to be consistent in one's behavior. As such, SDT has particular theoretical relevance to understanding the stress-buffering effects of high work control, given that self-determination reflects a control capability (i.e., the use of autonomy has become part of a more stable disposition and ability).

In support of an integration of the D-CM and SDT, two field studies have demonstrated that self-determination acts as a moderator of the stress-buffering effects of control on strain (i.e., burnout, Fernet et al., 2004) and non-self-determination acts as conjunctive moderator of the D-CM on motivation (i.e., work engagement; Parker et al., 2010). In a study with university professors, Fernet et al. (2004) found that high work control buffered the negative effects of high job demands on burnout for employees who were high in self-determination (whereas low work control was stress-exacerbating). In this research, a bipolar index of self-determination was used (i.e., the low end of the pole was non-self-

determined motivation). As such, it is unknown whether the effect observed in this study is explained by the presence of self-determined motivation or the absence of non-self-determination. Conceptualizing motivation as two unipolar constructs, Parker et al. (2010) extended on the Fernet et al. study with a sample of administrative workers and found that, for employees with high non-self-determination, passive job conditions (i.e., low demand and low control) resulted in the least work engagement, whereas, for employees with low non-self-determination, as outlined by the D-CM, high work control increased engagement when demands were high.

These findings provide support for the utility of integrating the D-CM and SDT. However, the past findings are disparate, which could be because of the sampling of different occupational groups or the operationalization/computation of self-determination. As such, a major contribution of this study is to undertake a more controlled and systematic test of the integration of the D-CM and SDT. It is important to note that these past cross-sectional studies also have taken an entirely between-participants perspective. Prior to outlining our specific hypotheses for the moderating effects of global motivation (i.e., self-determined and non-self-determined types) on the stress-buffering effects of work control, in the next section we outline theoretical and methodological arguments for why adopting a within-participants approach is warranted to investigate this moderating effect.

Within-Participants Approach: Adaptation and Reactivity to Work Characteristics

Previous research investigating occupational stress has either made a comparison between the characteristics of different jobs or has compared people's perceptions of the characteristics of their jobs (Totterdell, Wood, & Wall, 2006). The problem with this between-participants approach is that work characteristics are treated as though they are stable (Alliger & Williams, 1993). Such research designs fail to capture the true dynamic nature of the psychological experience of work. By examining individuals' work experiences from an intraindividual approach (i.e., individuals' experiences over time), we can garner a better understanding of the temporal effects of occupational stress and coping. Larsen (1989) described this as a process approach, whereby the relationship between personality and experience is dynamic and unfolding. This approach requires examination of patterns of change within individuals over time and enables investigation of how personality traits truly relate to situational responses (see Bolger & Zuckerman, 1995). For example, self-determined motivation might only serve as a source of resilience for coping with fluctuations in workload after some exposure to high work control. Conversely, non-self-determined individuals might have an initial adverse reaction to the presence of high control in the work environment; however, these individuals might be able to adapt to high work control over time and use this effectively to cope with variations in workload.

Process Models of Stress and Coping and Emotion Regulation

Two established theoretical models are particularly relevant to fully understand individuals' adaptation and emotional processes as they experience changes in workload under different levels of work control, namely the transactional stress and coping model (TSCM; Lazarus & Folkman, 1984) and the emotion regulation model (ERM; Gross, 1998). The TSCM offers one perspective on the sequential and temporal features of the stress process. The TSCM describes stress as a dynamic process, whereby the external demands placed on individuals are cognitively appraised and this appraisal determines the coping strategies that are implemented. According to the TSCM, when individuals have control over their environment, this enhances their appraisal of their ability to cope with the situation (or specific stressor). As such, they will employ more problem-focused coping strategies, which can be more adaptive and effective as these specifically target the stressor. When responding to high workload, individuals may use many different types of problem-focused coping strategies (i.e., including planning and active coping strategies; see Skinner, Edge, Altman, & Sherwood, 2003). More recently, researchers have framed coping strategies within a broader framework of self-regulation, claiming that coping strategies lay alongside other stress-reduction strategies, such as emotion-regulation strategies (Folkman & Moskowitz, 2004).

According to Gross' (1998) emotion regulation model (ERM), emotion regulation refers to the strategies used to influence what emotions we experience, when we experience them, and how we experience and express them. It is important to note that different emotion-regulation strategies can be differentiated along a timeline of the unfolding emotional response. In this respect, emotion generation begins with an evaluation of emotion cues, which then triggers a coordinated set of response tendencies (i.e., experiential, behavioral, and physiological). Because emotions unfold over time, the strategies used to modulate emotions can be distinguished in terms of when they have their primary impact on the emotion-generative process. More adaptive or effective emotion-regulation strategies should occur earlier in the emotion generation process (e.g., choosing situations, modifying situations, cognitive reappraisal), whereas less adaptive or effective emotion-regulation strategies occur later (e.g., attempts to regulate, manage, or suppress emotion that has already occurred). The former are referred to as antecedent-focused emotion-regulation strategies and the later response-focused emotion regulation strategies.

These two theories highlight the need to consider stress and coping processes over time using a within-participants approach. In the current study, a broad range of dependent variables that reflect these processes will be measured as we manipulate the level of workload participants must cope with during the work simulation. These dependent variables include anxiety, problem-focused coping strategies (i.e., planning and active coping), intrinsic motivation, and task performance. These dependent variables reflect emotion-regulation and coping efforts (i.e., planning and active coping), as well as the affective and behavioral outcomes of the emotion-regulation process (i.e., anxiety, intrinsic motivation, and task performance). In addition, we consider the role of work control and global motivation as moderators of the impact of workload on our dependent variables. The TSCM specifies the importance of situational control and individual differences as important precursors of the stress and coping process that occur in response to an external demand (i.e., like an increase in workload). Although the ERM does not specify what characteristics of a situation will determine which emotion-regulation strategies are

used, it is likely that environmental control and individual differences that determine the motivation and capacity to use this control will influence the extent to which different types of strategies are implemented.

Prior Experimental Research Manipulating Workload

The current research induces changes in workload over time using an experimental approach. The vast majority of prior experimental research investigating the D-CM has mainly used between-participants designs (see Flynn & James, 2009; Häusser, Mojzisch, & Schulz-Hardt, 2011; Jimmieson & Terry, 1997, 1998, 1999; O'Brien, Terry, & Jimmieson, 2008; Parker et al., 2009; Perrewe & Ganster, 1989; Searle, Bright, & Bochner, 1999, 2001). Only three experimental studies investigate task demands, such as workload, using methods that take into account within-participant effects (Glaser, Tatum, Nebeker, Sorenson, & Aiello, 1999; Hockey & Earle, 2006; Parkes, Styles, & Broadbent, 1990). Based on recent evidence from experience sampling studies indicating that task demands fluctuate on a day-to-day basis at work (Butler, Grzywacz, Bass, & Linney, 2005; Daniels, Boocock, Hartly, & Holland, 2009; Daniels & Harris, 2005), it is now crucial to incorporate a temporal dimension into studies on work demands and control.

In one such work simulation involving basic office tasks, Hockey and Earle (2006) found that high work control buffered the negative effects of a high workload on perceived mental fatigue and task performance. The within-participants manipulation was limited to a matched-pairs approach based on earlier performance on the task. Glaser et al. (1999) conducted a work simulation involving simple data entry tasks over 10 workdays. Whereas social support was initially stress-exacerbating (i.e., at Day 3), by Day 9, social support exerted no influence on the relationship between workload and strain. This finding highlights that it might take time or practice before elements of the task environment become useful to stress reduction. It should be noted, however, that workload was measured through self-reports rather than manipulated within-participant s (i.e., there was no direct comparison of participants against themselves in high and low workload conditions).

Unlike these two studies, Parkes et al.'s (1990) manipulation of work pace was entirely within-participants. While completing a letter-sorting task, participants completed two machine-paced conditions (i.e., slow and fast) and one self-paced condition. The results revealed that strain was highest among: (a) participants who preferred low work control after the self-pacing condition, and (b) participants who preferred high work control after both machine-pacing conditions. This design is rigorous; however, as noted by the authors, the order of exposure to pacing conditions could have resulted in feelings of autonomy during the self-pacing condition carrying over and influencing stress reactions and task performance during the machine-pacing conditions. As such, it is meaningful to extend on this research by investigating how participants respond to changes in workload at fixed levels of work control. Adopting such an experimental design allows examination of how participants react to an increase or decrease in workload. Participants' reaction to this change in workload will reflect how they deal with this potential stressor and whether work control aids coping processes.

The Current Study

Approach

Drawing on an integration of the D-CM and SDT from a P-E Fit perspective, it is expected that participants' global motivation (i.e., self-determined or non-self-determined) will moderate their reactions to changes in workload, such that high control will assist (and low control hamper) self-determined individuals' ability to deal with these changes in workload, whereas low control will assist (and high control hamper) non-self-determined individuals' ability to deal with these changes in workload. As such, and in line with the P-E fit approach, greater *adaptation* and less *stress reactivity* to workload changes is expected when there is compatibility between the individual and available work control. In contrast, less adaptation and greater stress reactivity to changes in workload is expected when there is an incompatibility between the individual and work control.

For the present study, we adopt an experimental design where workload is manipulated within-participants across four trials of an inbox activity. To assess how participants respond to changes in workload, at Trial 3 of the activity, workload will either increase or decrease. Adaptation and stress reactivity to this change in workload is examined via fluctuations in anxiety, coping, motivation, and performance. By increasing or decreasing workload at Trial 3, we can investigate whether participants: (a) adapt to the task and their current level of workload at Trials 2 and 4 (i.e., by comparing their scores to Trials 1 and 3, respectively) and (b) experience stress-reactivity to the change in workload at Trial 3 (i.e., by comparing their scores at Trial 3 to Trials 1 and 2). We have chosen to investigate these comparisons because we anticipate any change in workload has the potential to be destabilizing and stressful; however an increase in workload is expected to be more stressful than a decrease. We postulated this direction of effects, as any change in workload will require participants to adapt to a new routine and change their pace on the task. However, as there is considerable empirical evidence that higher levels of workload indeed leads to greater stress reactivity (e.g., de Lange et al., 2003), we expected greater stress reactivity for participants whose workload increased as opposed to decreased at Trial 3. The following sections outline our rationale and hypotheses for each dependent variable.

Implications for Anxiety and Coping

The use of different strategies for dealing with changes in the level of workload during work tasks (i.e., antecedent vs. response-focused emotion-regulation) is expected to depend on individuals' global motivation (i.e., which reflects their degree of comfort, or prior experience, with utilizing control). Prior research has demonstrated that self-determined motivation, as opposed to non-self-determined motivation, acts as an antecedent predicting how individuals cope with change (Amiot, Blanchard, & Gaudreau, 2008; Amiot & Gaudreau, 2010). This finding suggests that self-determined participants are more resilient to change through the use of more task-oriented coping strategies (i.e., planning and active coping strategies).

In the current study, planning coping is conceptualized as a strategy that aims to modify the situation, whereas active coping is

a strategy that targets the management of stress (Skinner et al., 2003). In this way, planning coping reflects an antecedent-focused emotion-regulation strategy as it involves attempts to modify the potentially stressful impact of a particular stressful situation by preparing for it. In contrast, active coping reflects a more response-focused emotion-regulation strategy, given that it involves concentrating efforts on dealing with the stressful nature of the task at hand. In the context of the current study, it is possible that individuals who are self-determined and working under high control conditions might use more antecedent-focused (i.e., planning coping) relative to more response-focused (i.e., active coping) strategies. Because this coping strategy occurs earlier in the emotion generative sequence (see Gross, 1998), it is expected to result in lower anxiety for self-determined individuals. It also is possible that non-self-determined individuals in high control conditions might not take advantage of planning coping as a strategy for stress reduction, thereby experiencing greater anxiety in such conditions. However, in line with prior literature it is anticipated that self-determined participants will implement more task-oriented coping strategies (i.e., both active and planning coping) and non-self-determined participants will implement less task-oriented coping strategies, and that this will be more evident when high control is available as opposed to low control.

As the experimental design enables measurement of anxiety and coping strategies after each of the four trials of the inbox activity, the hypotheses pertain to higher-order (i.e., 3-way and 4-way) interactive effects when the factors of workload change, control, and global motivation are included. Overall, it is anticipated that when there is a match between the participants' global motivation and work control there will be better adaptation (i.e., less anxiety and more coping) during the task (i.e., which pertains to a 3-way interactive effect of Trials × Control × Global motivation; part a of the hypotheses below). In contrast, a mismatch between global motivation and control will result in poorer adaption during the task. In addition, it is anticipated that when there is a change in workload, a match between the participants' global motivation and the available work control will result in less stress reactivity to this change, however this will be more evident when workload decreases as opposed to increases (i.e., which pertains to a 4-way interactive effect of Trials × Workload change × Work control × Global motivation; part b of the hypotheses below). The opposite is expected when there is a mismatch between global motivation and work control. As such, it was hypothesized that:

Hypothesis 1. (a) For individuals high in self-determination, compared with those low in self-determination, high work control will result in better adaptation (i.e., reducing anxiety and increasing planning and active coping efforts) during the task, and (b) this pattern will vary as a function of workload change, whereby less stress reactivity will occur when workload changes at Trial 3, and this effect will be more pronounced for a decrease in workload compared with an increase.

Hypothesis 2. (a) For individuals high in self-determination, compared with low self-determination, low work control will result in poorer adaptation (i.e., increasing anxiety and reducing planning and active coping efforts) during the task, and (b) this pattern will vary as a function of workload change, whereby more stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for an increase in workload compared with a decrease.

Hypothesis 3. (a) For individuals high in non-self-determination, compared with low non-self-determination, high work control will result in poorer adaptation during the task, and (b) this pattern will vary as a function of workload change, whereby more stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for an increase in workload compared with a decrease.

Hypothesis 4. (a) For individuals high in non-self-determination, compared with low non-self-determination, low work control will result in better adaptation during the task, and (b) this pattern will vary as a function of workload change, whereby less stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for a decrease in workload compared with an increase.

Implications for Intrinsic Motivation and Performance

SDT proposes a motivation sequence (Deci & Ryan, 2000; Vallerand, 1997), whereby environmental factors influence need satisfaction (i.e., need for autonomy), and where satisfaction of these needs determines the extent to which an individual exhibits situational self-determined motivation (i.e., intrinsic motivation toward a work task). Varying degrees of comfort and experience with control is expected to lead to varying degrees of fulfillment or nourishment of the need for autonomy. According to SDT, nourishment of the need for autonomy enhances intrinsic motivation, which then leads to various intrapersonal and interpersonal outcomes including concentration and intentions to persist (Grouzet, Vallerand, Thill, & Provencher, 2004). This process of intrinsic need satisfaction increases persistence (Meir & Barak, 1974) and performance at work (Baard, Deci, & Ryan, 2004). Integrating this SDT motivation sequence within the D-CM might help untangle the motivational processes that occur as a result of combinations of demand and control. Compatibility between an individual's global motivation and the level of autonomy available during a work task is predicted to result in more intrinsic motivation (i.e., finding tasks enjoyable and interesting) and higher task performance. Moreover, an incompatibility between the individual and work control is expected to result in less intrinsic motivation and less task performance. As the experimental design enables measurement of motivation and task performance after each of the four trials of the inbox activity, as before, the hypotheses pertain to higher-order (i.e., 3-way and 4-way) interactive effects when the factors of workload change, control, and global motivation are included. As such, it was hypothesized that:

Hypothesis 5. (a) For individuals high in self-determination, compared with low self-determination, high work control will result in better adaptation (i.e., increasing intrinsic motivation and task performance) during the task, and (b) this pattern will vary as a function of workload change, whereby less stress reactivity will occur when workload changes at Trial 3

and this effect will be more pronounced for a decrease in workload compared with an increase.

Hypothesis 6. (a) For individuals high in self-determination, compared with low self-determination, low work control will result in poorer adaptation (i.e., decreasing intrinsic motivation and task performance) during the task, and (b) this pattern will vary as a function of workload change, whereby more stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for an increase in workload compared with a decrease.

Hypothesis 7. (a) For individuals high in non-self-determination, compared with low non-self-determination, high work control will result in poorer adaptation during the task, and (b) this pattern will vary as a function of workload change, whereby more stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for an increase in workload compared with a decrease.

Hypothesis 8. (a) For individuals high in non-self-determination, compared with low non-self-determination, low work control will result in better adaptation during the task, and (b) this pattern will vary as a function of workload change, whereby less stress reactivity will occur when workload changes at Trial 3 and this effect will be more pronounced for a decrease in workload compared with an increase.

Method

Participants

Participants were 72 first-year psychology students at an Australian university. The sample consisted of 72.20% women, with gender distributed evenly across conditions. Participants' ages ranged between 18 and 51 (M = 20.78; SD = 5.64). All participants had current or prior work experience.

Design

A 4 (Trials: 1, 2, 3, 4) × 2 (Workload change: low-to-high or high-to-low) × 2 (Work control: low or high) × 2 (Global self-determination: low or high) mixed factorial design was used. All participants completed four trials of the inbox activity with a change in workload occurring at Trial 3. Participants were randomly assigned to the workload change (i.e., increase or decrease) and work control (i.e., low or high) conditions. Global self-determination was a measured participant attribute.

Experimental Task

The experimental task (i.e., an inbox activity) was an adaptation of in-basket tasks used in prior experimental research (see Jimmieson & Terry, 1997, 1999; Parker et al., 2009). E-mails were adapted from the teaching activity EvalSim (Nkomo, Fottler, & McAfee, 2004) and pilot tested with a student sample (N = 28). Adaptation of the e-mails included ensuring they were similar length (i.e., 85 to 95 words in length), a similar level of complexity, and relevant to a retail store context. Participants were instructed to consider themselves as Kim Jones, a Human Resource Manager at the fictitious Madison Department Store. Their task was to respond to e-mails (i.e., via an Outlook Express e-mail account) from their employees that raised a variety of human resource issues (e.g., disputes about performance appraisal criteria, staff taking excessively long meal breaks, and scheduling of morale boosting activities). For each trial, an online computer program randomized the selection and ordering of these e-mails and then sent each batch of e-mails to participants' e-mail account for each of the four trials.

Experimental Manipulations

Workload change. Workload was manipulated by varying the number of e-mails participants were required to address within a 10-min time period. Under low workload, there were three e-mails and, under high workload, there were six e-mails to complete in each trial. Half the participants received the high workload condition during the first two trials followed by the low workload condition during Trials 3 and 4. The other half of participants received the low workload condition during the first two trials followed by the high workload condition during Trials 3 and 4. This meant half the participants experienced an increase in workload in the third trial, while the other half experienced a decrease in workload in the third trial.

Work control. High work control was manipulated via instructions designed to heighten feelings of autonomy. The instructions addressed three of the five aspects of behavioral control identified in the work control literature; including scheduling, method, and pacing control (Jackson, Wall, Martin, & Davids, 1993). High work control participants were informed that they could address each e-mail in the order they believed appropriate (high scheduling control), alter their method (high method control), and adjust the time spent on each e-mail (high pacing control). Low work control was manipulated via instructions designed to reduce feelings of autonomy. Participants were instructed to reply to e-mails in the order presented (low scheduling control), reply to e-mails as they read them (low method control), spend an equal amount of time on each e-mail, and to continue working the entire time (i.e., low pacing control).

Procedure

Participants were seated at a computer terminal and completed a baseline questionnaire (i.e., demographics and baseline anxiety and intrinsic motivation toward the task). Participants then listened to audio recordings about the organizational context at "Madison Department Store" and task instructions that exposed them to the work control manipulation. Each participant had an Outlook Express e-mail account to which the researcher sent e-mails to for each trial. Just prior to commencing each trial, participants were informed of the current time and that they had 10 min to address the e-mails in their inbox. Participants were stopped after 10 min and then asked to complete a post-trial questionnaire. After participants completed the fourth post-trial questionnaire, they were directed to a final questionnaire that included a measure of global self-determination. Global self-determination was measured after the experiment for two reasons; first, to reduce self-reflective

priming effects, and second, to conceal the true goals of the study. Several checks were conducted to ensure that random assignment to conditions did not impact ratings of global self-determination. As expected, there was no effect of workload change or work control condition on ratings of global self-determination or non-self-determination (*ps* > .238, *ns*).

Measures

Global self-determination. The General Causality Orientation Scale assessed the strength of two general motivational orientations within the individual (Deci & Ryan, 1985). These self-determined (autonomous) and non-self-determined (controlled) general causality orientations have been shown to predict self-determined work motivation, which indicates these tendencies do impact self-regulation at the contextual level (Fu Lam & Gurland, 2008). The 17-vignette form (i.e., 34 items) was used. Respondents indicated on a 7-point scale the extent to which a self-determined and a non-self-determined response to each vignette was typical for them. For example, one vignette stated: *"You have been offered a new position in a company where you have worked for some time. The first question that is likely to come to mind is?"* An autonomous (i.e., self-determined) response is *"I wonder if the new work will be interesting?",* whereas a controlled (i.e., non-self-determined) response is *"Will I make more at this position?"* Internal consistency of self-determination motivation was α = .79 and non-self-determination was α = .79.

Manipulation checks. After each trial, perceptions of workload and work control were assessed. These measures were drawn from prior research manipulating demand and control in task contexts (Jimmieson & Terry, 1997, 1999; Parker et al., 2009). Workload was measured with a 3-item scale (e.g., "*What quantity of work was expected of you?*"), ranging from 1 (*hardly any*) to 7 (*a great deal*). Internal consistency at post Trial 1 was α = .80, post Trial 2 was α = .89, post Trial 3 was α = .89, and post Trial 4 was α = .87. Work control was measured on a 3-item scale (e.g., "*How much were you able to contribute to the way you carried out the inbox activity?*"), ranging from 1 (*not at all*) to 7 (*a great deal*). Internal consistency at post Trial 1 was α = .71, post Trial 2 was α = .78, post Trial 3 was α = .79, and post Trial 4 was α = .82.

Anxiety. At baseline and after each trial, three items (i.e., *anxious, nervous, and on edge*) from the tension-anxiety subscale of the Profile of Mood States (McNair, Lorr & Droppleman, 1971) were used to assess participants' mood state of anxiety. Participants responded on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). Internal consistency at baseline was α = .74, post Trial 1 was α = .87, post Trial 2 was α = .79, post Trial 3 was α = .87, and post Trial 4 was α = .89.

Coping strategies. After each trial, items adapted from the Ways of Coping Checklist (Lazarus & Folkman, 1984) measured two types of problem-focused coping strategies: planning coping and active coping. To measure planning coping, three items assessed strategizing, considering alternatives, and planning how best to perform the task (e.g., *"Tried to carefully plan a course of action rather than act on impulse"*). To measure active coping, three items pertained to actively working, concentrating on the task at hand, and avoiding distractions (e.g., *"Concentrated my efforts on performing the inbox task"*). Participants indicated how much they used each strategy during the trial on a 5-point scale ranging from 0 (*not at all*) to 4 (*yes, almost all the time*). For planning coping, internal consistency at post Trial 1 was α = .78, post Trial 2 was α = .76, post Trial 3 was α = .82, and post Trial 4 was α = .89. For active coping, internal consistency at post Trial 1 was α = .73, post Trial 2 was α = .76, post Trial 3 was α = .83, and post Trial 4 was α = .77.

Intrinsic motivation. At baseline and after each trial, four items adapted from the Situational Motivation Scale (Guay, Vallerand, & Blanchard, 2001) were used to measure intrinsic motivation (e.g., *"I will feel good when doing it"*). At baseline, the question stem was *"I am doing the inbox activity because"* and at post Trial 1 and 2 it was *"I did the inbox activity because."* Internal consistency at baseline was α = .66, post Trial 1 was α = .71, post Trial 2 was α = .71, post Trial 3 was α = .74, and post Trial 4 was α = .79.

Task performance. The number of e-mails completed by each participant during each 10-min trial was recorded as a measure of objective task performance.

Results

Descriptive statistics are displayed in Table 1. Gender and age were included as covariates in all the analyses that follow.

Table 1
Descriptive Statistics

Variables	*M*	*SD*	*Range*	α
Controls				
Gender	—	—	1–2	—
Age in years	20.78	6.76	17–56	—
Baseline anxiety	0.75	0.66	0–4	.74
Baseline intrinsic motivation	3.13	1.10	1–7	.66
Global motivation				
Self-determination	5.71	0.64	1–7	.79
Non-self-determination	3.81	0.79	1–7	.79
Post-trial 1				
Anxiety	1.32	0.92	0–4	.87
Planning coping	1.87	1.03	0–4	.78
Active coping	3.00	0.78	0–4	.73
Intrinsic motivation	3.29	1.26	1–7	.71
Task performance	73.38	26.04	0–6	—
Post-trial 2				
Anxiety	0.87	0.75	0–4	.79
Planning coping	1.96	1.03	0–4	.76
Active coping	3.04	0.81	0–4	.76
Intrinsic motivation	3.35	1.28	1–7	.71
Task performance	89.58	17.34	0–6	—
Post-trial 3				
Anxiety	0.89	0.98	0–4	.87
Planning coping	1.93	1.09	0–4	.82
Active coping	3.02	0.90	0–4	.83
Intrinsic motivation	3.27	1.32	1–7	.74
Task performance	91.44	15.06	0–6	—
Post-trial 4				
Anxiety	0.65	0.79	0–4	.89
Planning coping	2.09	1.24	0–4	.89
Active coping	2.93	0.96	0–4	.77
Intrinsic motivation	3.33	1.39	1–7	.79
Task performance	94.68	13.07	0–6	—

Note. For the task performance outcome, quantity of e-mails is reported as the proportion completed.

Manipulation Checks

A mixed factorial analysis of covariance (ANCOVA) on the workload manipulation check revealed no main effect of trials, $F(3, 198) = 0.73$, $p = .53$, *ns*. In support of the experimental manipulation of workload, a significant main effect of workload change, $F(1, 66) = 5.60$, $p = .02$, *partial* $\eta^2 = .08$, and a two-way interaction of trials and workload change, $F(3, 198) = 77.69$, $p < .001$, *partial* $\eta^2 = .54$, were revealed. Simple effects analysis revealed that participants who experienced an increase in workload reported more workload overall ($M = 4.76$, $SE = 0.15$) than those experiencing a decrease in workload ($M = 4.27$, $SE = 0.15$).

Moreover, at each trial, workload perceptions were significantly different depending on the workload change condition to which the participant was randomly assigned. More specifically, at each trial, workload was perceived as higher when participants had six e-mails as opposed to three e-mails to complete ($ps < .001$). When workload was increased, workload perceptions at Trials 1 ($M = 3.80$, $SE = 0.20$) and 2 ($M = 3.93$, $SE = 0.22$) were lower than Trials 3 ($M = 5.68$, $SE = 0.19$) and 4 ($M = 5.64$, $SE = 0.21$). When workload was decreased, workload perceptions at Trials 1 ($M = 5.03$, $SE = 0.20$) and 2 ($M = 5.21$, $SE = 0.22$) were higher than Trials 3 ($M = 3.31$, $SE = 0.19$) and 4 ($M = 3.51$, $SE = 0.21$). There was no significant main effect of the work control condition on workload perceptions, $F(1, 66) = 0.82$, $p = .37$, *ns*, or significant interaction between workload change and work control, $F(1, 66) = 1.97$, $p = .17$, *ns*, or significant interaction of trials by workload order by work control, $F(3, 198) = 0.72$, $p = .54$, *ns*, indicating the independence of the experimental manipulations.

A mixed factorial ANCOVA on the work control manipulation check revealed a significant main effect of the work control manipulation, $F(1, 66) = 13.49$, $p < .001$, *partial* $\eta^2 = .17$. Participants in the high work control condition perceived higher levels of discretion over how they completed the task ($M = 5.25$; $SE = 0.20$) compared to participants in the low work control condition ($M = 4.19$; $SE = 0.20$). There was no significant main effect of trials, $F(3, 198) = 0.59$, $p = .62$, *ns*. In addition, there was no significant interaction between workload change and work control, $F(1, 66) = 1.97$, $p = .17$, *ns*, or trials by workload change by work control, $F(3, 198) = 1.25$, $p = .27$, *ns*, further indicating the independence of the manipulations.

Data Analysis Strategy

Because global motivation is continuously measured, a median-split was performed to create a dichotomized categorical variable. This dichotomization was required to perform mixed factorial ANCOVA (see MacCallum, Zhang, Preacher, & Rucker, 2002). Checks were carried out to ensure no confounds emerged because of this new transformation of global motivation (e.g., gender was still evenly distributed across cells). Sums of squares Type 3 was used in all the SPSS analyses to evenly weight cells (Tabachnick & Fidell, 2007). As such, each analysis was a mixed factorial ANCOVA of 4 (Trials: within-participants) × 2 (Workload change: between-participants) × 2 (Control: between-participants) × 2 (Global self-determination or non-self-determination: between-participants) factors on each of the dependent variables. Table 2 (with non-self-determination as the moderator) and Table 3 (with self-determination as the moderator) summarize the results of the ANCOVAs on each of the dependent variables. Significant interactive effects were followed-up with simple effects to test the hypotheses. Simple effects of the within-participants factor of

Table 2
Analysis of Covariance (ANCOVA) Summary Table With Global Self-Determined Motivation as Moderator

Source	*F*				
	Anxiety	Planning coping	Active coping	Intrinsic motivation	Task performance
Main effects					
Trials[a]	0.05	1.37	0.06	0.17	0.98
Workload change condition	0.63	0.06	0.35	0.26	3.87
Work control condition	0.94	0.24	0.04	0.00	0.81
Self-determination	0.48	0.58	3.04	2.42	0.02
Two-way interactions					
Trials × Workload change condition[a]	7.33**	0.70	4.10*	0.31	123.69**
Trials × Work control condition[a]	2.72*	3.01*	2.32	1.37	0.12
Trials × Self-determination[a]	1.45	1.42	1.32	0.06	2.68*
Workload change condition × Work control condition	1.80	1.17	0.02	0.37	0.25
Workload change condition × Self-determination	0.00	0.93	0.68	0.84	2.37
Work control condition × Self-determination	1.73	0.06	0.77	0.50	0.15
Three-way interactions			1.29	0.37	0.44
Trials × Workload change condition × Work control[a]	2.03	1.25	0.71	1.12	0.21
Trials × Workload change Condition × Self-determination[a]	2.62	3.30*	1.06	1.33	0.36
Trials × Work control condition × Self-determination[a]	2.20	1.14	0.92	0.86	0.21
Workload change condition × Work control condition × Self-determination	4.50*	2.76			
Four-way interaction					
Trials × Workload change condition × Work control condition × Self-determination[a]	1.24	3.37*	1.53	0.66	0.16

Note. *MSE* for within-participants effects on anxiety = 0.30, planning coping = 0.33, active coping = 0.27, intrinsic motivation = 0.33, and quantity of emails = 0.49; *MSE* for between-participants effects on anxiety = 1.68, planning coping = 3.86, active coping = 2.16, intrinsic motivation = 3.81, and task performance = 1.66.
[a] Within-participants effects.
* $p < .05$. ** $p < .01$.

Table 3
Analysis of Covariance (ANCOVA) Summary Table With Global Non-Self-Determined Motivation as Moderator

Source	*F*				
	Anxiety	Planning coping	Active coping	Intrinsic motivation	Task performance
Main effects					
Trials[a]	0.04	1.13	0.10	0.09	2.05
Workload change condition	0.08	0.00	0.10	0.27	4.30*
Work control condition	0.89	0.35	0.01	0.28	0.00
Non-self-determination	6.68*	6.24*	5.07*	7.40*	4.05*
Two-way interactions					
Trials × Workload change condition[a]	9.14**	1.01	2.62	1.02	175.14**
Trials × Work control condition[a]	0.75	0.92	1.88	1.04	0.90
Trials × Non-self-determination[a]	0.60	0.38	0.77	0.16	0.72
Workload change condition × Work control condition	2.78	0.45	0.01	0.36	1.72
Workload change condition × Non-self-determination	0.00	1.37	2.80	0.23	0.28
Work control condition × Non-self-determination	0.15	1.68	0.00	1.27	0.08
Three-way interactions					
Trials × Workload change condition × Work control[a]	1.06	0.74	1.73	1.18	0.44
Trials × Workload change condition × Non-self-determination[a]	0.96	0.27	3.97*	1.79	2.89*
Trials × Work control condition × Non-self-determination[a]	2.86*	0.61	1.01	3.63*	0.36
Workload change condition × Work control condition × Non-self-determination	0.17	0.02	1.13	0.02	0.18
Four-way interaction					
Trials × Workload change condition × Work control condition × Non-self-determination[a]	0.86	1.01	0.68	.01	0.42

Note. *MSE* for within-participants effects on anxiety = 0.31, planning coping = 0.37, active coping = 0.26, intrinsic motivation = 0.32, and task performance = 0.48; *MSE* for between-participants effects on anxiety = 1.66, planning coping = 3.58, active coping = 2.03, intrinsic motivation = 3.62, and task performance = 1.61.
[a] Within-participants effects.
* $p < .05$. ** $p < .01$.

trials were conducted for any interactive effects involving this factor (i.e., such that fluctuations in the means of the dependent variables over time, as a function of the between-participants factors, could be examined).

Self-Determined Motivation (Table 2)

Anxiety. There were significant 2-way interactions of trials by workload change, $F(3, 198) = 7.33$, $p < .01$, *partial* $\eta^2 = .11$, and trials by work control, $F(3, 198) = 2.72$, $p = .05$, *partial* $\eta^2 = .04$. However, both of these interactions were qualified by a higher-order interaction of workload change by work control by self-determination, $F(1, 61) = 4.50$, $p = .04$, *partial* $\eta^2 = .07$. This 3-way interaction is graphed in Figure 1. Simple effects analyses revealed that anxiety differed by workload change at low work control and low self-determination, $F(1, 61) = 4.06$, $p = .048$, *partial* $\eta^2 = .06$. Low self-determined individuals with low work control found increasing demands more stressful than decreasing demands. All other pairwise comparisons were nonsignificant (ps $> .11$). As such, there was no support for Hypotheses 1 and 2 for the outcome of anxiety.

Planning coping. There was a 2-way interaction of trials by control, $F(3, 183) = 3.01$, $p = .03$, *partial* $\eta^2 = .05$, and a 3-way interaction of trials by workload order by self-determined motivation, $F(3, 183) = 3.30$, $p = .02$, *partial* $\eta^2 = .05$. These effects were qualified by a higher-order interaction, a 4-way interaction of trials, workload change, work control, and self-determined motivation, $F(3, 183) = 3.37$, $p = .02$, *partial* $\eta^2 = .05$. This interaction is displayed in Figures 2a (at increasing workload) and 2b (at decreasing workload). To deconstruct the 4-way interaction, the sample was split by workload change (i.e., increase or decrease).

At increasing workload (Figure 2a), there was a 2-way interaction of trial by self-determined motivation, $F(3, 90) = 2.93$, $p = .038$, *partial* $\eta^2 = .09$. The simple effects of trial revealed that, by Trial 4, there was a trend for high self-determined individuals to have reduced their use of planning coping, compared with low self-determined individuals ($p = .06$). This was independent of work control; as such, both low and high work control conditions resulted in decreased planning coping for self-determined individuals when workload increased.

At decreasing workload (Figure 2b), there was a 3-way interaction of trial by work control by self-determined motivation, $F(3,$

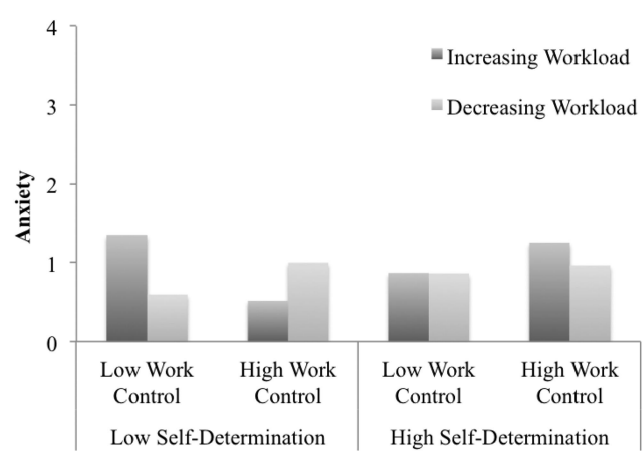

Figure 1. Workload change by work control by self-determination on anxiety.

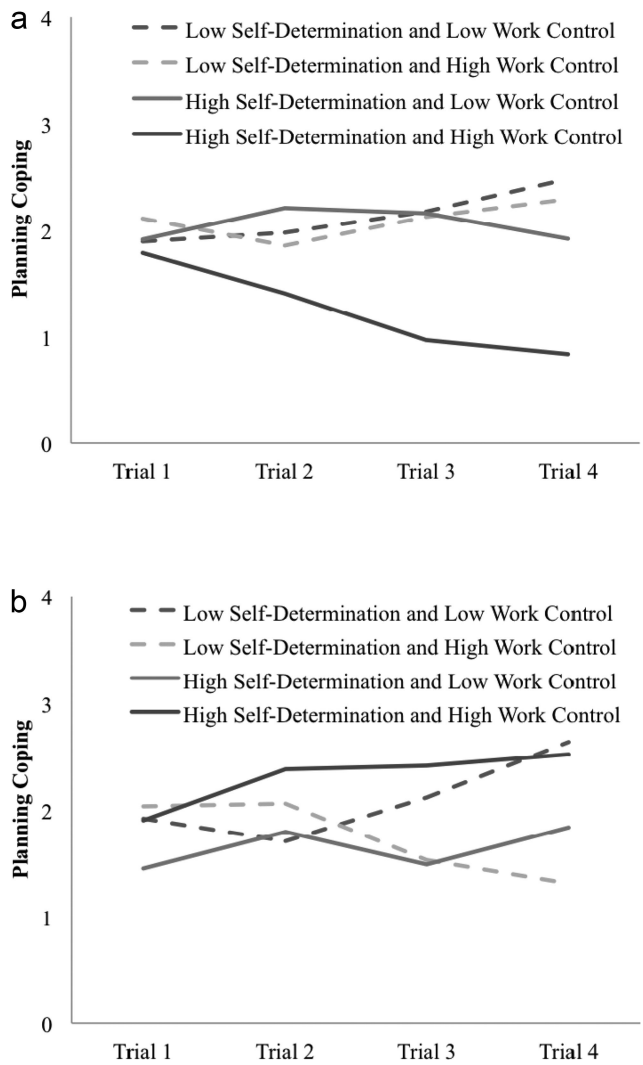

Figure 2. (a) Trials by workload change by self-determination at increasing workload on planning coping. (b) Trials by workload change by self-determination at decreasing workload on planning coping.

87) = 4.73, $p < .01$, *partial* $\eta^2 = .14$. The simple effects of work control revealed that, for individuals high in self-determination, more planning coping was used at high work control ($M = 2.53$, $SE = 0.33$) compared with low work control ($M = 1.81$, $SE = 0.30$; $p = .03$) at Trial 3. For those low in self-determination, there was a trend at Trial 4 for more planning coping at low work control ($M = 2.61$, $SE = 0.53$) compared with high work control ($M = 1.38$, $SE = 0.39$; $p = .07$). As such, there was partial support for Hypothesis 1a and 1b for the outcome of planning coping.

Active coping. There were no significant interactive effects involving self-determined motivation on active coping. A significant 2-way interaction of trials by workload change, $F(3, 183) = 4.10$, $p = .01$, *partial* $\eta^2 = .06$, emerged. However, as seen in Table 3, with the inclusion of non-self-determination in the model, this was qualified by the higher-order interaction of trials by workload change by non-self-determined motivation (also see Figure 5, a and b). This interaction is interpreted in the section below outlining the main findings involving non-self-determined motivation. As such, there was no support for Hypotheses 1 and 2 for the outcome of active coping.

Intrinsic motivation. There were no effects involving self-determined motivation. As such, there was no support for Hypotheses 5 and 6 for the outcome of intrinsic motivation.

Task performance. There was a significant 2-way interaction of trials by self-determined motivation, $F(3, 186) = 2.68$, $p = .048$, *partial* $\eta^2 = .04$ (Figure 3). Simple effects of trials revealed that, for individuals low in self-determination, performance increased from Trial 1 to Trial 2, and then from Trial 3 to Trial 4, $F(3, 60) = 19.29$, $p < .001$, *partial* $\eta^2 = .49$. For individuals high in self-determination, performance increased from Trial 1 to Trial 2, but not from Trial 2 to 3, or Trial 3 to 4, $F(3, 60) = 6.90$, $p < .01$, *partial* $\eta^2 = .26$. No other effects on the number of e-mails completed were significant. As such, there was no support for Hypotheses 5 and 6 for the outcome of task performance.

Non-Self-Determination (Table 3)

Anxiety. There was a significant main effect of participants' non-self-determination, $F(1, 61) = 6.68$, $p = .01$, *partial* $\eta^2 = .10$. Individuals with high non-self-determined motivation ($M = 1.13$; $SE = 0.11$) reported more anxiety than individuals with low non-self-determined motivation ($M = 0.72$; $SE = 0.11$). In addition, there was a significant 2-way interaction of trials by workload change, $F(3, 198) = 9.14$, $p < .01$, *partial* $\eta^2 = .13$, such that when workload increased, by Trial 4 ($M = 0.81$; $SE = 0.13$) anxiety was higher compared to when workload decreased ($M = 0.45$; $SE = 0.13$), $F(1, 61) = 4.00$, $p = .05$, *partial* $\eta^2 = .06$.

In support of Hypothesis 3a, a higher-order interaction of trials by work control by non-self-determination emerged, $F(3, 198) = 2.86$, $p = .038$, *partial* $\eta^2 = .05$. This 3-way interaction is graphed in Figure 4a (at low work control) and 4b (at high work control). Simple effects of non-self-determination revealed that significant differences occurred at low work control in Trial 2, $F(1, 61) = 5.82$, $p = .02$, *partial* $\eta^2 = .09$, and high work control in Trial 3, $F(1, 61) = 6.86$, $p = .01$, *partial* $\eta^2 = .10$. All other pairwise

Figure 3. Trials by self-determination on the number of e-mails completed.

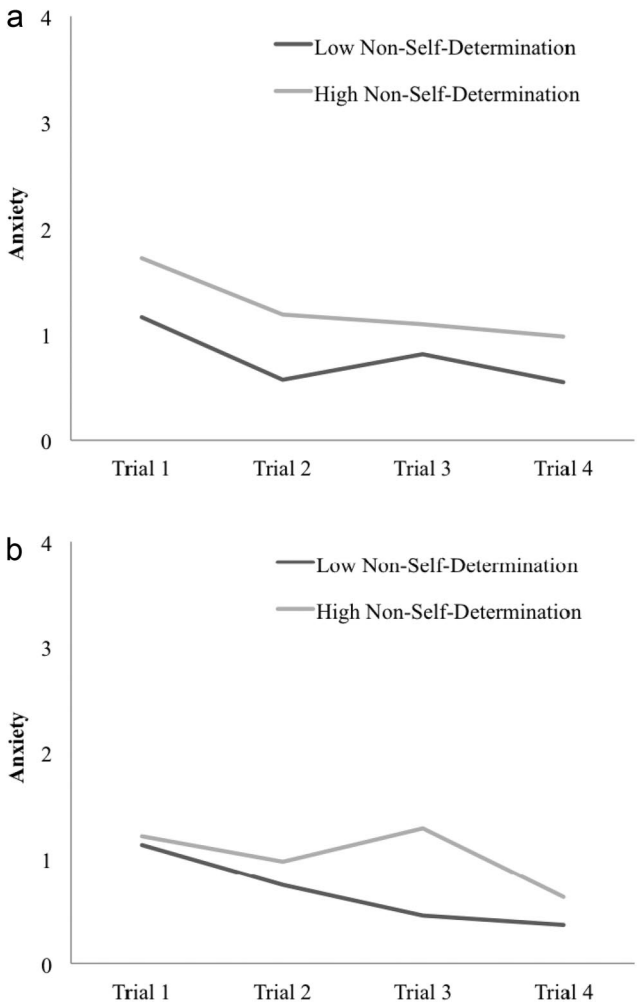

Figure 4. (a) Trials by non-self-determination at low work control on anxiety. (b) Trials by non-self-determination at high work control on anxiety.

comparisons were nonsignificant ($ps > .065$). As can be seen in Figure 4a, at low work control, by Trial 2, individuals with low non-self-determination had significantly lower anxiety than individuals with high non-self-determination. After the change in workload at Trial 3, this effect disappeared. In contrast, at high work control, after the level of workload was increased or decreased at Trial 3, individuals with high non-self-determination had significantly higher anxiety than individuals with low non-self-determination (Figure 4b). After adaptation to the change in workload at Trial 4, this difference was nonsignificant.

Planning coping. There was a significant main effect of non-self-determined motivation, $F(1, 61) = 6.24$, $p = .02$, *partial* $\eta^2 = .09$, such that individuals high in non-self-determined motivation ($M = 2.23$; $SE = 0.16$) used more planning coping strategies compared to those low in non-self-determination ($M = 1.64$; $SE = 0.16$). There were no other effects involving non-self-determination. As such, there was no support for Hypotheses 3 and 4 for the outcome of planning coping.

Active coping. There was a significant main effect of non-self-determined motivation, $F(1, 61) = 5.07$, $p = .03$, *partial* $\eta^2 = .08$, such that individuals high in non-self-determined motivation ($M = 3.19$; $SE = 0.12$) used more active coping strategies overall, compared to those low in non-self-determination ($M = 2.79$; $SE = 0.12$). There also was a 3-way interaction of trials by workload change by non-self-determined motivation, $F(3, 183) = 3.97$, $p = .01$, *partial* $\eta^2 = .06$. This interaction is displayed in Figure 5a (at increasing workload) and 5b (at decreasing workload). The simple effects of non-self-determined motivation revealed significant differences at Trial 3, $F(1, 61) = 10.91$, $p < .01$, *partial* $\eta^2 = .15$, and Trial 4, $F(1, 61) = 8.82$, $p < .01$, *partial* $\eta^2 = .13$, when workload was increasing. Highly non-self-determined individuals reported using significantly more active coping when workload was increased in Trial 3 and 4 (Figure 5a). When workload was decreasing, there were no significant differences across levels of non-self-determination at each trial ($ps > .239$). Thus, there was no support for Hypotheses 3 and 4 for the outcome of active coping.

Intrinsic motivation. There was a main effect of non-self-determination on intrinsic motivation, $F(1, 60) = 7.40$, $p = .01$,

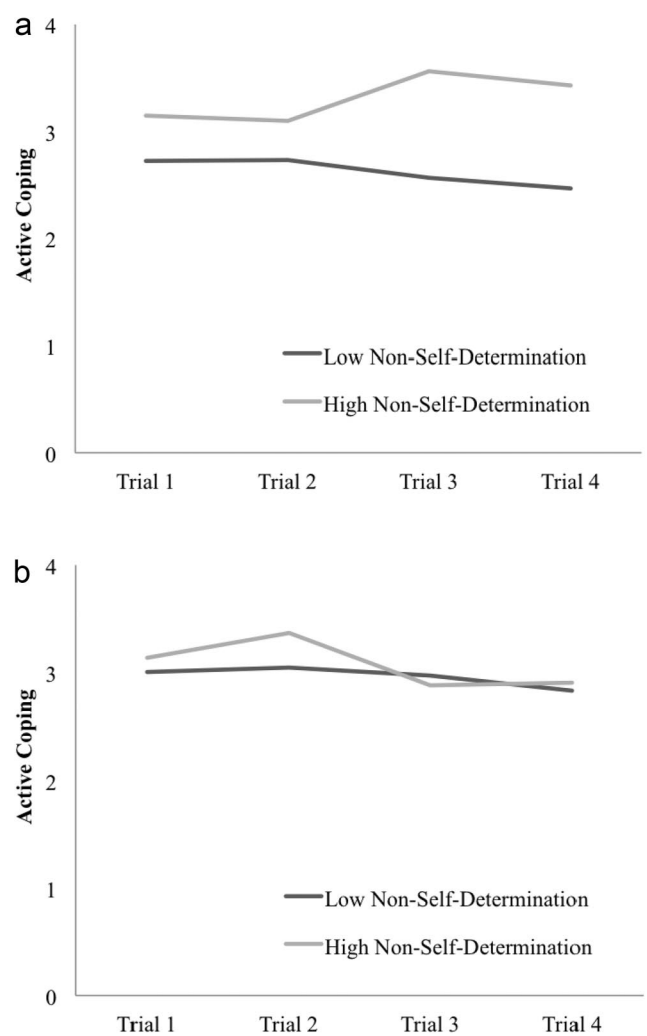

Figure 5. (a) Trials by non-self-determination at increasing workload on active coping. (b)Trials by non-self-determination at decreasing workload on active coping.

partial η^2 = .11. Contrary to expectations, those high in non-self-determination found the task *more* intrinsically motivating (M = 3.61; SE = 0.17) than those low in non-self-determination (M = 2.97; SE = 0.17). In support of Hypothesis 7a, there also was a significant 3-way interaction of trials by control by non-self-determined motivation, $F(3, 180) = 3.63$, $p = .014$, *partial* η^2 = .06. This interaction is graphed in Figure 6a (at low work control) and 6b (at high work control). Simple effects of non-self-determination revealed that, at high work control, intrinsic motivation for the task was higher for high non-self-determined than low non-self-determined motivation at Trial 1, $F(1, 60) = 4.49$, $p = .03$, *partial* η^2 = .08. However, this difference was nonsignificant across the other trials as intrinsic motivation decreased significantly from Trial 1 compared with Trial 2 ($p = .04$). In contrast, at low work control, intrinsic motivation was higher for high non-self-determined individuals compared to low non-self-determined individuals at Trial 2, $F(1, 60) = 6.85$, $p = .01$, *partial* η^2 = .10, Trial 3, $F(1, 60) = 7.28$, $p = .01$, *partial* η^2 = .11, and Trial 4, $F(1, 60) = 7.17$, $p = .01$, *partial* η^2 = .11.

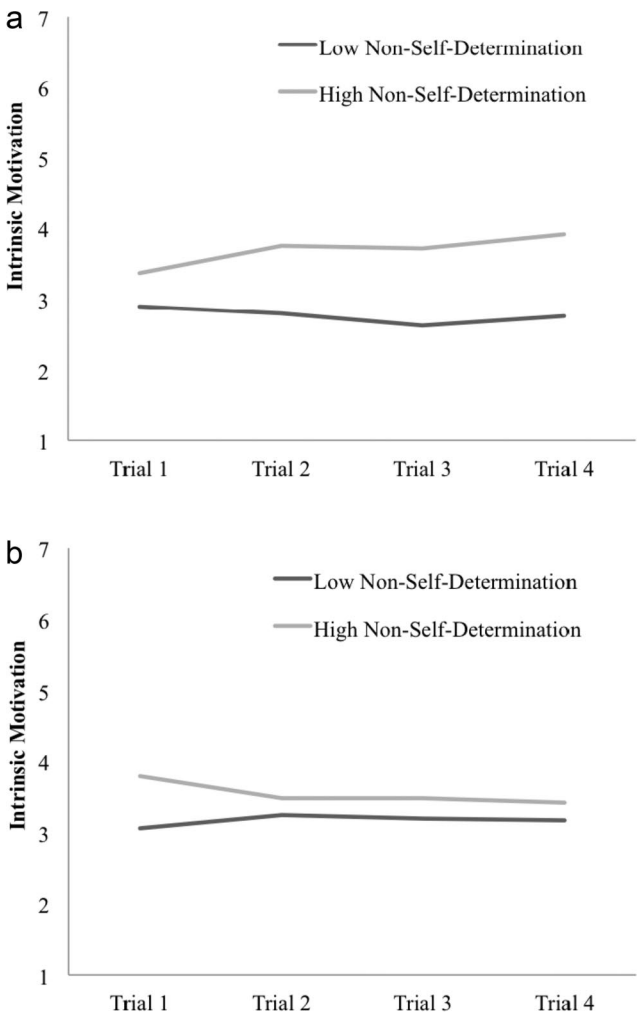

Figure 6. (a) Trials by non-self-determination at low work control on intrinsic motivation. (b)Trials by non-self-determination at high work control on intrinsic motivation.

Task performance. There was a main effect of non-self-determined motivation, $F(1, 62) = 4.05$, $p = .05$, *partial* η^2 = .06, such that high non-self-determined participants (M = 3.96; SE = 0.11) completed more e-mails than low non-self-determined participants (M = 3.65; SE = 0.11) participants. There also was a significant main effect of workload change, $F(1, 62) = 4.30$, $p = .04$, *partial* η^2 = .07, such that participants who experienced the increasing workload condition (M = 3.96; SE = 0.11) ultimately completed more e-mails than those who experienced the decreasing workload condition (M = 3.64; SE = 0.11). A 2-way interaction of trials and workload change also emerged, $F(3, 1862) = 175.14$, $p < .01$, *partial* η^2 = .74. However, this effect was qualified by a 3-way interaction of trials by workload change by non-self-determined motivation, $F(3, 186) = 2.89$, $p = .04$, *partial* η^2 = .05. This interaction is graphed in Figure 7a (at increasing workload) and b (at decreasing workload).

Simple effects of non-self-determination revealed that, when workload was increased (Figure 7a) at Trial 4, high non-self-determined individuals had completed more e-mails than low non-self-determined individuals, $F(1, 62) = 8.48$, $p = .01$, *partial* η^2 = .12. When workload was decreased (Figure 7b) at Trial 2, high non-self-determined individuals completed more e-mails than low non-self-determined individuals, $F(1, 62) = 6.78$, $p = .012$, *partial* η^2 = .10. All other pairwise comparisons were nonsignificant (ps > .224). This pattern indicates that high non-self-determined individuals, compared to low non-self-determined individuals, improved their task performance the second time they experienced a high workload, whenever this occurred across the four trials. As such, there was no support for Hypotheses 7 and 8 for the outcome of task performance.

Discussion

This experimental study examined the dynamic temporal effects of changes in workload (i.e., an increase or decrease at Trial 3) while participants were working under conditions of low or high work control. Participants' global motivation (i.e., self-determined or non-self-determined) was expected to moderate their reactions to changes in workload, such that high control would assist (and low control hamper) self-determined individuals ability to deal with these changes in workload, whereas low control would assist (and high control hamper) non-self-determined individuals ability to deal with these changes in workload. In support of the hypotheses, for non-self-determined individuals, low work control was stress-buffering and high work control stress-exacerbating in the prediction of anxiety and intrinsic motivation. For self-determined individuals, high work control facilitated adaptive use of planning coping in response to changing workload. Other interactive effects of global motivation that were irrespective of work control emerged on anxiety, active coping, and task performance (i.e., the number of e-mails completed). These findings are described below.

Support for Hypothesized Effects of Self-Determined Motivation

In partial support of Hypotheses 1a and 1b, the level of an individual's global self-determination moderated the stress-buffering effect of work control, as workload changed, on planning

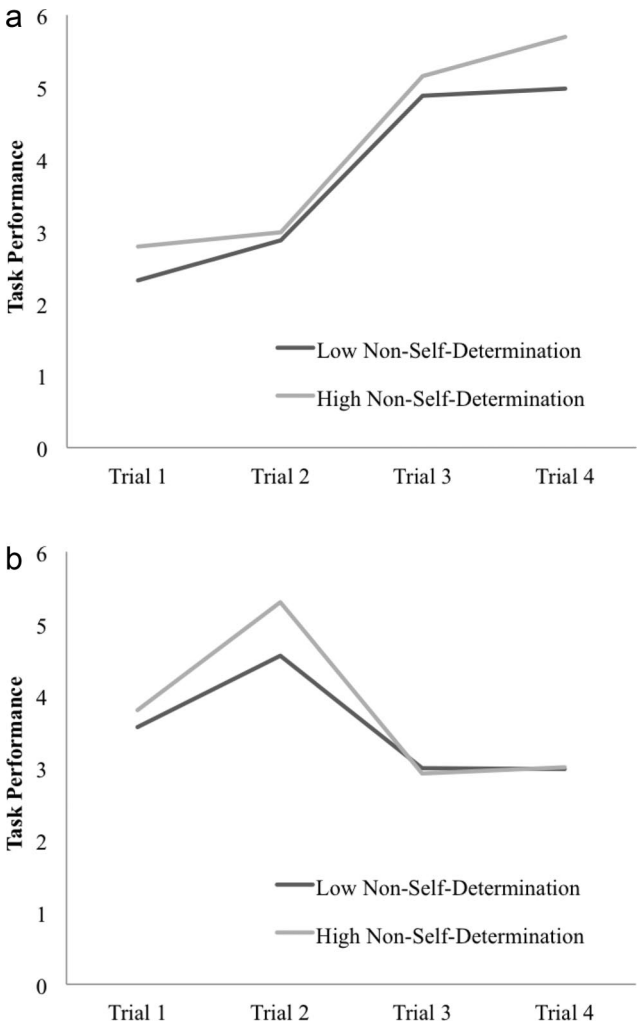

Figure 7. (a) Trials by non-self-determination at increasing workload on task performance. (b) Trials by non-self-determination at decreasing workload on task performance.

coping. Overall, this pattern of findings indicated that, at Trial 3, high self-determined individuals used the high work control available to implement a more antecedent-focused emotion-regulation strategy adaptively in response to a task stressor (i.e., change in workload). When workload was decreasing, at low control, changing the use of planning coping strategies was restricted for individuals with high self-determination. When workload was increasing, under both low and high work control conditions, self-determined individuals reduced their planning coping.

Although it was hypothesized that high work control would be particularly useful to adaptively increasing planning coping when workload increased (Hypothesis 1b), this pattern of results was reinterpreted by the fact that taking the time to strategize what to do during a high workload 10-min trial of the inbox activity is maladaptive, especially after some experience and practice completing the activity under low workload conditions in Trials 1 and 2.

It seems that high work control enabled self-determined individuals to more strategically implement planning coping strategies in response to changes in workload. The use of planning coping early in the emotion generation process reduced the likelihood that self-determined individuals experienced negative emotions such as anxiety (Gross, 1998). This is in line with other research findings suggesting that self-determined individuals are less emotionally reactive to their external environment (Hodgins, Yacko, & Gottlieb, 2006; Hodgins et al., 2010) and cope better with situational demands (Amiot, Gaudreau, & Blanchard, 2004, Amiot et al., 2008). Unfortunately, this effective use of planning coping did not improve task performance (i.e., was not reflected in the number of e-mails completed during each 10-min trial).

For self-determined global motivation, there was no support for the hypothesized stress-buffering and stress-exacerbating effects of work control on the other dependent variables (i.e., anxiety, active coping, intrinsic motivation, and task performance).

Support for Hypothesized Effects of Non-Self-Determined Motivation

The interactive effects of trials by work control by non-self-determined motivation on anxiety and intrinsic motivation provided partial support for Hypothesis 3a and 7a. Individuals with high non-self-determination working under high control experienced increased anxiety at Trial 3. Increased anxiety occurred whether workload increased or decreased; the change in workload was stressful when work control was high but not when work control was low. Moreover, while working under high work control conditions, non-self-determined individuals' intrinsic motivation toward the task declined after Trial 1. Furthermore, when working under low work control conditions, intrinsic motivation toward the task increased over trials. When working under high work control, although the finding on anxiety suggests that some adaptation to the stressfulness of this change in workload at Trial 3 had occurred by Trial 4, the effect on intrinsic motivation suggests that participants' enjoyment of the task under high work control did not improve. These interactive effects support a P-E Fit perspective on strain.

The results on both anxiety and intrinsic motivation suggest that non-self-determined individuals were not comfortable working in a high work control environment. Burger (1989) has postulated that negative reactions to possessing high control will be observed when there is low likelihood of obtaining desired outcomes, a reduction in perceived predictability of efforts leading to desired outcomes, or increased concern for self-presentation. It is possible that these concerns are higher for individuals with high non-self-determination. This view is contradictory to SDT, which asserts that all individuals have an innate need for autonomy, and that despite differences in preferences for autonomy, such individuals will still strive when opportunities to have this need fulfilled are provided (Deci & Ryan, 1987; Deci & Ryan, 2000). However, the fact that anxiety returned to a low level by Trial 4 suggests that non-self-determined individuals benefit from high work control after some practice on a task over time (see Deci & Ryan, 2000; Radel, Pelletier, Sarrazin, & Milyavskaya, 2011). This finding can be partially explained by needs-as-motives hypothesis, which claims that individuals who have had their need for autonomy thwarted (i.e., individuals who have developed a global non-self-determined orientation) would hold a stronger desire for opportunities to be autonomous (Sheldon & Gunz, 2009). It is likely that

non-self-determined individuals might want to be autonomous but lack the concrete skills or experience to fully take advantage of the control opportunities made available to them.

These findings on anxiety and intrinsic motivation suggest that there are instances in which enhanced autonomy is not beneficial (i.e., for non-self-determined individuals working under high control). Ryan and Deci (2006) have argued against many of the theories and propositions that claim there are negative effects of high autonomy or control (e.g., Muraven & Baumeister, 2000; Shapiro et al.,1996), by specifying that choices or self-regulatory demands are not the type of autonomy specified within SDT. Despite overlap between an autonomy-supportive environment within the SDT perspective and a high work control environment within the D-CM perspective, there are some differences between these approaches. An autonomy-supportive environment is much more than having control over one's tasks, methods, and general decision-making (i.e., the type of control considered in the D-CM; Breaugh, 1985; Ganster, 1989; Jackson et al., 1993). An autonomy-supportive environment is best described as an environment that encourages individuals to make their own choices and that makes them feel safe and supported in their pursuit of independently mastering a task (Deci & Ryan, 1987). It also is the opposite or absence of a "controlled" environment, which is described as coercive (e.g., presence of extrinsic rewards), threatening (e.g., time pressures), and/or evaluative (e.g., monitoring or surveillance is present). This controlling environment is quite distinct from a low work control environment, which is best described as lacking discretion over how one goes about completing their work (e.g., an environment where there are strict rules or procedures to follow regarding how work gets done).

In the present study, the low work control condition inhibited the choices of the participants in terms of how they paced, ordered, and completed the tasks that comprised the inbox activity. Indeed, these participants were given strict instructions on how to complete the task (i.e., more task structure). In this way, the low work control condition was not identical to a "controlled" environment, from a SDT point of view. The low work control condition was not more time pressured (i.e., this was manipulated independently), did not have an evaluative or surveillance element to it, (i.e., the level at which participants were monitored was the same across conditions), and did not have extrinsic incentives (e.g., there was no additional rewards for participants in the low control condition). A low control environment, as represented in the current study, does not necessarily thwart fulfillment of basic psychological needs such as autonomy, competence, and relatedness. In fact, for non-self-determined individuals, a low work control environment might be a safe starting point for positive experiences of high work control or at least adaptation to these working conditions over time.

For non-self-determined global motivation, there was no support for the hypothesized stress-buffering or stress-exacerbating effects of work control on the other dependent variables (i.e., active coping, planning coping, and task performance).

Other Moderating Effects of Global Motivation

Effects of self-determined motivation. An interactive effect of workload change by work control by self-determined motivation emerged on anxiety, indicating that individuals who are low in global self-determined motivation found the increased workload condition stressful when they had low work control. Although not hypothesized, it seems that a combination of two key aspects of the environment thought to cause distress (i.e., overall experience of threat as well as low autonomy-support; Deci & Ryan, 1987) are particularly distressing to individuals who are low in self-determined motivation. This effect has been observed in the field on the outcome of emotional exhaustion (Fernet et al., 2004). However, it is uncertain, because of the use of a bipolar index of self-determination used by Fernet and colleagues, if this stress-exacerbating effect of low work control was uniquely because of the absence of, or low levels of, self-determination.

It is interesting to note that the interaction of trials by self-determination on the number of e-mails completed showed that individuals high in global self-determined motivation were not trying to, or not able to, complete as many e-mails across the four trials as individuals with low self-determination. It is possible that highly self-determined individuals were focusing on different aspects of task performance. In this respect, self-determined individuals, being more focused on learning and mastery goals rather than performance goals, might have focused on the process of responding rather than the number of e-mails completed. It also is possible that self-determined individuals were not as invested in the task as their self-worth was not contingent on their task performance (Ryan & Brown, 2003). Despite a lack of support for the hypotheses on task performance, the interactive effect on planning coping demonstrated that self-determined individuals were trying to meet the demands of the situation when high control was available to them.

Effects of non-self-determination. The interactive effects of trials by workload change by non-self-determination on active coping and the number of e-mails completed indicate that non-self-determined individuals were using more active coping and improving their performance in response to the changing task demands (i.e., the changing levels of workload). These results demonstrated that, regardless of the level of the work control available to them, these individuals increased active coping efforts in response to an increased workload. These individuals also performed better (i.e., completed more e-mails) the second time they experienced high workload. In addition, although not hypothesized, of note is the finding that non-self-determined motivation had positive main effects on anxiety, coping (i.e., both planning and active), as well as intrinsic motivation. This increased effort might be because of their performance on the task being tied to self-worth, as highly non-self-determined individuals tend to tie their self-esteem more closely to external elements like success (Ryan & Brown, 2003).

It is possible that because of this contingent self-worth (Ryan & Brown, 2003), non-self-determined individuals were more invested in and trying harder at the task. In fact, these individuals were feeling more anxious and intrinsically motivated at the same time, and they also implemented more active and planning coping strategies. However, the interactive finding on task performance is more complex as prior research has shown that self-determined individuals tend to perform better. For example, in an experiment, Radel, Sarrazin, and Pelletier (2009) primed self-determined and non-self-determined orientations and found that self-determined priming led to enhanced persistence and performance at a task that involved learning a new motor skill. In addition, Baard et al.

(2004) found that a self-determined orientation led to higher employee performance evaluations, but only through intrinsic need satisfaction. Unfortunately, in the Baard et al. study, non-self-determination was not measured, so it is unknown as to whether a non-self-determined orientation would have produced a stronger indirect effect through need satisfaction on performance (or whether this orientation would have had a stronger direct effect on performance).

Research on goal orientations has revealed that holding a performance goal is not always detrimental to performance as this depends on the specific type of performance goal (Grant & Dweck, 2003). In fact, only performance goals that are explicitly linked to ability (i.e., proving one's ability or self-worth) initially decrease performance, but not once the goal is met with success (i.e., once the desired performance standard is reached). Performance goals related to being normative (i.e., being the same level of performance as others), or that focus on achieving positive outcomes (i.e., simply "doing well"), are not related to performance. It is possible that, in the context of the present task, non-self-determined individuals either (1) met the demands with success despite the pressure they placed on themselves, or (2) held performance goals that were more closely tied to being normative or achieving a certain performance outcome. In the present study, participants completed the task in separate cubicles; as such, the first explanation is probably a more accurate explanation of the current study's findings. Future research is needed to untangle the joint effects of global motivation and performance goals during fluctuations in workload.

Practical Implications

Overall, these findings support a P-E Fit explanation of strain and motivation, which signifies this research has implications for both selection, career counseling, and outplacement services. These research findings suggest that matching individuals' global non-self-determination to job characteristics such as workload level (or degree of fluctuation in workload) and work control can be beneficial to anxiety levels and intrinsic motivation. Although it might seem that global self-determination provides some degree of resiliency, it is important to note that highly self-determined individuals were not necessarily the best performers (i.e., completing fewer e-mails than those low in self-determination and overall being less engaged in the task compared with non-self-determined individuals). Future research is needed that examines both: (a) the long-term consequences of non-self-determined individuals desire to perform well on work tasks, and (b) the long-term consequences of self-determined individuals' exposure to work conditions that do not afford significant challenge.

These findings also have implications for training and development. One significant implication is that non-self-determined individuals might benefit from practice at using high work control opportunities to their advantage. In this instance, non-self-determined individuals might be able to learn some lessons from self-determined individuals on the appropriate use of planning coping (or other antecedent-focused emotion-regulation strategies; see Gross, 1998). For non-self-determined individuals, provision of opportunities to practice using antecedent emotion-regulation strategies, in environments that afford such use, could lead to fewer experiences of negative emotions. For example, non-self-determined employees might benefit from training on how to be more proactive, by learning how to take advantage of the work control opportunities available at work and use this control to change the task conditions or task environment to suit them more (Searle, 2008). This training could take the form of spaced rather than massed practice to give non-self-determined individuals more time to become comfortable and familiar with high work control and to provide them with the opportunity to practice utilizing work control in a safe environment.

Limitations and Future Research Directions

The current study was limited to a small sample of university students in a simulated organizational setting. Conducting this research in this setting has advantages, primarily enabling the findings to be evaluated according to their causal implications (Dipboye & Flanagan, 1979; Locke, 1986). Although attempts were made to generate realism, there is uncertainty regarding how these effects operate on a daily basis in organizational contexts. The short-term nature of the inbox activity does not reflect the importance and meaning of work carried out in work settings or the amount of time spent completing complex work tasks. In future research, utilizing experience sampling methodologies could be particularly useful for determining whether the short-term effects observed in the current study occur for employees on a daily basis at work. Another limitation that should be noted is the small sample size, which provided enough power to detect both small and large within-participants effects, but only enabled detection of moderate to large between-participants effects.

A further limitation relates to the choice and inclusion of dependent variables. First, the task performance dependent variable (i.e., number of e-mails completed) might not have been sensitive enough to uncover the stress-buffering effects of work control. In future research, utilizing tasks that enable varied indicators of task performance (e.g., like what was used by Glaser et al., 1999; typing speed, accuracy, and productive time) might reveal more effects. Second, we did not assess the full range of the emotion-generation model of emotion-regulation strategies. In a recent book chapter on emotion regulation, Shiota and Kalat (2012) make a distinction among three broad types of emotion regulation: situation-focused, cognitive-focused, and response-focused. In the current research, only two types of coping strategies that could be categorized as situation-focused (i.e., planning coping) and response-focused (i.e., active coping) were investigated. Future research could incorporate cognitive-focused emotion regulation strategies, for example, positive reappraisal.

Finally, it should be noted that when workload was increased at Trial 3, neither self-determined nor non-self-determined individuals were protected by having compatibility between their comfort with work control and the control available in the work environment. Protective effects of P-E Fit compatibility were only observed when workload was decreased (i.e., on planning coping for self-determined individuals). It is possible that the increase in workload at Trial 3, which was a doubling of workload, was too high to reveal such effects. Future research should examine different levels of workload change and potentially examine how introducing smaller increases in workload incrementally is handled (i.e., and then also examine whether the effects of workload on strain and motivation depend on the work control available and

individuals' global motivation). Not only this, but future research also might consider including additional trials prior to and after a change in workload (e.g., 8–10 trials in total) so that more advanced statistical techniques such as linear growth curve modeling can be utilized.

Conclusion

The current research findings offer support for (a) extending the D-CM to incorporate individual differences such as global motivation as moderators and (b) examining the dynamic effects of workload changes over time. Our findings highlight that: (a) high work control might be more useful to self-determined individuals (i.e., through the use of planning coping strategies designed to meet the demands of the situation) and (b) high work control is stress-exacerbating for non-self-determined individuals, resulting in increased anxiety when workload levels chance, as well as lower intrinsic motivation toward the task over time. Planning coping reflects a more antecedent-focused emotion-regulation strategy (Gross, 1998). Self-determined individuals use of high work control to enable adaptive use of planning coping might help them more effectively stop the generation of negative emotions. As non-self-determined individuals' anxiety reduced from Trial 3 to Trial 4, these findings also inform P-E Fit theory, as it seems that a compatibility or incompatibility between an individual and their environment is not necessarily static. Individuals might learn to adapt to, or even overcome, an incompatibility between their work preferences and their work environment.

As a methodological contribution, the current study examined reactions to changes in workload within-participants over four trials of an inbox activity. Not only does this extend the experimental paradigms typically utilized in research testing the D-CM, it enabled a more rigorous test of the stress-buffering effects of work control at different types and levels of global self-determination. Future experimental research should further examine stress and coping processes over time.

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Correction to Parker, Jimmieson, and Amiot (2013)

In the article, "Self-Determination, Control, and Reactions to Changes in Workload: A Work Simulation," by Stacey L. Parker, Nerina L. Jimmieson, and Catherine E. Amiot (*Journal of Occupational Health Psychology*, Advance online publication. March 4, 2013. doi: 10.1037/a0031803), there are errors in Hypothesis 2 (a) and Hypothesis 4 (a). Hypothesis 2 (a) should read, "For individuals high in self-determination, compared with those low in self-determination, low work control will result in poorer adaptation . . ." and Hypothesis 4 (a) should read, "For individuals high in non-self-determination, compared with low non-self-determination, low work control will result in better adaptation during the task . . ." All versions of this article have been corrected.

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