

**SELF-REGULATION IN A SIMULTANEOUS, MULTIPLE-GOAL ENVIRONMENT**

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(ABSTRACT)

The present study sought to extend goal-setting research by examining the nature of individuals' self-regulation with respect to performance goals while pursuing multiple, simultaneous goals. It was proposed that goal revision and effort allocation would be influenced by goal-performance discrepancies (GPD), causal attributions for factors affecting performance, self-efficacy, and rate of progress toward task goals. Results indicated that GPDs predicted goal revision direction and magnitude, and that controllability attributions moderated the GPD – revision relation. GPD size determined prioritization between tasks, as did self-efficacy. Mixed results were found for self-efficacy moderating the relation between GPD size and task prioritization. Rate of progress toward a task goal generally predicted prioritization between tasks and the amount of exerted effort within a single task. Although many results were not in the anticipated form, they still fit with modern theoretical frameworks associated with work motivation. Implications and suggestions for future research are discussed.

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## Chapter 1. Introduction

For the last two decades the beneficial effects of goal setting have been demonstrated in both field and lab studies, on nearly one hundred different tasks, across races, and in at least eight countries (Latham & Locke, 1991). The ubiquitous nature of these positive goal-setting effects have demonstrated goal setting's potential to substantially improve human performance.

Central to the goal setting effect is the proposition that difficult goals lead to greater performance than "do your best" goals or no goals, an idea for which Tubbs (1986) and Wood, Mento, and Locke (1987) found meta-analytic support ( $d = .82$ ,  $d = .58$ , respectively). These results indicate that notable differences exist in mean performance between groups having difficult versus any other goal type, such that difficult goals lead to increased performance. Tubbs (1986) also reported that difficult, specific goals lead to better performance compared to either "do your best" or no goals ( $d = .50$ ). This effect presumably occurs because specific goals provide an explicit performance standard to satisfy, unlike "do your best" instructions and no goals, which suggest more ambiguous performance objectives (Locke, Chah, Harrison, & Lustgarten, 1989). While this research area has presented the field of work motivation with a history of important and valuable advances, this same literature has received criticism concerning limitations that restrict our knowledge of the ways goal setting is likely to be used in a typical organizational setting.

### *Limitations of Prior Goal Setting Research*

While more than 200 goal-setting studies were published prior to 1990 (Locke & Latham, 1990), the overwhelming majority of these efforts focused on the impact of goals on performance within a single performance episode. In these studies, participants either set or were assigned one goal for a single task, and their performance monitored for one performance episode to determine the impact of these performance goals on task performance. Although such research provided the initial groundwork of goal setting knowledge and duly advanced our understanding of work motivation, it presents a relatively narrow perspective on how goals are likely to be utilized in an actual organizational environment. That is, because these studies have focused on the impact of a single goal on performance at a single point in time, this research has not been able to inform us as to how individuals are likely to utilize performance goals in a dynamic manner over successive performance episodes. In addition, the vast majority of these studies have not examined how individuals deal with and utilize multiple, simultaneous

performance goals in an achievement context. A search of published and unpublished research yielded no more than 10 multiple goal studies. This is not to describe prior research as either inappropriate or without value, but focused on more basic and arguably unrealistic goal-setting circumstances.

More specifically, past research appears to have focused on an examination of the impact of performance goals in environments that do not correspond to the typical organizational setting in at least two important ways. First, in real life the circumstance is rare in which individuals pursue just one goal at a time. For instance, in an employment context nearly all jobs demand a balancing of multiple, concurrent responsibilities. As an example, telemarketing jobs are often seen as exceedingly simple with regard to job complexity. Nevertheless, individuals who perform such jobs typically have numerous goals to balance such as engaging customers in dialogue, operating what is typically a computerized calling system, and educating themselves about the products or services they sell. Indeed, it is practically impossible to identify a job consisting entirely of a solitary task or duty. Second, it is equally unusual to perform a goal-oriented task just once without repeating it at a later time; jobs are usually structured in such a way that incumbents complete essentially the same assignment or carry out the same duty numerous times within a single month, week, or even a single workday. It is correct, then, to say that actual work scenarios typically require us to balance multiple job duties, and more often than not we are also required to perform these tasks multiple times. Therefore, a considerable need exists for studies investigating goal setting in more realistic situations involving multiple and simultaneous goals that occur repeatedly over time.

#### *Limitations of Multiple Goal Research*

Although multiple goal studies are gradually becoming more prevalent in the literature, the majority of published work on *multiple* goals has not incorporated tasks that simulate actual work behavior. For instance, several multiple goal studies have taken place in classrooms where goals were defined as levels of test performance on either course exams or skills tests (Radosevich, 1999; Phillips, Hollenbeck, & Ilgen, 1996), making the generalizability of these results to the workplace questionable. After all, it would be quite a challenge to identify any job exclusively requiring incumbents to learn and briefly demonstrate mastery of information over a four- or five-month period before completely starting the process over again as students do with the beginning of a consecutive semester. For participants in classroom-based goal setting studies,

each new semester presents the equivalent of a new job assignment along with entirely new supervisors (i.e., course instructors). Additionally, the only two multiple goal studies that employed tasks resembling traditional work activities used virtually identical experimental tasks (Hoy, 1986; Kernan & Lord, 1990). Kernan and Lord (1990) used both a computerized requisition task in which participants checked stock levels following numerous requisitions (re-ordering parts as necessary), and an invoice verification task requiring participants to use a computerized price list to determine invoice totals. Hoy (1986) used a requisition task identical in description to Kernan and Lord's (1990) and focused on both quality and quantity performance measures on the single task to incorporate multiple goals. Therefore, it is fair to say that of the identifiable published and unpublished multiple goal studies, only two tasks have been used to date that approximate an actual employment situation. While the use of experimental tasks that relate less strongly to typical work tasks does not invalidate results from such studies, the generalizability of these results is perhaps not as direct as those from studies utilizing tasks similar to activities one would encounter in an employment setting.

#### *Purpose of the Present Study*

Based upon these limitations, it is apparent that we must continue the expansion of our goal setting knowledge into the domain of multiple goal scenarios by more effectively investigating the goal-setting effect in circumstances requiring the performance of numerous tasks over multiple performance episodes. Examining self-regulatory behaviors in such an environment can offer considerable insight into performance variability in these contexts by illustrating how individuals establish, raise, and lower goals while engaging in several simultaneous tasks. In addition, this type of research can also identify determinants of effort allocation and switching between activities, utilizing tasks that represent a closer approximation of realistic work-world activities. Therefore, the purpose of the present study was to examine the processes involved in self-regulation of performance in an environment that incorporated multiple 'realistic' tasks in a design requiring participants to perform these tasks simultaneously across repeated trials. By focusing on self-regulatory behaviors during such performance trials, the current study aimed to further explicate the processes involved in individuals' regulation of goal-directed behavior.

### *Models of Self-Regulation*

Self-regulation refers to the process through which an individual's forethought affects his or her future behavior (Bandura, 1991). Instead of reacting to only the factors immediately before them, individuals are more realistically self-reflective regarding their performance and how it is influenced by various factors. In this way, we typically engage in normative comparisons of our performance with a personal standard, which ultimately affects our emotions, motivation, and future performance (Bandura, 1989, 1991; Carver & Scheier, 1998).

According to existing theories (e.g., Bandura, 1986; Carver & Scheier, 1981; Klein, 1989), effective self-regulation consists of three primary components-- goal establishment, performance evaluation, and self-reaction. Self-regulation clearly originates with the establishment of a goal. This goal effectively becomes the preliminary standard against which performance will be evaluated, and sets the foundation upon which self-regulation will operate. Some self-regulation theorists believe the initiation of such goals is an inevitable result of individuals consciously attending to their current performance (e.g., Bandura, 1986). Others claim goal establishment occurs as a result of individuals striving for higher-order goals, such that lower-level goals are established by these individuals to ensure their continued advancement toward their original over-arching standard (Powers, 1973; Campion & Lord, 1982; Klein, 1989; Carver & Scheier, 1998). Regardless of the origin of these goals, they represent the foundation of self-regulation as it applies to task performance.

The second component of successful self-regulation entails a comparison of current performance with the previously created goal, otherwise referred to as self-evaluation. A wealth of prior research has demonstrated the fundamental importance of individuals knowing their performance level when striving to improve their performance (Erez, 1977; Tubbs, 1986; Neubert, 1998).

The third and final component of self-regulation concerns responses to discrepancies between goals and performance often referred to as "self-reaction" (Bandura, 1986, 1989). More specifically, self-regulatory theories indicate that after receiving feedback, individuals then determine how to align performance with a previously defined goal. A number of reactions are possible, including but not limited to: exerting greater effort, raising or lowering the goal, and changing task performance strategies. Various theories of self-regulation offer seemingly different explanations for these same behaviors. For instance, while some assert that behavior is

entirely motivated by the urge to reduce discrepancies between goals and current performance level (e.g., Klein, 1989; Carver & Scheier, 1998), others maintain that goal-directed behavior is essentially driven by a desire to achieve self-satisfaction (e.g., Bandura, 1986). More specifically, some researchers invoke a control theory perspective (e.g., Klein, 1989) to explain discrepancy-reduction drives as an attempt to achieve homeostasis between performance and goals. The social cognitive viewpoint (e.g., Bandura, 1986) argues that the same behavior is instead motivated by a desire to feel good about oneself for accomplishing a goal. Regardless of the specific explanation for goal-driven behavior, self-regulatory theories share the larger principle that individuals are sensitive to discrepancies between goals and performance, and that such discrepancies motivate them to align performance with goals (Austin & Vancouver, 1996; Kluger & DeNisi, 1996).

At this point, it should be noted that although these two perspectives (control theory and social cognitive theory) have been repeatedly depicted as distinguishable and even tested as opposing theories of self-regulation (e.g., Locke, 1991; Phillips et al., 1996), a closer examination of the purported differences between these theories suggests that these two approaches are, in fact, highly compatible with one another. It has recently been noted that although there are numerous terminology differences and several minor differences in the processes proposed to be involved in the evaluation of performance relative to one's standard, these two theories are actually remarkably similar (Donovan, 2001). For example, both theories propose that self-regulation involves the initiation of a goal, evaluation of performance, and cognitive and/or behavioral reactions to possible goal-performance discrepancies. Based upon these similarities, Donovan (2001) recently proposed that motivation researchers should be working toward an assimilation of assertions from the two theories instead of continuing to test them as distinct from one another. In light of these ideas, the present study utilized a general model of self-regulation derived from both control theory and social cognitive theory propositions in developing its research questions and hypotheses, rather than drawing exclusively from either social cognitive theory or control theory models.

#### *Prior Research on Self-Regulation*

Research to date on self-regulation utilizing either a social-cognitive perspective or a control theory perspective has generally focused on two distinct aspects of self-regulation: Discrepancy production, and discrepancy reduction.

### *Discrepancy production.*

Discrepancy production refers to circumstances where an individual sets a goal above current performance levels, thereby creating a discrepancy between performance and the desired outcome. In fact, research conducted on this phenomenon indicates that it is a common tendency for individuals to set goals higher than their most recent performance. More than fifty years ago Lewin, Dembo, Festinger, and Sears (1944) cited empirical work suggesting that children as young as 12 have a predisposition to strive for higher performance than in the immediate past, and that this tendency is maintained throughout adulthood. Similarly, while investigating self-regulatory behaviors in a university classroom setting, Campion and Lord (1982) found that participants indicated their lowest average accepted goal level was one letter grade higher than previous test performance. Furthermore, once individuals attained their goal, they more frequently raised it on subsequent performance episodes rather than lowered it (Campion & Lord, 1982). Additionally, Phillips et al. (1996) demonstrated that positive discrepancy creation is a frequent occurrence in an achievement setting; more than half of their participants set goals above current performance for both easy and difficult tasks. Recent work has also shown that when individuals exceed a goal, they tend to raise it in proportion to the size of the discrepancy between performance and the goal (Donovan & Williams, 1996; Donovan, 2001; Williams, Donovan, & Dodge, 2000). That is, once individuals in these studies surpassed their original performance standard, they tended to set a more challenging performance goal at a level above their current performance level, thereby creating a new goal-performance discrepancy. Taken as a whole, this research evidence clearly indicates that discrepancy production is an important process in the regulation of performance.

### *Discrepancy reduction.*

In contrast to the discrepancy production process, discrepancy reduction refers to the process by which individuals reduce the discrepancy that exists between their performance goal and their current level of performance. In general, theories of self-regulation argue that individuals faced with a discrepancy have four alternative courses of action (Austin & Vancouver, 1996). First, individuals experiencing a goal-performance discrepancy may choose to work harder, exerting more effort in an attempt to reduce the discrepancy. Wood and Locke (1990, in Kluger & DeNisi, 1996) claim that, when individuals fail to meet a goal to which they are committed, the most common reaction is to increase effort on the task. Bandura and Cervone

(1983) found that when participants had a personal goal and received feedback concerning their progress toward that goal, in addition to being self-efficacious and/or self-dissatisfied with their task performance, individuals clearly enlisted greater effort to reduce the goal-performance discrepancy. Additionally, the size of negative goal-performance discrepancies has been positively associated with resulting increases in task-focused effort. Campion and Lord (1982) also reported partial support for the hypothesis that greater frequency of goal failure leads to an increase in effort.

Individuals may also choose to alter their task performance strategies in an attempt to elevate performance. Mone and Shalley (1995) found, for instance, that individuals pursuing specific, difficult goals on a complex task changed performance strategies significantly more often than individuals following 'do-your-best' instructions on complex tasks and all types of goal instructions for simple tasks. In a related vein, Earley, Connolly, and Lee (1989) reported that study participants trained in performance strategy search techniques outperformed other participants assigned matching specific, difficult goals, again demonstrating that individuals do search for better performance strategies and that such searches can lead to improved performance.

When faced with particularly large or threatening discrepancies, individuals may also choose to simply abandon the task. Austin and Vancouver (1996) describe a model of ruminative thought (Martin & Tesser, 1989), positing that after an individual repeatedly fails to meet their goal and withdraws from the task, they are still likely to think about the task and the failed goal. The model suggests that individuals who ultimately fail to meet their goal will experience learned helplessness, or the belief that they do not possess the agency to achieve the goal. Mikulincer (1994) offers a very similar explanation for this pattern of repeated goal failure leading to learned helplessness. According to Mikulincer (1994), following a series of goal failures, individuals come to believe they cannot control performance outcomes and therefore adopt the perspective that goal success or goal failure occurs independently of their effort. Through this process, learned helplessness directly leads to goal abandonment.

Finally, individuals faced with a discrepancy between their goal and current performance level may lower their performance goal as a means of reducing this goal-performance discrepancy. Of these strategies, goal revision appears to be one of the most prevalent strategies used by individuals pursuing goals (Campion & Lord, 1982; Donovan, 2001; Donovan &



Williams, 1996; Williams et al., 2000); when failing to meet performance goals, individuals are likely to revise goals in a downward direction, especially when discrepancies are perceived to be large or insurmountable (Williams et al., 2000). For example, Campion and Lord (1982) reported that participants in their classroom-based study who missed a test goal by at least two letter grades were more likely to lower their subsequent goal than individuals who either met, exceeded, or missed their goal by only one letter grade. Furthermore, the extent of such downward goal revision is typically related to the size of the negative goal-performance discrepancy (Donovan & Williams, 1996).

#### *Moderators of Discrepancy Reduction Strategies*

While it has been shown that individuals may choose to reduce goal-performance discrepancies by increasing effort, changing their goal, or altering task strategies, the most common mode of discrepancy reduction identified has been downward goal revision. As noted by Bandura (1989), however, it is not the case that individuals faced with a goal-performance discrepancy immediately revise their goal so as to remove or reduce this discrepancy. Instead, individuals faced with discrepancies may be unwilling to abandon or revise performance goals in certain situations. Recent research has identified a number of factors that play key roles in determining whether individuals engage in goal revision or resist such behavior when facing a goal-performance discrepancy.

##### *Self-efficacy.*

According to some theorists (e.g., Bandura, 1986), self-efficacy plays a central role in explaining self-regulatory behaviors. In fact, Bandura (1991) has stated that individuals' self-efficacy influences almost every aspect of self-regulation, including their specific preferences and ambitions, their degree of perseverance, and whether or not they will have self-aiding or distracting thoughts. With regard to self-regulatory behaviors in particular, self-efficacy affects self-set goal level such that the more self-efficacy someone has on a particular task, the higher their goals and the greater their perseverance despite difficulty or goal failure (Bandura & Cervone, 1986; Bandura, 1989).

Despite evidence that self-efficacy influences the goal setting process, results concerning the specific role of self-efficacy in the *downward goal revision* process have been somewhat ambiguous. While one study showed that self-efficacy failed to moderate the relationship between goal-performance discrepancy and goal revision (Donovan & Williams, in press),

another study demonstrated that highly efficacious individuals were less likely to revise goals downward in response to negative goal-performance discrepancies, compared to those who were less efficacious (Donovan & Swander, 2001). One likely cause for this lack of convergence in results is that the track athletes' (Donovan & Williams, in press) self-efficacy levels suffered from range restriction, making it difficult to observe any relationship between this variable and subsequent goal revision. Another explanation for these differing results concerns possible differences in self-efficacy between athletes and students. Given Bandura's definition of self-efficacy as the "self-belief in one's capabilities to exercise control over events to accomplish desired goals" (Wood & Bandura, 1989, p. 364), it could be argued that athletes are constantly coached to ignore thoughts suggesting likely goal failure for upcoming competition. As a result, their self-efficacy may develop greater resiliency compared to college students.

*Causal attributions.*

The attributions made by individuals concerning the factors affecting their performance have also been shown to influence self-regulatory behaviors. Weiner's (1985) attribution theory provides a theoretical foundation that aids our comprehension of such cognitions, helping us to understand how these attributions affect self-regulation. According to Weiner (1985), attribution theory consists of three attribution components: stability, locus, and controllability. The majority of research investigating the effect of performance attributions on self-regulation has primarily focused on the stability and controllability dimensions. An exception, however, is presented by Thomas and Mathieu (1994) and concerns the relation between goal attainment and satisfaction. More specifically, they reported that with regard to self-regulation, locus of causality attributions were found to moderate the relation between goal attainment and satisfaction such that individuals with an internal locus reported greater satisfaction following goal attainment compared to those with either a neutral or external locus.

An individual who believes the determinants of their performance level will remain the same on subsequent performance episodes makes a stable attribution, whereas if they believe the forces affecting performance are likely to change during ensuing trials, they make an unstable attribution. Attribution theory proposes that for stable attributions of success, greater expectancies of later success are supported, while stable attributions of failure result in expectations for future failure. When unstable attributions are made, however, expectancies for future success or failure are uncertain. Thomas and Mathieu (1994) found that students in a

classroom field study showed greater increases in self-efficacy when they made stable attributions for goal achievement. However, it is equally possible for individuals to make stable attributions for goal failure. For instance, in examining the self-regulatory activity of cross-country runners during a competitive season, Donovan and Williams (1996) found that individuals who attributed goal failure to stable causes were more likely to revise their goals downward.

Controllability concerns the extent to which an individual believes they have the ability to control the factors affecting their performance (Weiner, 1985). Because the individual directly influences the degree of exerted effort, when poor performance is attributed to a lack of effort a high controllability attribution is made. Likewise, an attribution of low controllability would occur if the same individual attributed test failure to bad luck, a factor over which they exert no control. Donovan and Williams (in press) assessed the influence of controllability attributions on goal revision and found that individuals who made strong controllability attributions were less likely to engage in downward goal revision in response to goal-performance discrepancies for both proximal and distal goals, relative to individuals who made weak controllability attributions.

#### *Task deadlines.*

Recent research has also indicated that self-regulatory systems may operate differently depending upon the amount of performance time remaining before a task deadline. Investigating this moderating role of task deadlines, Williams et al. (2000) reported different goal revision patterns depending on whether an individual was in the first versus second half of a performance trial. More specifically, Williams et al. (2000) found that the track athletes they observed were not as likely to revise goals downward during the first half of their performance episode, compared to the second. It was suggested that the athletes believed any goal-performance discrepancies encountered during the first part of the performance episode could be reduced or eliminated with increases in effort. However, as the performance trial continued into the second half of the track season, they became increasingly aware that boosting effort alone would not align performance with goals. For that reason, the athletes engaged in greater goal revision during the second half of their competitive season. Donovan and Williams (in press) also found that the relationship between goal-performance discrepancy size and revision of both proximal

and distal goals was stronger in the second half of the performance episode compared to the first part.

*Conscientiousness.*

The influence of the Big Five personality variables (Costa & McCrae, 1992) on self-regulation has also been investigated. More specifically, conscientiousness has been shown to affect self-regulatory behavior insofar as highly conscientious individuals are less likely to revise performance goals downward in response to negative goal-performance discrepancies (Donovan & Swander, 2001). This corresponds with results from Barrick, Mount, and Strauss (1993), which indicate that more conscientious individuals tend to exhibit greater goal commitment and as a result receive higher performance ratings from their supervisor compared to their less conscientious counterparts. Mudgett and Quinones (1997) reported the same pattern for highly conscientious individuals, based on results indicating that participants high on conscientiousness were initially more resistant to goal revision than those less conscientious.

*Goal orientation.*

Originally developed by Dweck and colleagues (e.g., Dweck, 1986; Dweck & Leggett, 1988; Elliott & Dweck, 1988), the goal orientation construct is a personality variable describing the types of goals individuals implicitly tend to pursue in achievement settings. While some individuals are inclined to pursue goals of increasing competence even at the risk of negative feedback (learning goal orientation), others are more apt to engage in behavior intended to secure positive feedback, often engaging in challenge-avoidant behaviors (performance goal orientation; Dweck & Leggett, 1988).

Not surprisingly, goal orientation has been identified as a predictor of self-regulation. Phillips and Gully (1997) reported that individuals with a learning goal orientation demonstrated greater levels of self-efficacy, which lead to heightened performance. In contrast, they also found that individuals with a performance goal orientation demonstrated lower levels of self-efficacy, leading to worse performance relative to those with a learning goal orientation. In much the same way, results from a field study by VandeWalle, Brown, Cron, and Slocum (1999) indicated that learning goal orientation was positively associated with sales performance, and that three aspects of self-regulation (goal setting, effort, and planning) mediated this relationship. In contrast, VandeWalle et al. (1999) also reported that performance goal orientation had no relationship with sales performance. As might be expected with regard to the relationship between goal

orientation and the revision of task goals, both Donovan and Williams (in press) and Donovan and Swander (2001) found that individuals with a strong performance goal orientation engaged in greater goal revision than those with a weaker performance goal orientation.

In light of results from previous studies concerning the influence of various dispositional, cognitive, and contextual variables on self-regulation, it is expected that somewhat similar relationships are likely to exist between many of the same variables when individuals work toward simultaneous and multiple goals. In that regard, the current study specifically addressed how both self-efficacy and causal attributions affect self-regulatory behaviors in a multiple goal environment, as well as the influence of existing discrepancy size on self-regulation.

### *Multiple Goal Environments*

At this point in time, researchers investigating the effects of goal setting on work motivation have the benefit of drawing upon an abundance of prior work on the topic. Over the last several decades we have come to understand a good deal about the influence various contextual and dispositional variables have on goal setting in general, and self-regulation in goal setting scenarios more specifically. Despite this ever-increasing body of work, however, we still know relatively little about how these variables function in a multiple and simultaneous goal environment. It is for this reason that preliminary advances into the area of multiple simultaneous goals, such as this one, stand to yield valuable information about the self-regulation of goal-setting behaviors.

The collection of existing research on multiple goals can be described as relatively diverse. In order to address the similarities and differences between multiple goal studies, the relevant existing research is categorized below according to whether a specific study incorporated more than one distinct task, truly simultaneous performance goals, and the ability for participants to switch between such goals during the performance episode.

#### *Multiple, distinct tasks.*

The initial criterion concerns whether multiple goal studies used more than one task. A key study by Kernan and Lord (1990) satisfies this criterion by having engaged participants in both a requisition and an invoice-processing task. Because Phillips et al. (1996) required participants to work on four different skills-tests, their study also involved more than one task. Additionally, Radosevich (1999) falls under the grouping of multiple goal studies employing more than one task because his study participants were college students required to set goals in

each course for which they were enrolled. Finally, Donovan and Williams (in press) had track athletes set both proximal (weekly) and distal (seasonal) goals for each competitive event in which they participated, therefore involving multiple and distinct tasks.

*Simultaneous performance goals.*

The second criterion concerns whether a multiple goal study made use of simultaneous performance goals. It should be noted that despite the possible tendency to refer to studies in this category as simultaneous task research (i.e., more than one task at a time), it is more appropriate to describe work in this group as using simultaneous performance goals since these studies do not always involve truly distinct tasks. Kernan and Lord (1990) present a prototypical study in this second category because their participants worked toward two separate goals (a requisition task-goal, plus an invoice-processing task-goal) at the same time, thereby involving simultaneous performance goals. Similarly, Phillips et al. (1996) incorporated concurrent goals by requiring participants to work on four separate skills-tests during single performance episodes. Finally, Hoy (1986) presented the only remaining multiple goal study to incorporate simultaneous performance goals, done so by requiring participants to work toward both quality and quantity goals on a single requisition task during a performance episode.

*Inter-task switching.*

The third and final categorization criterion concerns whether participants were permitted to switch between performance goals during the trial episode. Kernan and Lord (1990) allowed participants to switch their focus at will between goals on the requisition and invoice-processing tasks, and therefore their study represents one in which inter-goal switching was permitted. Similarly, Phillips et al. (1996) encouraged participants to work on each of four different skills-tests in any order or method they preferred. Even though her participants engaged in only a single task, Hoy (1986) did allow participants to choose the extent to which they pursued both quality and quantity goals of the requisition task during a single performance episode. Whether Radosevich (1999) fits this final criterion remains debatable. While participants in the Radosevich (1999) study were certainly allowed to switch their focus among the courses they were currently taking, this study clearly differs from others in this category because the performance episode lasted an entire semester, whereas the typical study permitting inter-goal switching usually lasts no more than two hours at most.

In general, then, existing multiple goal studies can be categorized according to three criteria: whether multiple tasks were involved, whether simultaneous performance goals were used, and whether each study afforded switching among performance goals during the performance trial. Figure 1 provides a summary of this approach to classifying the current multiple goal studies. Based upon this summary, it is apparent that very few studies have been conducted to examine how individuals utilize multiple, simultaneous, performance goals and how these individuals may switch among these goals when attempting to effectively regulate performance. As such, the purpose of this study is to provide an examination of these goal environments in an attempt to remedy this general lack of research.

#### *Self-Regulation in Multiple Goal Scenarios*

As previously noted, only a handful of studies to date have addressed self-regulation in multiple, simultaneous goal scenarios.

##### *Discrepancy reduction evidence.*

Regarding discrepancy reduction, Radosevich (1999) found support for one component of self-regulatory theories; participants were sensitive to discrepancies, and were clearly motivated to reduce such differences between goals and performance. For instance, large negative discrepancies between test performance and test goals tended to result in downward revision of test goals. Furthermore, Donovan and Williams (in press) also described the same downward goal revision tendency when reporting that participants who missed a performance goal tended to lower their goal in relation to the size of the existing goal-performance discrepancy.

##### *Discrepancy production evidence.*

Phillips et al. (1996) specifically addressed the creation of positive discrepancies within a simultaneous, multiple goal environment and found that positive discrepancies were created throughout a series of five performance episodes. Interestingly, positive discrepancy creation occurred for fewer participants in easy task conditions relative to difficult task conditions. As a result, Phillips et al. (1996) cautioned that positive discrepancy creation might not be a self-regulatory norm, as some believe. Within the difficult task condition, however, individuals engaged in positive discrepancy creation fairly frequently (40% of participants on the difficult verbal, and 32% of participants on the difficult quantitative task).

Radosevich (1999) also addressed discrepancy creation in a multiple goal environment. As so frequently found in single-goal studies, individuals in a multiple goal environment set goals at a level higher than their current performance. In fact, ninety-eight percent of participants engaged in positive discrepancy creation at the start of the study, while generally continuing to set goals higher than past performance on successive trials. Additionally, discrepancy creation occurred more frequently for tasks (i.e., specific courses) that participants were performing well on, relative to other tasks.

Donovan and Williams (in press) offered still further evidence of discrepancy production. In a field study using track and field athletes, they found that when individuals engaged in discrepancy production, the extent of such action was typically in direct relation to the size of the existing discrepancy between performance and the surpassed goal.

Based upon this evidence for both discrepancy reduction and discrepancy production processes in multiple goal settings, it was hypothesized that goal revision (both upward and downward) within a simultaneous multiple goal environment would be a function of the discrepancy that individuals encountered between their current levels of performance and their performance goal. Individuals who achieved or surpassed their goal (creating a positive goal-performance discrepancy) would be likely to raise that goal for future performance episodes, while individuals who failed to achieve their goal (creating a negative goal-performance discrepancy) would be likely to lower their goal.

*Hypothesis 1:* Goal revision will be positively related to the direction and magnitude of an individual's goal-performance discrepancy. Individuals experiencing negative goal-performance discrepancies will lower subsequent goals, while individuals experiencing positive goal-performance discrepancies will raise subsequent performance goals.

*Causal attributions as moderators of goal revision.*

A smaller number of studies have addressed the moderating role that causal attributions may have on self-regulation. Donovan and Williams (in press) found, for instance, that participants who made stable attributions for the causes of their performance tended to engage in greater goal revision than participants not making stable causal attributions. Radosevich (1999) corroborated many of the results found in Donovan and Williams (in press) with regard to the influence of individual difference variables on self-regulation. For instance, Radosevich (1999) reported that participants with large goal-performance discrepancies who made stable



performance attributions were more likely to engage in both proximal and distal goal revision compared to other participants.

These results concerning causal attributions and goal revision are entirely consistent with the resource allocation perspective on self-regulation that is commonly taken in the research literature (e.g., Kluger & DeNisi, 1996). This perspective suggests that when individuals are making decisions as to how to allocate their finite resources (e.g., time spent on task, effort, concentration) in order to reduce goal-performance discrepancies, they are unlikely to invest large amounts of time and effort on tasks where they associate goal failure with stable causes. In other words, when individuals experience goal failure and perceive that the causes of their performance are likely to recur in the future, it is unlikely that they will exert large amounts of effort in an attempt to reduce their goal-performance discrepancy. Instead, these individuals will be likely to turn to cognitive (rather than behavioral) means of reducing this discrepancy by revising their goal. Likewise, when individuals achieve or surpass their goal and attribute this performance to stable causes (indicating that continued success is likely to occur in the future), it is likely that these individuals will raise their goals (and invest future task resources) to a greater extent than individuals who succeed and attribute their performance to unstable or uncertain causes. Based upon these arguments, it was hypothesized that stability attributions would moderate the relationship between goal-performance discrepancies and subsequent goal revision.

*Hypothesis 2:* Greater amounts of goal revision (discrepancy production and reduction) in response to goal-performance discrepancies will occur for individuals reporting stable performance attributions compared to those reporting unstable attributions.

Donovan and Williams (in press) also reported that individuals who made strong controllability attributions for their performance tended to engage in less goal revision than participants who made weaker controllability attributions. This effect is in accord with Weiner's (1985) attribution theory. It should not be surprising that when Donovan and Williams' (in press) participants attributed their performance to factors beyond their control (suggesting that neither greater effort nor better performance strategies would help align performance with goals), they more frequently revised their goals. Likewise, a similar argument can be made from the resource allocation perspective: Individuals are not likely to invest greater resources toward achieving a task goal when they perceive the factors influencing their performance on that task as beyond their control. The same effect was anticipated in the current study insofar as those participants

who reported the weakest controllability attributions for their performance were also likely to be the same participants who engaged in the greatest amounts of goal revision.

*Hypothesis 3:* Controllability attributions will moderate the relation between goal-performance discrepancies and goal revision, such that greater goal revision will occur when low controllability attributions are reported.

*Effort allocation.*

An important finding from Kernan and Lord's (1990) early study of multiple goals was the identification of aspects distinguishing single from multiple goal scenarios. Unlike a single goal environment, in a multiple goal scenario task valence and goal expectancies exerted a substantial influence on several aspects central to self-regulation. More specifically, Kernan and Lord (1990) found that, when pursuing multiple goals, individuals placed greater goal priority on tasks for which there was a smaller discrepancy between their goal and their performance. While this finding directly contradicts a strict cybernetic control theory explanation of goal-related behavior (e.g., Powers, 1973), which would argue that large discrepancies are likely to capture attention and lead to greater changes in behavior, this tendency for individuals in the Kernan and Lord (1990) study to attend to the smallest discrepancy can be explained by more recent control theory models (e.g., Carver & Scheier, 1981; Hyland, 1988) which utilize a resource allocation perspective when predicting goal prioritization. More specifically, these more recent theoretical formulations argue that, when individuals deal with multiple performance goals and attempt to divide their resources among these goals, a large goal-performance discrepancy is likely to lead individuals to redirect their resources to other tasks in the performance environment. This process, termed "disengagement from a control system" (Hyland, 1988), is seen as a functional response that protects individuals from the negative consequences (e.g., dissatisfaction, negative affect) that are associated with the pursuit of large, and perhaps unattainable discrepancies over successive performance episodes. In other words, individuals direct their attention and resources towards the smaller discrepancy in an attempt to minimize the negative consequences associated with effortful pursuit of the larger discrepancy. Consistent with this framework, it was hypothesized that individuals in a multiple goal environment would exert more effort on the task with the smallest goal-performance discrepancy.

*Hypothesis 4:* While pursuing goals on multiple simultaneous tasks, individuals will exert the greatest effort on the task with the smallest goal-performance discrepancy.

In addition to prioritizing tasks with small discrepancies, Kernan and Lord (1990) also found that participants prioritized tasks on which they reported greater expectancies of achieving their goal. While Kernan and Lord (1990) addressed the role of expectancies and not self-efficacy in goal setting scenarios, the two constructs remain closely linked in conceptual terms. In fact, Kernan and Lord (1990) touched upon the self-efficacy concept in discussing their results, at one point stating, “The task for which subjects perceive themselves to be more efficacious was accorded higher priority” (p. 199). This corresponds with the resource allocation standpoint to the extent that individuals are expected to invest their resources on the task goal they have the most confidence in attaining. According to Bandura (1989), self-efficacy consists of the self-belief in one’s ability to control the events affecting goal attainment (Wood & Bandura, 1989). Based upon this definition, self-efficacy can be interpreted as a specific type of expectancy and the almost inextricable nature of the two concepts is demonstrated.

Given Kernan and Lord’s (1990) evidence that individuals prioritize tasks based on performance expectancies, and because self-efficacy can be described as a narrowly defined expectancy, it was believed that self-efficacy would influence the prioritization of tasks by individuals while pursuing simultaneous multiple goals.

*Hypothesis 5:* While pursuing goals on multiple simultaneous tasks, individuals will exert the greatest effort on the task for which they report the greatest self-efficacy.

While Kernan and Lord (1990) demonstrated the singular effects of both expectancies and goal-performance-discrepancy size on goal prioritization in a multiple goal setting, the actual relation between these variables is likely to be more complex. Based upon the arguments provided above, it would appear that individuals would devote the largest amount of task resources to task goals for which they have both a small goal-performance discrepancy and a high level of self-efficacy. Therefore, within the context of the current study it was expected that self-efficacy and goal-performance-discrepancy size would jointly affect goal prioritization when individuals pursued multiple simultaneous performance goals such that individuals would direct more task resources (i.e., effort) to tasks on which they had small goal-performance discrepancies and high self-efficacy.

*Hypothesis 6:* In a multiple simultaneous goal environment, individuals will expend greater effort on the task for which they are the most efficacious and that has the smallest goal-performance discrepancy.

A final factor that is likely to influence the attentional resources individuals direct towards specific tasks in a multiple goal environment is the individual's rate of progress toward goal attainment, termed 'velocity' in control theory (Carver & Scheier, 1990). Although an individual's goal-performance discrepancy is likely to be primarily responsible for directing attention among tasks, recent control theorists (e.g., Carver & Scheier, 1990) also suggest the existence of a higher-order negative feedback loop (a meta-monitoring loop) that monitors the *pace* at which an individual reduces discrepancies, rather than the absolute magnitude of the goal-performance discrepancy. When the meta-loop detects that an individual is reducing a discrepancy at a high rate, Carver and Scheier (1990) argue that this is likely to produce positive task-related affect. In contrast, when the meta-loop detects a slow rate of discrepancy reduction, negative task-related affect results. Based upon the disengagement from control systems argument presented previously (Hyland, 1988), it would be expected that individuals would direct attention away from a goal that is producing negative affect, and redirect attention to goals where rate of progress and positive affect are high. Therefore, it was hypothesized that individuals would take into account their rate of progress in reducing their goal-performance discrepancies when allocating resources such that more effort would be exerted on tasks for which the individual had a high rate of progress.

*Hypothesis 7:* While pursuing multiple simultaneous task goals, individuals will prioritize the task for which they have the highest rate of progress toward the respective task goal.

#### *Exploratory Topic: Switching Among Simultaneous Goals*

Neither social cognitive theory nor control theory offer outright predictions as to how individuals switch their attention between multiple simultaneous tasks. This specific aspect of goal-oriented self-regulation stands to benefit substantially from the current study. By focusing on contextual and dispositional factors within a multiple goal environment, the current study intended to shed initial light on inter-task switching behavior. More specifically, the current study presented an opportunity to investigate the process by which individuals switch their attention and effort between multiple simultaneous task goals, possibly as a function of self-efficacy, causal attributions for performance, and rate of progress toward task goals.

#### *Present Study*

Through the above propositions, the current study aimed to broaden the existing goal-setting research by investigating the dynamic nature of individuals' self-regulatory behaviors

when working toward multiple simultaneous task goals. Additionally, it was further hoped that the present study would be able to offer results having greater generalizability to work settings, compared to results from prior studies suffering the limitations already discussed. By incorporating experimental tasks resembling realistic employment-type activities into a multiple simultaneous goal design, the current study stands to add substantially to our current understanding of work motivation. Figure 2 contains a depiction of the model proposed within the current study.

## Chapter 2. Method

### *Participants*

Participants for the current study consisted of 156 college students enrolled in psychology and management courses at a large southeastern university. In exchange for their voluntary participation, all participants received extra course credit. The precise number of participants was based upon Jaccard, Turisi, and Wan's (1990) protocol for moderated multiple regression power analysis, specifying a power level of .80 and an alpha level of .05. Jaccard et al.'s (1990) procedure further required the specification of variance accounted for by a model's main effects plus the additional variance accounted for by interaction term(s). Based on previous research, the variance accounted for by the main effects was set at .20, while the variance accounted for by the interaction term was determined to be .03 in the present study.

### *Tasks*

The current study required participants to simultaneously work on two separate computerized tasks. While they were forced to attend to only one task at a time, participants were able to switch between tasks at their discretion. The computerized tasks specifically included a scheduling task and a form-processing task.

As just mentioned, participants were only able to see and work on one task at a time. Certain information was displayed constantly, regardless of the task currently selected. The information always visible to participants included the remaining trial time, as well as information about each of the tasks such as their goal for each task during the current trial, the participant's current performance level for each task during the current trial, and the current goal-performance discrepancy for each task. Concerning the specific nature of the computerized tasks, participants were instructed to imagine they were the manager of a hypothetical media center. Their job consisted of two tasks: Creating weekly schedules of films to be shown in a movie theater owned by the media center, and processing electronic requests from people in the community who requested any combination of CDs, movies, and video games they wished to rent from the media center.

#### *Scheduling task.*

Within the scheduling task, participants were instructed to schedule films to be shown in the media center's movie theater. While performing this task, participants were presented with a table displaying a seven-day calendar (Sunday to Saturday in all cases), as well as a list of film

titles from which they could select films to be shown for the week currently displayed on the calendar. The list of available film titles to be scheduled was unique for every blank calendar week presented to participants, and indicated each film's title, genre, length in minutes, and the cost incurred by the media center for showing that film a single time. While performing the scheduling task, participants were required to abide by three scheduling rules in order to complete a valid schedule, and weekly schedules containing any violations of these rules were not accepted; participants were only permitted to move on within the scheduling task (i.e., receive a fresh, blank calendar week in which to schedule films) when they submitted a schedule that violated none of these rules. The first of such rules was that for each week, a budget of \$2,000 was not to be exceeded. As stated, each film had an associated screening cost, and participants were required to not go over budget in scheduling films for any specific week. The second rule stated that at least one film had to be shown every night the theater was open (the theater was always open every day of every week). The final rule indicated that each week at least one film had to be shown from each genre; the same six genres were always available for each weekly schedule. Additionally, these scheduling rules were constantly displayed when participants worked on the film-scheduling task. In order to prevent participants from developing a method of scheduling films that made the task too routinized, and therefore too simple, each blank weekly calendar contained one block of 'reserved' time that was randomly inserted on different days and at different times across successive weeks. This block of time was typically just under an hour, and participants were unable to schedule films that overlapped with the reserved block of time. Whenever participants felt they had created an acceptable schedule, they used the computer mouse to click a 'Submit' button that either accepted the schedule if it contained no violations of the rules (in which case, a new (blank) weekly calendar was immediately presented), or indicated that the submitted schedule contained a violation of the scheduling rules. The particular rule violation was never indicated, however.

*Form-processing task.*

As already mentioned, the form-processing task required participants to process fictitious electronic requests from individuals who had requested a combination of CDs, movies, and video games to rent from the media center. With this in mind, the task was named the 'media-request task' within the computer software containing the experimental tasks, and this title will be used from this point on to refer to this experimental task. All electronic requests consisted of three

items and always represented at least two of the available forms of media available to rent (i.e., CDs, movies, and video games). To process each request, participants were required to search for each requested item within an inventory list containing all items owned by the media center, in order to determine whether the center owned each requested item and whether a copy was currently available to rent. For each of the three requested items that comprised a single electronic request, participants were required to indicate whether the item was available, currently checked out, or missing, as well as confirming how the items would be obtained and paid for, which was indicated in the original request. Once participants felt they had correctly processed a request, they used the computer mouse to click a 'Submit' button that either accepted correctly processed requests, or indicated that the request had been incorrectly processed. As with the film-scheduling task, no specific explanation was provided as to why such requests were not correct, just that they contained an error.

#### *Procedure*

After all participants arrived at the lab, the Wonderlic Personnel Inventory (Wonderlic, 1983) was administered as a paper-and-pencil measure of cognitive ability. Following the completion of this inventory, participants were told they would work on a computerized simulation activity for the remainder of the study. The computerized tasks first briefly introduced participants to the nature of the activity they were to perform for approximately the next hour and a half. Participants then completed a five-minute practice trial for each of the two tasks. They did not practice both tasks at the same time, however. Appendix A illustrates the procedure for the current study.

Before beginning the first 10-minute performance trial, participants were required to create and record goals on the computer for both of the tasks for the upcoming performance episode. Participants were also required to complete measures of self-efficacy for each of the task goals, as well as indicating their expectancy for attaining the specific goals for the upcoming trial. Once the performance trial began, participants worked on the two tasks, switching between them at their discretion. At the end of each performance trial, participants were presented with computerized feedback indicating their performance on each of the tasks, their original goals, and the goal-performance discrepancy for each task within the respective trial. Participants were also required to complete items assessing their causal attributions for their recent performance. The next trial began once participants again set goals for the two tasks and completed the self-



efficacy, and expectancy measures for each task. This process was repeated for a total of five 10-minute performance episodes.

#### *Additional Extra Credit as Performance Incentive*

To encourage realistic goal-striving behavior within the current study, participants were able to earn one additional extra-credit point that was awarded based on their performance during the final 10-minute trial. More specifically, one bonus extra-credit point was granted to participants who performed at a specified level within each of the film-scheduling and media-request tasks. The levels of these goals were determined through pilot testing ( $N = 50$ ) and were obtained by approximately 15 percent of those participants. It was explained to participants that everyone was given the same goal on the final trial in order to earn the additional extra credit, although participants were not informed of the specific performance level required to earn the additional extra credit until just before the final trial.

#### *Measures*

##### *Self-efficacy.*

Previous research has indicated that composite measures of self-efficacy demonstrate significantly greater reliability than single-item self-efficacy measures, as well as greater convergent validity with self-set goals than do single-item measures (Lee & Bobko, 1994). In light of these findings, self-efficacy was assessed in the current study using a self-efficacy composite consisting of items addressing self-efficacy strength and magnitude (Appendix B). More specifically, this composite was formed by asking participants to indicate self-efficacy magnitude by providing yes / no answers to items addressing whether they believed they could attain specific levels of performance (e.g., "Will you be able to correctly process 4 requests, 6 requests, 8 requests?"). Similarly, self-efficacy strength was assessed by requiring participants to indicate on a Likert scale the degree to which they were confident they would achieve each of these specified levels of performance for each of the upcoming tasks (e.g., "How confident are you that you will correctly process 10 requests, 12 requests, 15 requests, 20 requests?"). The final self-efficacy composite for each participant (assessed before each performance trial and following any instance of goal attainment) was created by first retaining only the magnitude items participants answer with a 'yes'. The strength-item counterpart for each of these retained magnitude items was then used to calculate a composite score by summing individuals' raw scores on these strength items to produce a self-efficacy composite (Lee & Bobko, 1994).

Because participants in previous studies were believed to have not correctly understood efficacy measures of this kind (strength and magnitude measures), an additional measure of efficacy was used in the current study based on an efficacy measure in Phillips et al. 1996; Appendix C).

*Ability.*

The Wonderlic Personnel Inventory (Wonderlic, 1983) was used to measure cognitive ability in the present study. The Wonderlic is a 12 minute, self-administered paper and pencil test that consists of 50 items designed to assess general cognitive ability. This measure is scored in terms of the number of questions answered correctly, so scores can range from 0 - 50.

*Task interest.*

Participants completed a measure of task interest after completing the five performance trials. Degree of task interest was assessed with 3 seven-point Likert items for each of the tasks. These 3 items assessed: a) the general level of interest participants had in each task, b) the enjoyment that resulted from performing each task, and c) the degree to which the individual would enjoy performing this task in the future.

*Performance.*

Performance was measured independently within each of the two tasks. Performance on the film-scheduling task was measured according to the number of weeks for which participants correctly scheduled films, while performance on the media-request task was assessed in terms of how many electronic requests a participant correctly processed during a specific trial.

*Goal-performance discrepancy.*

Goal-performance discrepancies (GPDs) were calculated for each participant on each task during every trial by dividing each individual's performance by their relevant performance goal. Thus, a GPD value greater than one indicated that an individual surpassed their performance goal, while a GPD less than one indicated that an individual failed to reach their performance goal.

*Goal revision.*

Across all three tasks, goal revision was calculated by dividing a participant's new task goal by their old task goal. This method yielded a number greater than one when a more difficult goal was set, and a number less than one result when a less difficult goal was established.

### *Task effort.*

Within the current study, the focus with regard to task effort was on the amount of exerted effort within each task, and the differences in effort between tasks. Multiple measures of task effort were intended to have been recorded, but due to an oversight, only one measure of effort was ultimately recorded. This effort measure was the number of computer mouse-clicks made within each experimental task. Performing the tasks during the five trials, however, required only the computer mouse (i.e., no additional keystrokes were necessary).

It should be noted that the nature of the effort variable varied slightly between the two experimental tasks. As stated, total number of mouse-clicks comprised the effort variable within both tasks. A subtle difference existed, however, in the particular manner in which effort was exerted in the film-scheduling task versus the media-request task. In this way, effort on the film-scheduling task generally involved using the mouse to select films from the list of available titles, and also using the mouse to place each film in a unique spot within the calendar. If the scheduling of a film in this manner violated any of the scheduling rules, participants then used the mouse to remove the scheduled film from the calendar and proceeded in their attempt to create an acceptable schedule. Within the film-scheduling task, therefore, effort generally involved a series of attempts at creating acceptable schedules, and a portion of the resulting mouse-clicks were due to participants working backwards at brief points in time (i.e., clearing incorrectly scheduled films from the calendar). In contrast, effort on the media-request task generally involved participants proceeding through a series of steps required to correctly process a particular electronic request. Although participants clearly made errors during this task that potentially required them to use the mouse to fix previously entered information, performing the media-request task was different from the film-scheduling task in that it did not require participants to use the mouse to swap or move around various things within the task. In other words, the film-scheduling task required participants to move previously scheduled films in order to make a particular schedule work, whereas the media-request task required participants to use the mouse to search the reference list and to complete each electronic request (i.e., no swapping or moving around of items was required).

### *Rate of progress.*

To determine rate of progress for each participant on each task during every performance trial, the rate of progress assessment focused on the change in goal-performance discrepancy size

across successive performance trials. Specifically, rate of progress was determined by subtracting discrepancy size on the most recent trial from the discrepancy size associated with the previous trial. For example, to calculate rate of progress on the film-scheduling task for a participant who had just completed trial three, their discrepancy size for trial two was subtracted from their discrepancy size from trial three. If they completed ten invoices during trial three and eight invoices during trial two, the rate of progress value would be two, indicating a positive rate of progress, whereas if the participant had only completed seven invoices during trial three (and eight invoices during trial two), the rate of progress value would be -1, indicating a decrease in rate.

#### *Causal attributions.*

To assess causal attributions for participants' task performance, part of the Causal Dimension Scale (Russell, 1982) was used in the current study. Participants were instructed to answer six questions (three stability and three controllability items, as seen in Appendix D) on a nine-point Likert scale with regard to their most recent performance. Responses to items within each of the stability and controllability subscales were summed, resulting in controllability and stability scores for each assessment. Russell (1982) reported modest reliability estimates for the Causal Dimension Scale (three-item stability subscale  $\alpha = .84$ ; three-item controllability subscale,  $\alpha = .73$ ).

#### *Expectancies.*

Performance expectancies were assessed for goals on each of the two tasks before every performance trial began. On a scale from zero to 100, participants indicated their perceived likelihood of achieving their new goal. This technique for collecting expectancy data has received support in the literature (e.g., Kernan & Lord, 1990), particularly because of evidence indicating that self-reports of probabilities have valuable associations with relevant outcome variables such as those associated with the current study.

#### *Analyses*

Data for the present study was analyzed using a stacked subjects or pooled time series design (cf., Jaccard & Wan, 1993; Sayrs, 1989; Williams & Alliger, 1994) in which responses from participants were pooled across performance trials and within experimental tasks. To avoid concerns about nonconstant error variance associated with individual differences between participants, a least-squares dummy variable approach (Jaccard & Wan, 1993; Sayrs, 1989) was

utilized in all analyses. In this type of analysis,  $N - 1$  dummy coded participant vectors were created representing each of the participants in the present study. Each of these participant vectors were then entered into all hierarchical regression equations at the first step in order to remove between-subject variance prior to examination of the variables of interest.

In addition to concerns about heteroscedasticity, pooled time series designs also raise concerns about the possibility of serial correlation or dependency in the dependent variables of interest across time (i.e., dependent variable scores at Time 2 may partially be a function of the dependent variable scores at Time 1). Because such dependency can inflate the Type I error rate of all analyses conducted on such data (Jaccard & Wan, 1993), all analyses conducted in the present study were examined to ensure that such serial correlation was not a problem. This examination was done via a series of autocorrelation functions (ACFs) calculated for each regression equation. Essentially, these autocorrelation functions provide a correlation coefficient representing the degree of dependency in the residuals of prediction. More specifically, an ACF represents the correlation between values of the unstandardized residuals in prediction for the various regression equations and the lagged values of these residuals from analyses pertaining to the previous performance trial. From a practical standpoint, an ACF of .20 or less in terms of absolute value indicates that there is little cause for concern over serial dependency in the data, while an ACF that substantially surpasses .20 is cause for concern (J. J. Jaccard, personal communication, June, 1998).

Autocorrelation functions were calculated for 18 of the 24 regression analyses performed to test the hypotheses proposed in the present study. The six regression analyses for which ACFs were not calculated were cases in which logistic regression was used. It should be pointed out that within logistic regression, the relation between independent and dependent variables is modeled by an S-shaped curve. ACFs use the Pearson correlation, however, for which Agresti and Finlay (1997, p. 320) stated that, “the correlation is valid only when a straight line is a reasonable model for the relationship,” which does not describe the S-curve that is fundamental to logistic regression. For this reason, although ACF values associated with logistic regression analyses might indicate cause for concern regarding serial dependency, it may be that such an ACF value would be artificially inflated due to the curvilinear relation inherent in logistic regression. ACF values pertaining to logistic regression analyses might also falsely indicate serial dependency because of the maximum range of values associated with the standard error of

the estimate for unstandardized residuals stemming from these regression analyses. Indeed, estimated values within logistic regression are either zero or one (e.g., indicating group membership), whereas linear regression is not bound to these values. For this reason, one would *generally* expect smaller standard errors of the estimate within logistic regression analyses. It should be noted that smaller standard errors of the estimate result in larger correlation coefficients (Hays, 1988). Within the present study, the mean standard error of the estimate for the unstandardized residuals from the six logistic regression analyses was .012, whereas the same statistic pertaining to the twelve linear regression analyses used to test the same hypotheses (hypotheses four through seven) was .539.

Results from all but one ACF indicated that there was no cause for concern over potential serial dependency within the data. Other than one ACF value of | .268 |, all ACF values ranged from less than | .001 | to | .105 |, clearly assuaging any concern with respect to potential dependency in the residuals of dependent variables across successive performance trials.

The test of hypothesis seven within the media-request task generated the ACF value of | .268 |. Because the results had indicated support for this hypothesis within this task, further investigation was undertaken to determine whether this ACF truly indicated substantial serial dependency among temporally distinct measures of the same variables (i.e., to determine whether a Type I error occurred in the test of hypothesis seven). This analysis involved regressing the dummy coded participant vectors, the rate of progress variable, and a variable representing the lagged values of the effort variable onto the task effort variable; because the lagged effort variable was entered in the step preceding the rate of progress variable, results from this analysis removed any variance in the effort variable that might have been attributed to serial dependency. Significant results from this analysis should alleviate concerns of substantial serial correlation within the variables comprising the regression equation. Results of this analysis were significant, which could be interpreted as evidence that serial dependency was not a problem. When the ACF value was calculated for *this* analysis, however, the value failed drop below .20 in absolute value (ACF = | .259 |), which would have allayed concern regarding serial dependency. Based on these findings, there is an inflated chance of having made a Type I error in the test of hypothesis seven within the media-request task. This issue is mentioned again below in the section pertaining to tests of hypothesis seven.

### Chapter 3. Results

Descriptive statistics for all variables are presented in Table 1. Table 2 contains intercorrelations for all variables.

#### *Tests of the Hypotheses*

The first hypothesis proposed that goal revision would be positively related to the direction and magnitude of an individual's GPD. More specifically, it was suggested that individuals who failed to meet performance goals would lower subsequent goals, whereas individuals who either met or surpassed their performance goals would raise subsequent goals. Investigating the film-scheduling task in isolation, the dummy coded participant vectors were hierarchically regressed on goal revision in the film-scheduling task in step 1. In step 2, GPD on the same task was regressed on goal revision, and results indicated that GPD was, in fact, a significant predictor of goal revision ( $b = -.508$ ,  $\beta = -.397$ ,  $p < .001$ ), explaining just over 8% of the variance in goal revision ( $\Delta R^2 = .081$ ,  $p < .001$ ). Exactly the same procedure was followed to test the same hypothesis with respect to the media-request task. Results indicated that GPD was also a significant predictor of goal revision on the media-request task ( $b = -.337$ ,  $\beta = -.192$ ,  $p < .001$ ), accounting for a little more than 2% of the variance in goal revision ( $\Delta R^2 = .023$ ,  $p < .001$ ). Results from these analyses are displayed in Table 3.

Although tests of hypothesis one indicated that GPD significantly predicted goal revision within a single task, the nature of this relation was not as predicted. Previous work in single-goal scenarios has tended to support a positive relation between GPD size and goal revision (i.e., larger GPDs lead to greater goal revision) and between the sign of a GPD and the direction of subsequent revision (i.e., negative GPDs result in downward revision, while positive GPDs lead to upward revision). In the present study, however, results indicated that individuals engaged in the greatest upward goal revision after encountering the greatest goal failure on the respective task, and also engaged in the greatest downward revision when they surpassed their goal by the widest margin on that particular task. At this point it should be restated that within the present study, GPDs greater than 1 in value represented instances in which a goal was surpassed and values less than 1 indicated goal failure. Figure 3 illustrates this operationalization as it relates to the operationalization of goal revision, while indicating the general nature of results from tests of hypothesis one. In light of these results, hypothesis 1 was not supported, even though significant relationships among the variables were detected.

The second hypothesis stated that greater amounts of goal revision in response to GPDs would occur for individuals reporting stable performance attributions compared to those reporting unstable attributions. Investigating this hypothesis within the film-scheduling task, the dummy coded participant vectors were regressed on the goal revision variable at step 1, followed by the main effects for GPD and stability attributions at step 2, and the GPD x stability product term at step 3. Support for the hypothesis would be evidenced by a significant product term and a relation among the variables in the predicted form. Results indicated significant main effects for GPD ( $b = -.506$ ,  $\beta = -.396$ ,  $p < .001$ ) and stability attributions ( $b = .027$ ,  $\beta = .150$ ,  $p < .01$ ) in step 2, but a non-significant interaction term in step 3 ( $b = -.030$ ,  $\beta = -.360$ ,  $ns$ ). These results are presented in Table 4. Testing the hypothesis in precisely the same manner for the media request task yielded significant main effects for GPD ( $b = -.337$ ,  $\beta = -.192$ ,  $p < .001$ ) and stability attributions ( $b = .022$ ,  $\beta = .122$ ,  $p < .05$ ), yet as with the film-scheduling task, also failed to indicate a significant interaction term ( $b = -.023$ ,  $\beta = -.220$ ,  $ns$ ). These results therefore failed to indicate support for hypothesis two. Table 4 contains these results, as well. Within single tasks, stability attributions failed to interact with GPD in predicting goal revision.

The third hypothesis proposed that controllability attributions would moderate the relation between GPDs and goal revision, such that greater goal revision would occur when low controllability attributions were reported. Similar to the testing of the previous hypothesis, moderated multiple regression was used in which dummy coded participant vectors were regressed on the goal revision variable at step 1, followed by the main effects for controllability attributions and GPD at step 2. In step 3 the GPD x controllability product term was added; for the hypothesis to be supported the interaction term must be significant and the nature of the interaction should follow the predicted form. Testing this hypothesis within the film-scheduling task, significant main effects were found at step 2 for GPD ( $b = -.531$ ,  $\beta = -.415$ ,  $p < .001$ ) and controllability attributions ( $b = .026$ ,  $\beta = .145$ ,  $p < .05$ ). Additionally, a significant interaction term was found for GPD and controllability attributions ( $b = -.034$ ,  $\beta = -.548$ ,  $p < .01$ ), explaining just over one percent of variance in revision, however ( $\Delta R^2 = .014$ ,  $p < .01$ ). These results are displayed in Table 5. The specific nature of this interaction was in the opposite direction than hypothesized, though. Figure 4 indicates that within the film-scheduling task, controllability attributions moderated the GPD – goal revision relation in such a way that when participants reported *greater* perceived controllability over the factors affecting their



performance, they actually engaged in greater amounts of goal revision. More specifically, a stronger GPD – goal revision relation occurred in instances of greater perceived control over the factors affecting performance. These results, therefore, failed to support the hypothesis. Likewise, when this hypothesis was tested in the same manner with the media-request task, significant main effects were found for GPD ( $b = -.381, \beta = -.217, p < .001$ ) and controllability attributions ( $b = .024, \beta = .130, p < .05$ ). A significant interaction term was also found ( $b = -.039, \beta = -.486, p < .01; \Delta R^2 = .01, p < .01$ ), but Figure 5 indicates that again the moderating role of controllability attributions on the relation between goal revision and GPD was in the opposite direction than proposed (Table 5 contains the results from this regression analysis). More specifically, results suggested that controllability moderated the goal revision – GPD relation in such a way that greater revision occurred when greater perceived controllability was reported, and that the relation between GPD and goal revision was strongest when participants reported greater perceived control over their performance. In sum, these findings indicated that hypothesis three was not supported.

The remaining four hypotheses differed from the first three in that they proposed differences in effort allocation across tasks as a function of individual or contextual variables. Results of these hypothesis tests should therefore indicate whether participants dedicated greater effort to the specific experimental task as predicted by the respective hypothesis. That is, they should indicate on which task greater effort was exerted. In order to statistically test hypotheses of this nature (i.e., predicting a dichotomous dependent variable), logistic regression was used. Additionally, in order to set up the proper regression equation for each hypothesis, dummy coding was applied to the respective independent variable(s), as well as to the dependent variable. With respect to the independent variables, dummy vectors were created that represented for which task participants had higher or lower standing on the variable in question, as denoted by the hypothesis. Even though dichotomizing continuous data is typically not a preferred approach, logistic regression remains a strong and appropriate tool to analyze data of this nature, even when all variables in a regression equation have been dummy coded. Indeed, Tabachnick and Fidell stated that, “Logistic regression is relatively free of restrictions and...the variety and complexity of data sets that can be analyzed is almost unlimited. The outcome variable does have to be discrete, but a continuous variable can be converted to a discrete one when there is reason to do so,” (2001; p. 521). Pampel’s (2000) discussion of logistic regression addresses

equations with both dummy-coded dependent and independent variables in the same equation, indicating that such treatment of the data is appropriate. Additionally, Jaccard (2001) explained that interaction effects of two or more dummy coded independent variables on a dummied dependent variable could be aptly tested using hierarchical logistic regression.

*Interpretation of logistic regression coefficients.*

In logistic regression the effects of independent variables on a dependent variable can be expressed as logged odds, odds, or probabilities. The statistical software used to perform logistic regression most often reports regression coefficients in the form of logged odds. These coefficients represent the, “change in predicted logged odds of experiencing an event or having a characteristic for a one-unit change in the independent variables. For dummy variables, a change in one unit implicitly compares the indicator group to the reference or omitted group,” (Pampel, 2000, p. 19). Interaction terms are interpreted as in ordinary regression.

Converting coefficients from logged odds to odds allows for meaningful interpretation of the influence of the independent variable(s) on the dependent variable. Odds ratios are commonly associated with logistic regression analyses and represent the odds of one level of the independent variable with the odds of another level of the independent variable. When an independent variable has been dummy coded, the antilog (also referred to as the exponentiated coefficient,  $e^b$ ) of the logged odds indicates this odds ratio. Although odds can be converted to probabilities, which may seem to ease interpretation, probabilities are not interpretable with a single coefficient; for this reason, odds are frequently the preferred form.

*Significance testing of logistic regression coefficients.*

Coefficients in logistic regression are generally tested in the same fashion as in linear regression. The Wald statistic is a common tool for testing the statistical significance of each coefficient, and is obtained by squaring each coefficient after dividing it by its standard error. The Wald statistic has a chi-square distribution, which is sensitive to large sample sizes such as those in the present study. To address the sample size issue with respect to the chi-square distribution, Raftery (1995; in Pampel, 2000) suggested the Bayesian Information Criterion (BIC) be used to provide greater confidence in results from more traditional tests of statistical significance. The BIC specifies that to reject the null, the squared  $z$ -value for a coefficient (i.e., its Wald statistic) should be larger than the log of the sample size, and the resulting value therefore indicates the difference in model information when including versus excluding the

variable. BIC values less than zero suggest very little support for including the respective variable, and for values greater than one, Raftery (1995) provided a rule of thumb for interpreting the extent of evidence for including a variable: Values from 0 to 2 represent weak evidence; values from 2-6 offer positive evidence; values from 6-10 indicate strong evidence; and values greater than 10 suggest very strong evidence of including the respective variable in the regression model. Based on this information, the statistical significance of logistic regression coefficients pertaining to tests of hypotheses in the present study have been interpreted using both the Wald statistic and the BIC. Confidence intervals have also been reported for each coefficient. Again, support for the hypotheses would be determined by a significant Wald statistic, a BIC value indicating the particular variable(s) should be included in the respective regression model, and a ninety-five percent confidence interval for each coefficient that does not contain zero.

Hypothesis four proposed that individuals would exert the greatest effort on the task with the smallest GPD. It should be restated here that the nature of exerted effort differed slightly between the two tasks; the film-scheduling task required that participants use the mouse to move films around within a weekly calendar, whereas the media-request task required that the mouse be used to process electronic requests in much more of a serial manner. GPD was dummy coded such that for each participant on each trial, a 1 indicated that there was a smaller GPD on the film-scheduling task, and a 0 indicated a smaller GPD on the media-request task. The dependent variable (i.e., effort) was dummy coded in such a way that a 1 indicated the film-scheduling task received greater effort and a 0 indicated that the media-request task received greater effort. After entering the dummy coded participant vectors in step 1, the dummy coded GPD variable was regressed on the dummy coded effort variable in step 2.

The resulting Wald statistic for GPD was 60.507 ( $p < .001$ ), clearly indicating that GPD size significantly predicted the amount of effort exerted between the two tasks. Additionally, the BIC value of 54 provided very strong evidence for the utility of GPD in predicting the task that received greater effort. Interpreting the results from this analysis, however, indicated that the hypothesis was not supported; significant results were found in the opposite direction than hypothesized (results indicated greater effort was exerted on the task with the larger GPD). The odds of exerting greater effort on the film-scheduling task were 95.3 percent lower for participants who had a smaller GPD on that task, rather than on the media-request task (i.e., the

odds were 95.3 percent lower of exerting greater effort on the task with the smaller GPD). In terms of an odds ratio, about 5 people per every 100 exerted greater effort on the film-scheduling task when experiencing a smaller GPD on that task (i.e., approximately 5 participants for every 100 exerted greater effort on the task for which they experienced a smaller GPD).

Table 6 contains the logged odds and the Wald statistics (and the standard errors for each), plus the probability for each Wald statistic. Also included are the exponentiated coefficient (the odds ratio for the dummied independent variable groups) and the confidence interval for the logged odds coefficient.

It should be noted that hypothesis four essentially suggests that the amount of effort expended by an individual is related to the size of their GPD, such that small discrepancies lead to greater amounts of effort. Approaching hypothesis four from a more general perspective such as this allows for regression analyses that do not require dichotomized independent and dependent variables. When hypothesis four was tested along these lines, the dummy coded participant vectors were regressed on task-related effort in step 1, followed by GPD in step 2. Within the film-scheduling task, GPD significantly predicted the amount of effort expended by individuals ( $b = 3.916$ ,  $\beta = .099$ ,  $p < .05$ ). Similarly, GPD also significantly predicted task-related effort within the media-request task ( $b = 10.096$ ,  $\beta = .346$ ,  $p < .001$ ). Table 7 presents the results from these analyses, respectively. In both of these analyses, however, the significant results were in the opposite direction from what was predicted. Although hypothesis four indicated that greater effort would be associated with smaller GPDs, the current data indicated that participants actually exerted greater amounts of effort in cases of larger GPDs. According to this additional and more general test of hypothesis four, support for the hypothesis was again not found.

The fifth hypothesis indicated that individuals would exert the greatest amount of effort on the task for which they reported the greatest amount of self-efficacy. It should be restated that two separate measures of self-efficacy were used in this study. For logistic regression analyses using these measures, participant efficacy scores were dummy coded within each performance trial in such a way that a 1 indicated a participant was more efficacious on the film-scheduling task and a 0 indicated greater efficacy on the media-request task. For convenience, the efficacy measure created based on Lee and Bobko's (1994) suggested technique for assessing efficacy will be referred to as self-efficacy measure A; likewise, the second efficacy measure used, that

created by Phillips et al. (1996), will be referred to as measure B. Performance trials in which participants were equally efficacious with respect to the two tasks were omitted from these analyses because such cases do not fit into one of the dichotomized groups (violating logistic regression's assumption that all observations be mutually exclusive and collectively exhaustive; Wright, 1995). The task effort variable was dummy coded in exactly the same manner as had been done to test hypothesis four (1 represented greater effort on the film-scheduling task, whereas 0 represented greater effort on the media-request task). In addition to omitting trials in which participants were equally efficacious on the two tasks, trials were also omitted in which participants exerted precisely the same amount of effort on each of the tasks, although these instances were exceedingly uncommon.

To test hypothesis five, the dummy coded participant vectors were hierarchically regressed on the dummy coded task effort variable at step 1. Step 2 involved regressing the main effect for the dummy coded self-efficacy variable (measure A) on the dummy coded variable for task effort. The results revealed that the Wald statistic for efficacy measure A was 13.004 ( $p < .001$ ). Combined with a BIC value of 6.66 providing strong evidence for using efficacy measure A to predict the task receiving greater effort, these results indicated that efficacy measure A was a significant predictor of the task on which participants exerted the greatest effort. Table 8 contains the results from this analysis. Interpreting these results showed that the odds of exerting greater effort on the task for which participants were more efficacious (as hypothesized) were 83.6 percent *lower* than their having exerted greater effort on the task for which they were less efficacious, which failed to support the hypothesis. The odds ratio indicated that for every 100 participants, only about 16 exerted greater effort on the task for which they were more efficacious, again clarifying that the observed relation between efficacy and task prioritization was not as predicted.

Performing the same analysis with self-efficacy measure B yielded a non-significant Wald statistic value of .01 (*ns*) and a BIC value of -6.23, which indicated very little support for using efficacy measure B to predict the task on which participants exerted the greatest effort. Values for this analysis are also presented in Table 8.

As with the previous hypothesis, hypothesis five can be stated in a general way such that individuals would exert the greatest amount of effort when they were more efficacious with respect to their performance goal. Testing hypothesis five in this manner required regressing the

dummy coded participant vectors on task-related effort in step 1, followed by self-efficacy in step 2. Using self-efficacy measure A to test this hypothesis within the film-scheduling task, results indicated that self-efficacy significantly predicted the amount of exerted effort ( $b = .080$ ,  $\beta = .399$ ,  $p < .001$ ;  $\Delta R^2 = .064$ ,  $p < .001$ ). These results are presented in Table 9. Testing the same hypothesis within the media-request task, however, failed to indicate that self-efficacy significantly predicted amount of effort exerted ( $b = .005$ ,  $\beta = .054$ ,  $ns$ ;  $\Delta R^2 = .001$ ,  $ns$ ). Table 9 also contains these results.

When the same hypothesis was also tested using self-efficacy measure B within the film-scheduling task, significant results were found ( $b = -1.135$ ,  $\beta = -.247$ ,  $p < .001$ ;  $\Delta R^2 = .017$ ,  $p < .001$ ), although the relation between efficacy and effort was in the opposite direction from what was predicted. Testing the hypothesis within the media-request task using efficacy measure B failed to yield significant results in either direction ( $b = .063$ ,  $\beta = .026$ ,  $ns$ ;  $\Delta R^2 < .001$ ,  $ns$ ). Results from these analyses are contained in Table 10. These results, therefore, tended to indicate that hypothesis five was not supported. Although the predicted relation between effort and self-efficacy was found within the film-scheduling task using self-efficacy measure A, the opposite relation among the variables was found using self-efficacy measure B within the same task, as well as in the logistic regression analysis discussed above; non-significant results were found using both efficacy measures to predict task-related effort within the media-request task. In light of these findings, results generally suggested very little support for hypothesis five. This was seen when efficacy was used to predict the task on which participants exerted greater effort (logistic regression analyses), as well as when efficacy levels were used to predict the *extent* of exerted effort within a single task (linear regression analyses).

Hypothesis six extended the previous two hypotheses by proposing that individuals would expend the greatest amount of effort on the task for which they were the most efficacious and that had the smallest GPD. The same dummy coding was applied to the independent variables (i.e., GPD and self-efficacy), and the dependent variable (i.e., effort), as was done to test hypotheses four and five. Hierarchical moderated logistic regression was utilized to test the hypothesis, and in step 1 the dummy coded participant vectors were regressed on the dummied effort variable. The second step involved regressing the main effects for the dummy coded GPD variable and the self-efficacy variable (measure A) on the effort variable. Finally, in step 3 the product term (dummied GPD x dummied self-efficacy) was regressed on the effort variable, and

in order to support hypothesis six, this product term would have to be significant and in the predicted direction.

Testing this relation using self-efficacy measure A yielded a non-significant Wald statistic of 2.502 (*ns*), and a BIC value of  $-3.68$  indicating very little support for the interaction of GPD and self-efficacy (measure A) in predicting task prioritization. Coefficients and test statistics from this analysis are contained in Table 11. As with results from the previous hypothesis, this non-significant finding does not warrant an interpretation of these results. The same conclusion was reached using self-efficacy measure B, as well. The Wald statistic for this analysis was .232 (*ns*) and the BIC value was  $-5.81$ , which suggested very little support for the interaction of GPD with efficacy measure B in predicting the task on which participants put forth the greatest effort (see Table 11 for results from this analysis). Based on these results, hypothesis 6 was not supported.

Analyzing a more general interpretation of hypothesis six involved regressing the dummy coded participant vectors on task-related effort in step 1, followed by the main effects for GPD and self-efficacy at step 2, and finally the GPD x self-efficacy product term at step 3. Using self-efficacy measure A to test this broader hypothesis within the film-scheduling task yielded significant main effects for self-efficacy ( $b = .097, \beta = .483, p < .001$ ) and GPD ( $b = 9.271, \beta = .235, p < .001$ ). Despite the fact that the logistic regression analysis for hypothesis six indicated no significant interaction between GPD and efficacy in predicting task-related effort, this additional analysis yielded a significant interaction term ( $b = .019, \beta = .160, p < .05; \Delta R^2 = .004$ ), indicating that self-efficacy and GPD did interact in predicting the amount of effort exerted on the film-scheduling task. Figure 6 depicts the nature of this relation among the variables, and Table 12 contains the results from the regression analysis. This suggests that within the film-scheduling task, individuals put forth greater effort when faced with larger GPDs, and that highly efficacious individuals exerted more effort than their less efficacious counterparts. In other words, the relation between GPD and task-related effort was stronger when individuals were more efficacious.

Using self-efficacy measure B to test the hypothesis in the same manner within the film-scheduling task also yielded significant main effects for GPD ( $b = 4.493, \beta = .114, p < .01$ ) and self-efficacy ( $b = -1.189, \beta = -.259, p < .001$ ) at step 2, as well as a significant interaction term at step 3 ( $b = .561, \beta = .502, p < .05; \Delta R^2 = .004$ ). Table 13 contains the results from this analysis.

Although a negative coefficient for self-efficacy was found in step 2, results from the test of moderation using self-efficacy measure B match those using measure A (i.e., a significant, *positive* interaction term was found). These additional analyses, then, indicated that results of analyses using efficacy measure A lead to the same conclusion as analyses using efficacy measure B; self-efficacy and GPDs did interact to predict the amount of effort individuals exerted within a single task (i.e., the film-scheduling task). As shown in Figure 7, however, the nature of this relationship was not entirely as had been predicted. Just as had been seen with efficacy measure A, results from analyses using efficacy measure B indicated that individuals tended to exert greater effort when confronted with larger GPDs, and that greater effort was demonstrated by more efficacious individuals within the film-scheduling task.

Assessing the same hypothesis within the media-request task using self-efficacy measure A indicated significant main effects for GPD ( $b = 12.495, \beta = .429, p < .001$ ) and self-efficacy ( $b = .024, \beta = .254, p < .001$ ) at step 2, as well as a significant interaction term at step 3 ( $b = .035, \beta = .472, p < .001; \Delta R^2 = .029$ ). Table 12 displays the results from this analysis. Figure 8 indicates that even though the nature of the relationship was again not as hypothesized, the form of the relationship was highly similar to that found within the film-scheduling task with both efficacy measures in the sense that greater effort was put forth when large GPDs were encountered, and that the most efficacious participants exerted the largest amounts of effort. When the analysis was conducted using self-efficacy measure B, a significant main effect was found for GPD ( $b = 10.143, \beta = .348, p < .001$ ), but not self-efficacy ( $b = -.057, \beta = -.023, ns$ ). A significant interaction term was found, however ( $b = .633, \beta = .783, p < .001; \Delta R^2 = .010$ ), offering more evidence that self-efficacy and GPDs interacted in determining the amount of task-related effort exerted within the media-request task (results contained in Table 13). Not surprisingly, Figure 9 shows that this relationship was not in the hypothesized form, although it did indicate the same relationship as had been seen in Figures 6 through 8. Although individuals exerted greater effort when confronted with larger GPDs, results indicated that more efficacious participants put forth the greatest amounts of effort.

Hypothesis seven indicated that individuals would exert greater effort on the task for which they had the highest rate of progress toward the respective task goal. Testing this hypothesis involved using logistic regression to hierarchically regress the dummy coded participant vectors on the dummy coded task-related effort variable at step 1, and the dummy



coded rate-of-progress variable on effort at step 2 (where rate-of-progress was dummied such that a 1 indicated a higher rate of progress on the film-scheduling task, and a 0 indicated a higher rate on the media-request task). Results from this analysis yielded a Wald statistic of 16.421 ( $p < .001$ ) and a BIC value of 10.11, which provided very strong evidence for the utility of rate of progress toward a task goal in predicting task prioritization. Table 14 contains the model coefficients and their associated test statistics for this analysis.

In light of these results, it can be said that the odds were 380.9 percent higher of exerting greater effort on the task for which a participant was experiencing the greatest rate of progress toward their respective task goal, rather than exerting greater effort on the other task. In terms of an odds ratio, about 481 participants for every 100 exerted greater effort on the task for which they experienced a higher rate of progress. Based on these results, it was concluded that rate of progress significantly predicted the task that received the greatest effort, such that participants put forth the greatest effort on the task for which they were experiencing the fastest rate of progress toward their respective task goal; these conclusions support hypothesis 7.

A broader interpretation of hypothesis seven simply proposes that greater effort would be associated with a higher rate of progress. Determining rate of progress within each task required a different calculation of GPD than used in previous analyses. Whereas previous analyses made use of a proportional calculation of GPD (i.e., performance divided by goal), analyzing hypothesis seven with linear regression required a subtraction-based calculation of GPD; in determining rate of progress for all remaining tests of hypothesis seven, GPD was calculated by comparing performance level with goal level. Positive GPD values indicated that the goal was surpassed, while negative GPD values indicated the goal was not met. Rate of progress was determined by subtracting GPD on the most recent trial from the GPD associated with the previous trial. In this way, positive rate of progress values represented an increase in rate of discrepancy reduction between successive trials, whereas negative rate of progress values indicated a decrease in rate of discrepancy reduction across trials. Tests of hypothesis seven within each task first involved regressing the dummy coded participant vectors on task-related effort at step 1, followed by rate of progress at step 2. Assessing this relationship within the film-scheduling task yielded non-significant results ( $b = .082$ ,  $\beta = .009$ ,  $ns$ ;  $\Delta R^2 < .001$ ,  $ns$ ), as seen in Table 15. Within the media-request task, however, rate of progress significantly predicted task-related effort, such that greater effort was exerted when higher rates of progress occurred ( $b =$

.298,  $\beta = .085$ ,  $p < .01$ ;  $\Delta R^2 = .006$ ,  $p < .01$ ), which is displayed in Table 15. It must be pointed out that this was the previously mentioned analysis that generated an ACF value greater than | .20 |, even after controlling for the amount of effort exerted on the previous trial. Therefore, the chance of erroneously concluding that rate of progress significantly predicted the amount of exerted effort must be taken into account. Based on these results, mixed support was found for hypothesis seven, indicating that greater effort was probably exerted on the media-request task when a higher rate of progress toward the task goal was experienced, but this relationship was not found within the film-scheduling task. Combined with the findings from the logistic regression analysis of this hypothesis, results generally pointed toward rate of progress predicting the exertion of task-related effort.

### *Supplemental Analyses*

#### *Exploratory investigation.*

The previously stated exploratory hypothesis concerned the examination of instances in which individuals switched between tasks as a function of self-efficacy, causal attributions for performance, and rate of progress toward a task goal. Unfortunately, due to an oversight during the development of the software containing the experimental tasks used in the present study, the specific type of data intended to facilitate the exploration of participants' switching between tasks was not recorded. In order to best understand the nature of individuals' switching between tasks, it had been decided that a 'snapshot' of the specific moment when a participant switched from one task to the other would be recorded, where the 'snapshot' would include data pertaining to the participant's current performance, their existing GPD on both tasks, rate of progress toward each task goal, and their relevant efficacy scores and causal attribution ratings. Instead of obtaining this 'snapshot' data, the recorded data simply represented the number of times each participant switched between tasks within each performance trial, but nothing more. For this reason, the exploratory topic (i.e., examining the factors surrounding individuals' switching between tasks) was not examined.

#### *Omission of the final two performance trials.*

Because a number of the analyses in the current study indicated non-hypothesized relations among the respective variables, in addition to the observed variables accounting for relatively little variance associated with each of the dependent variables (particularly compared to studies investigating the same variables in single goal studies), additional analyses were

performed in an attempt to better understand the nature of these relations. More specifically, the last two performance trials were temporarily omitted (trials four and five), and all original hypotheses were tested again. The reason for re-testing the analyses without these final trials concerned possible fatigue effects suffered by participants toward the end of the experimental session. By the time participants encountered the fourth and fifth trials, they had already been in the lab for approximately one and a half hours (facing the computer in the same position, even). Although not always the case, it was not unusual at that point for the behavior of participants to indicate their attention was beginning to wane and they were perhaps anxious to conclude their participation in the study. It was felt that retesting the hypotheses without including these performance trials might provide a meaningful explanation concerning the extent to which results from the present study failed to coincide with those from previous studies, while also potentially explaining a greater amount of variance in the dependent variables.

When hypothesis one was tested without data from the final two trials, the same non-hypothesized negative relation was observed between GPD and goal revision within the film-scheduling task ( $b = -.209$ ,  $\beta = -.235$ ,  $p < .05$ ;  $\Delta R^2 = .017$ ). Within the media-request task, however, results indicated the hypothesized *positive* relationship between GPD and goal revision was supported ( $b = .300$ ,  $\beta = .241$ ,  $p < .01$ ;  $\Delta R^2 = .023$ ). Therefore, results from the film-scheduling task suggested that participants revised goals to the greatest extent when faced with substantial goal *failure* (revision amounts decreased as negative GPDs shrank and extended into increasingly large positive GPDs), while results from the media-request task indicated that greater revision was associated with larger positive GPDs. Unlike most of these additional analyses, these two analyses accounted for less than 20 percent of variance in the dependent variable.

Tests of hypothesis two omitting trials four and five failed to indicate support within both the film-scheduling and the media-request tasks ( $b = -.028$ ,  $\beta = -.468$ , *ns*;  $b = -.008$ ,  $\beta = -.103$ , *ns*, respectively). In other words, stability attributions failed to interact with GPD in predicting goal revision for both experimental tasks. Given the non-significant results obtained from the original tests of hypothesis two within both experimental tasks, it is not entirely surprising that the hypothesis was not supported in this case.

When hypothesis three was tested without data from trials four and five, results were somewhat similar to what had been found in the original analyses. Within the film-scheduling

task, the same non-hypothesized negative coefficient was found ( $b = -.028$ ,  $\beta = -.630$ ,  $p < .05$ ;  $\Delta R^2 = .014$ ). Figure 10 indicates that participants reporting low controllability tended to revise their goals downward, particularly as the magnitude of negative GPDs decreased; surprisingly, downward revision was greatest for those who reported low controllability and surpassed their goal by a wide margin (as found in the original analyses). Participants who reported high controllability tended to revise their goals upward when facing larger negative GPDs, and the extent of this revision decreased as their GPD went from large, negative values to large, positive values. Analyses on the media-request task failed to yield significant results for this hypothesis ( $b = -.013$ ,  $\beta = -.228$ , *ns*).

Omitting trials four and five from logistic regression analyses of hypothesis four (proposing greater effort on the task with a smaller GPD) failed to indicate support for the hypothesis, as did the analysis using all performance trials. The Wald statistic was 33.234 ( $p < .001$ ) and the BIC was 27, indicating very strong evidence for using GPD size to predict the task receiving greater effort. The odds were 98.5 percent lower of exerting greater effort on the task with the smaller GPD; it can also be stated that no more than 2 out of every 100 participants put forth greater effort on the task for which they faced a smaller GPD. As with the original analysis, these results failed to support the hypothesis.

Results from tests of hypothesis four tested with linear regression within each experimental task produced results akin to those found in the original tests of the hypothesis using linear regression. In this way, the hypothesis was not supported within either task (film-scheduling:  $b = 7.854$ ,  $\beta = .287$ ,  $p < .001$ ,  $\Delta R^2 = .025$ ; media-request:  $b = 12.881$ ,  $\beta = .532$ ,  $p < .001$ ,  $\Delta R^2 = .113$ ). These results re-confirm that GPD significantly predicted the amount of task-related effort within each task, but the nature of this relationship was again in a different form than predicted; whereas the hypothesis proposed that greater effort would be exerted when smaller GPDs existed, greater effort was actually related to larger GPDs. Interesting to note, however, these analyses accounted for 60 and 76 percent of the variance in task-related effort, respectively.

Although the original test of hypothesis five using efficacy measure A indicated that efficacy was a significant predictor of task prioritization (but not in the direction hypothesized), re-analyzing the hypothesis omitting trials four and five indicated non-significant results associated with efficacy measure A (Wald = 2.253, *ns*; BIC = -3.65). As in the original test of the

hypothesis using efficacy measure B, re-testing the hypothesis without including the final trials indicated efficacy was not a significant predictor of the task on which participants exerted the greatest effort (Wald = .009, *ns*; BIC = -5.77). Therefore, results of analyses excluding trials four and five again failed to support the hypothesized relation between efficacy and task prioritization. The only difference between the original and supplemental analyses was the conclusion that efficacy measure A in the latter no longer significantly predicted task prioritization.

Hypothesis five was tested separately for both self-efficacy measures within each task, as done in the original tests of hypothesis five. This hypothesis proposed that self-efficacy would predict the task on which participants exerted the greatest amount of effort; it was expected that greater effort would be put forth when individuals reported greater efficacy. The only instance in which significant results were found was within the film-scheduling task, using self-efficacy measure A ( $b = .021$ ,  $\beta = .127$ ,  $p < .05$ ,  $\Delta R^2 = .005$ ). These results are not particularly different from the original tests of the hypothesis in which significant results were only found within the film-scheduling task. In both this and the original tests of hypothesis five, support was found for the hypothesized relationship among efficacy and exerted effort within the film-scheduling task using efficacy measure A. Even though the original test of hypothesis five within the film-scheduling task using efficacy measure B indicated a significant relationship between efficacy and effort (but in the opposite direction than predicted), results when trials four and five were omitted failed to yield significant results in either direction.

Logistic regression analyses testing whether GPD and self-efficacy interacted in predicting the task on which greater effort was dedicated (hypothesis six) yielded non-significant results when trials four and five were omitted, just as they did when these trials were not excluded. Neither significant Wald statistics nor supportive BIC values were found for supplemental analyses using either efficacy measure A (Wald = .031, *ns*; BIC = -5.73) or measure B (Wald = 1.374, *ns*; BIC = -4.22). That the logistic regression analyses using both efficacy measures (omitting trials four and five) failed to indicate significant results provides additional support for the previous conclusion that efficacy and GPD failed to interact in determining the task on which participants exerted the greatest effort.

The broader interpretation of hypothesis six proposed that self-efficacy and GPD would interact to determine the amount of effort participants exerted within a single task, and testing

this hypothesis without data from trials four and five yielded similar results to those obtained in the original tests of the hypothesis. Analyses using self-efficacy measure A indicated the same significant, but non-hypothesized relationship within the film-scheduling task ( $b = .029$ ,  $\beta = .335$ ,  $p < .01$ ,  $\Delta R^2 = .013$ ), as well as the media-request task ( $b = .031$ ,  $\beta = .480$ ,  $p < .001$ ,  $\Delta R^2 = .025$ ). These findings support the original results indicating that self-efficacy and GPD did interact in determining the extent to which individuals exerted task-related effort, although the nature of this relationship was such that greater effort was associated with greater GPDs, and that more efficacious participants exerted greater effort relative to less efficacious participants (see Figures 11 and 12, respectively).

Similar results were found in analyses using self-efficacy measure B, except for non-significant results associated with the film-scheduling task ( $b = .389$ ,  $\beta = .496$ ,  $ns$ ), which is the only point of difference between these analyses and those originally conducted. Therefore, the previously reported (and non-hypothesized) relationship was found within the media-request task ( $b = .628$ ,  $\beta = .907$ ,  $p < .01$ ,  $\Delta R^2 = .009$ ). Of course, the interaction term accounted for less than one percent of the variance in exerted effort, though. The form of this relation is shown in Figure 13.

Results from the logistic regression analysis performed to re-test hypothesis seven excluding trials four and five indicated a significant Wald statistic value of 9.640 ( $p < .001$ ). Additionally, the BIC value for this analysis was 4.06, indicating positive support for the rate of progress variable significantly predicting task prioritization, where ‘positive’ falls between ‘weak’ and ‘strong’ support, according to Raftery’s (1995) guidelines. The odds were nearly ten thousand (9,900) percent higher for participants to have exerted greater effort on the task for which they were experiencing a faster rate of GPD reduction, although the massive ninety-five percent confidence interval associated with the exponentiated coefficient ( $e^b$ ) that largely determined these odds must be taken into consideration ( $e^b = 100$ ; CI = 5.46 – 1,830.32). The odds ratio for this analysis indicated that 100 participants prioritized the task on which they were experiencing a faster rate of progress for every 1 participant that did not. As with results from the original test of hypothesis seven, these findings did indicate that participants were significantly more likely to put forth greater effort on the task for which they were experiencing a faster rate of progress toward their respective task goal.

While hypothesis seven was supported in the original within-task analyses (linear regression analyses), the same hypothesis failed to receive support when trials four and five were omitted from the analyses. More specifically, rate of progress predicted exerted task-related effort in neither the film-scheduling task ( $b = .649, \beta = .091, ns$ ) nor the media-request task ( $b = .194, \beta = .062, ns$ ).

*Expectancy as a predictor of task prioritization.*

As previously stated, Kernan and Lord (1990) found that, when working toward multiple goals, individuals prioritized the task for which they had the greatest expectancy of achieving the respective task goal. Within the current study it was argued that self-efficacy is a specific type of expectancy and therefore, based on Kernan and Lord's (1990) results, self-efficacy should predict the specific experimental task that participants prioritized with greater effort. Given this operationalization, it was proposed that participants in the current study would exert greater effort on the task for which they reported the greatest efficacy (hypothesis five), although this hypothesis was largely unsupported. It was also proposed that greater effort would be associated with an interaction of efficacy and GPD (hypothesis 6, proposing greater effort in the face of small GPDs and greater efficacy). Because precisely the same expectancy data was recorded in the current study as had been used by Kernan and Lord (1990) to report that expectancies significantly predicted prioritization, hypotheses five and six were re-tested using the more general expectancy variable in place of self-efficacy to see whether the current study could replicate Kernan and Lord's (1990) findings.

To re-test hypothesis five using hierarchical logistic regression, the dummy coded participant vectors were regressed on the dummy coded task effort variable at step 1. Step 2 involved regressing the main effect for the dummy coded expectancy variable (where 1 indicated greater expectancy of goal attainment on the film-scheduling task, whereas 0 indicated greater expectancy for the media-request task) on the dummied task effort variable. Results indicated that the Wald statistic was .263 ( $ns$ ) and the BIC value was -5.43, indicating very little support for efficacies predicting the task on which participants put forth the greatest effort. These results therefore indicated that expectancies did not significantly predict task prioritization.

This relation between expectancies and task prioritization can be tested more generally, as well, by hypothesizing that within each experimental task, expectancies would relate significantly with exerted effort, such that greater expectancies for goal attainment would be

related to greater effort. Results of this analysis would indicate whether the positive relation between expectancies and effort as proposed herein was supported within each experimental task. Testing this within the film-scheduling task involved regressing the dummy coded participant vectors on exerted effort in step 1, followed by the expectancy variable (in continuous form) in step 2. Results indicated that expectancies significantly predicted the amount of exerted effort within the film-scheduling task ( $b = -.276, \beta = -.231, p < .001$ ), although these results indicated a negative relation between expectancy and effort such that greater effort was exerted when participants were less confident in attaining their performance goal on this task. The same relation was not observed in the media-request task in that expectancy in achieving a task goal did not significantly predict the amount of exerted effort on the task ( $b = -.005, \beta = -.008, ns$ ). Therefore, these results again failed to replicate those of Kernan and Lord (1990).

Re-testing hypothesis six using expectancies in place of self-efficacy allowed for the testing of whether participants prioritized that task for which they had the greatest expectancy of goal attainment and that had the smallest GPD. Using logistic regression to perform the initial analysis, in step 1 the dummy coded participant vectors were regressed on the dummied task effort variable (1 indicated the film-scheduling task received greater effort, and 0 indicated the media-request task received greater effort), followed by the dummy coded GPD variable (1 indicated a smaller GPD on the film-scheduling task, while 0 indicated a smaller GPD on the media-request task) and dummy coded expectancy variable in step 2 (where a 1 indicated a greater expectancy within the film-scheduling task, while a 0 indicated the same within the media-request task). In step 3, the GPD x expectancy product term was added to the equation. Results indicated a non-significant Wald statistic (.193, *ns*), and a BIC value (-5.32) that suggested very little support for the interaction of GPD and expectancies in predicting the task on which participants exerted the greatest effort. Based on these results, it was concluded that expectancies failed to interact with GPD in explaining task prioritization.

The broader interpretation of hypothesis six substituting expectancies for efficacy was tested within each of the two tasks using linear regression methods, as well. When re-testing hypothesis six in this fashion within the film-scheduling task, the dummy coded participant vectors were regressed on the effort variable in step 1, followed by the main effects for GPD and expectancy at step 2, and finally the GPD x expectancy product term at step 3. Results were non-significant, suggesting that GPD and expectancies did not interact in explaining the extent of



task-related effort within the film-scheduling task ( $b = -.090$ ,  $\beta = -.224$ , *ns*). Within the media-request task, results *did* indicate support for the interaction of GPD and expectancies in predicting the amount of exerted effort ( $b = -.110$ ,  $\beta = -.389$ ,  $p < .05$ ;  $\Delta R^2 = .003$ ), which is challenging to interpret in a meaningful way given the non-significant findings with respect to the same hypothesis within the film-scheduling task, not to mention results from the re-testing of hypothesis five that indicated expectancies did not significantly predict exerted effort within the media-request task. That the interaction term accounted for only one-third of one percent must be highlighted, as well as the large statistical power within the present study possibly explaining this finding more than anything else. Regardless, Figure 13 shows that the nature of the moderating role of expectancies on the relation between GPD and effort was quite similar to that of the observed role of self-efficacy in moderating the relation between GPD and task-related effort; in this way, the GPD – goal revision relation was strongest for participants facing high GPDs, and the greatest amounts of effort were exerted by participants reporting the greatest expectancy for attaining their performance goal within the media-request task.

## Chapter 4. Discussion

The general purpose of the present study was to investigate self-regulatory, goal-striving behavior. Moreover, the specific focus was on the manner in which individuals self-regulate while simultaneously working toward multiple goals, and the influence of cognitive and situational variables on this process. Although a number of previous studies have illustrated the likely means through which individuals alter their goals and allocate resources as a function of previous performance and its related effects, very little empirical work exists in which these topics have been investigated in a multiple goal environment. More specifically, prior research has informed us as to the role that GPDs play in goal revision (e.g., Campion & Lord, 1982; Williams et al., 2000), yet exceedingly minimal empirical attention has been focused on how GPDs affect goal revision in a situation in which individuals work toward more than one goal at the same time, and do so over repeated performance episodes. Although a relative profusion of research has addressed the method by which situational factors such as self-efficacy and causal attributions for performance affect self-regulatory behavior (e.g., effort allocation and goal revision), the research addressing these processes in multiple goal scenarios remains particularly sparse. For these reasons, the primary purpose of the present study was to investigate the ways in which cognitive and situational variables (i.e., GPD, self-efficacy, causal attributions for performance, and rate of progress) affect self-regulatory processes as they specifically pertain to goal-directed behavior, and the interplay of these variables over successive performance episodes.

### *Findings and Conclusions*

#### *Hypothesis 1.*

The first hypothesized relation within the present study was that goal revision would be related to the direction and magnitude of one's GPD. It was proposed that individuals experiencing goal failure would revise subsequent goals downward, and that upward goal revision would be engaged when performance goals had been surpassed. The extent of this negative and positive goal revision was hypothesized to be in direct relation to the size of the existing GPDs, as seen in several previous studies (e.g., Donovan & Williams, 1996; Williams et al., 2000; Campion & Lord, 1982). Although results from the present study indicated that GPD significantly predicted goal revision, the form of this relation was not as predicted. Instead, results indicated that individuals tended to engage in the greatest amounts of upward goal

revision when facing the most extreme instances of goal failure on the same task. Equally unanticipated was the finding that downward goal revision occurred to the greatest extent when participants surpassed their goal on the respective task by a wide margin. The reason for this effect was not entirely clear. Regarding individuals who raised their goals despite having performed well below their previous goal, this behavior might be that of compensatory goal setting. This would be true to the extent that individuals possibly felt their previous performance level was unacceptably low and they raised their goal on the next performance trial, intending to redeem their previous performance by achieving more lofty goals through greater effort.

Attempting to understand why participants revised subsequent goals downward after having surpassed previous performance goals on the same task is a somewhat bigger challenge. An admittedly elaborate explanation presupposes that participants were particularly invested in avoiding negative consequences relating to performance on the two tasks. Indeed, empirical work regarding the ‘disengagement from control systems’ perspective (Hyland, 1988; Carver & Scheier, 1981) suggests that individuals are concerned with avoiding negative affect associated with various forms of failure, such as a considerable negative GPD. It has also been stated that when a performance-contingent incentive exists, individuals are likely to develop a priority system to ease decisions relating to effort allocation (Kernan & Lord, 1990). Turning to the present study, it is reasonable to suggest that a central goal of participants was to maximize their performance level on both tasks in order to take full advantage of their chances of obtaining the additional extra-credit point in the final trial. In light of this higher-order goal (i.e., maximizing performance on both tasks), participants would be expected to prioritize their weaker task following noteworthy performance (i.e., goal attainment) on the other task. If a participant intended to prioritize their weaker task with greater effort, keeping in mind that their self-regulatory behavior should guard against negative affect stemming from any sizeable goal failure, it would not at all be surprising for participants to lower their goal on the task for which they had most recently experienced a positive GPD (i.e., goal attainment). The reason for lowering their goal on their stronger task, of course, would be a perceived inability to perform at the same level when dedicating greater effort to the other task; without lowering this goal, participants would be far more likely to experience the negative affect that should accompany the probable goal failure on the related task. This assertion was tested by first selecting only the cases in which downward goal revision followed goal attainment within a single task. Paired-

samples t-tests were then used to ascertain whether significantly greater effort was exerted on the alternative task (i.e., the task for which the participants had not just engaged in downward revision following goal attainment). Results failed to support the assertion, however, in that no significant difference in exerted effort existed following instances in which participants revised downward after meeting goals on the film-scheduling task; when participants met their goal on the media-request task and revised subsequent goals downward, they actually exerted significantly greater effort on that task, rather than shifting focus to their weaker task. It must be restated here that the nature of the effort variable used in the present study was somewhat flawed in that it did not account for mental effort. The effort measure was also confounded with performance efficiency in the sense that effort was the total number of times a participant clicked the mouse on a task within a given trial, and highly efficient performance would be expected to result in at least slightly fewer mouse-clicks than if the same performance level had been obtained with less efficiency. These aspects of the effort variable might have been responsible for the lack of support for the above assertion.

Yet another possible explanation exists for these findings. It could have been the case that participants in the present study were not regulating their behavior in such a way as to truly maximize their performance, whether that performance pertained to a single task or across multiple tasks. It is possible that participants were not overly concerned with their performance in the present study, and that they were simply participating to earn the minimum extra course credit earned by all participants. If this were the case, it would not be surprising for participants to have established a general level of performance; as long as performance was equal to or above this level, participants would be satisfied with how they were performing in the study. Further, if an individual surpassed this performance level required for satisfaction concerning performance, they would most likely shift their focus to the other task. Therefore, it may have been the case that participants lowered their goals after surpassing them because they had already performed at or above the level they personally required for satisfaction with their performance. As stated, lowering the goal would allow them to ensure they did not encounter a large negative GPD on the subsequent trial. Results also indicated that participants tended to raise their goals when they failed to meet them on previous trials. According to this alternative explanation for the current results, it would not be unexpected for participants to have raised their goals to the level required for satisfaction with performance, which may explain the present findings.

It should be noted that as with most previous work investigating the link between GPD and goal revision, GPD was a significant predictor of goal revision. The amount of variance in goal revision explained by GPD in the present study, however, was noticeably lower than that reported in previous research. Of course, in the current investigation the observed GPD – goal revision relation was in the opposite direction than predicted based on results from earlier studies, yet it is entirely possible that the current results in this regard have begun to provide an illustration of some ways in which self-regulation may operate differently in a simultaneous, multiple-goal environment, relative to a single-goal scenario. For instance, when simultaneously balancing multiple performance goals, individuals may be most concerned with their combined performance across both activities, which may lessen the effect of the GPD – goal revision relation within a single task.

*Hypothesis 2.*

The focus of the second hypothesis was on the potential moderating role of stability attributions for performance on the relation between GPD and goal revision. Several previous studies found that stability attributions for performance moderated the GPD – goal revision relation such that greater amounts of revision were associated with more perceived stability in the factors affecting performance (Donovan & Williams, 1996; Radosevich, 1999; Donovan & Williams, in press). Despite these previous findings, results from the present study failed to indicate support for this relation. Instead, analyses performed within each experimental task indicated that stability attributions did not moderate the GPD – goal revision relation.

Comparing the current study with previous research supporting the moderating role of stability attributions on GPD and goal revision lead to the observation the factors affecting performance in this study might have tended to be more stable relative to those in other studies. Participants from these prior studies were track and field athletes, cross-country runners, or students taking a wide assortment of college courses. Participants in the current study, however, performed two computerized activities in which the only factors that changed across performance episodes were the specific film titles available to be scheduled in the film-scheduling task, and the requested items within each media request associated with that task. Compared to athletes competing at multiple locations under varying weather conditions (and against different opponents at each competition), as well as college students enrolled in an array of courses taught by different instructors, it is possible that the nature of the present study would

not afford the perception of particularly unstable factors influencing performance. The nature of the stability attribution data from the current study was therefore examined to determine whether range restriction might explain the non-significant effects. It was found, however, that range restriction was not a limitation; the full range of stability attribution ratings were endorsed, the mean was centered fairly close to the midpoint, and the deviation in stability ratings was not restricted.

Multicollinearity was also assessed as a potential cause for the non-significant effect of stability attributions. To the extent that multicollinearity may lead to erroneous estimation of regression coefficients, results of tests of hypotheses involving these coefficients are also likely to suffer. The variance inflation factor (VIF) is a suitable diagnostic for assessing the extent of collinearity among independent variables, for which values greater than 10 are generally interpreted as indicative of problematic collinearity (Pedhazur, 1997). The VIF values associated with the dummy participant vectors, GPD, and stability attributions within the film-scheduling task were all less than 3.0 in step 2 of the hierarchical regression analysis. In step 3 (adding the GPD x stability product term), VIF values increased to values greater than 10, but this should be expected considering the main effects of these variables within the same regression equation, and was therefore not of concern. Similarly, the same analyses within the media-request task indicated VIF values for participant dummy vectors, GPD, and stability attributions below 3.0 in step 2 of the hierarchical analysis. Step 3 did generate VIF values greater than 10, although the presence of the main effects for GPD and stability in the same regression equation indicated unwarranted concern regarding collinearity. These findings suggest, then, that the lack of significance concerning the moderating role of stability attributions was not related to multicollinearity among the independent variables.

After eliminating the potential for range restriction in stability attributions, as well as possible multicollinearity among the predictors, unfortunately no straightforward explanation exists for finding that stability attributions did not moderate the relation between GPD and goal revision. It must be noted here that Williams et al. (2000) also failed to identify stability attributions as a moderator of the GPD – goal revision relation.

### *Hypothesis 3.*

The third hypothesis proposed that controllability attributions for factors affecting performance would also moderate the relation between GPD and goal revision, such that greater

amounts of goal revision would be associated with lower levels of perceived controllability. The basis for this hypothesis was previous empirical work that had demonstrated a moderating role of controllability in this manner (Williams et al., 2000; Donovan & Williams, in press; Radosevich, 1999), and drew upon the resource allocation perspective to explain these findings. This perspective suggests that individuals are unlikely to invest finite resources on a task if they perceive little control over the factors affecting their performance on that particular activity.

Unlike results associated with the moderating role of stability attributions in the present study, it was found that controllability attributions *did* significantly moderate the relation between GPD and goal revision. The specific nature of this moderating role, however, was in the opposite direction than had been hypothesized herein and therefore contradicted results from earlier studies, only one of which was a multiple goal scenario (Radosevich, 1999). Whereas previous research tended to find that greater amounts of goal revision were associated with less perceived controllability, results from the current study indicated that the greatest magnitude of revision was associated with *high* controllability. More specifically, participants tended to engage in the greatest amount of upward goal revision when having failed to meet their goal by the widest of observed margins and perceiving the greatest control over their performance. When participants surpassed their goal by the greatest amount and reported high controllability, they tended to engage in the greatest amount of *downward* revision, which is the inverse of that reported in prior research, most of which was conducted in single-goal settings. The same trend was observed when weaker controllability was reported, but to a lesser degree.

Although no clear theoretical explanations appear to exist for this finding, one might be inclined to suggest that a participant reporting greater controllability raised their goal to such an extent because they felt attainment of a lofty goal was possible through greater effort, and that the large negative GPD they faced provided a strong impetus for this effort. The self-satisfaction that should accompany goal attainment in such a scenario (i.e., following substantial goal failure) could possibly drive this sort of goal revision (Bandura, 1986). In a related sense, participants who reported high controllability over the factors affecting their performance and experienced large, positive GPDs (substantial goal success) may have chosen to focus on improving their performance on the other task. In doing so, they most likely revised their goal on their strong task to avoid a large negative GPD during the upcoming trial, probably guarding against negative affect, as suggested by the 'disengagement from a control system' perspective (Hyland, 1988).

The high controllability they reported for the original task should lead them to feel that they would be able to return to the task and again perform at a high level if they exerted sufficient effort, because effort would be the primary factor affecting performance under their control. A reexamination of the current data did not indicate that significantly greater effort was exerted on the weaker task immediately after a participant revised their goal on the other task (after having met their goal on that other task), but again, the flawed nature of the effort variable could be responsible.

*Hypothesis 4.*

The fourth hypothesis proposed that GPD would predict the task for which participants exerted the greatest amount of effort, such that greater effort would be associated with smaller GPDs. Results from the logistic regression analysis used to test this hypothesis indicated that GPD size was a significant predictor of the task on which participants exerted greater effort. Surprisingly, though, the greatest amounts of effort tended to be associated with large negative GPDs.

Similarly, the linear regression analyses performed within each task to determine whether greater effort was associated with smaller GPDs yielded results of the same nature; participants exerted significantly greater effort when faced with larger, negative GPDs. Exerted effort tended to decrease as participants encountered increasingly smaller negative GPDs, and effort decreased still further as increasingly positive GPDs were encountered. While previous work within multiple-goal scenarios found that smaller negative GPDs were associated with greater prioritization (Kernan & Lord, 1990), as supported by the resource allocation perspective, the contradictory results from the present study can be explained by both social cognitive theory and control theory. This is true insofar as both of these motivational frameworks maintain that greater GPDs generally trigger stronger responses than smaller GPDs (Carver & Scheier, 1982; Bandura, 1986; Powers, 1973). Champion and Lord (1982) reported that individuals who experienced the greatest amount of goal failure (performing well below their intended level on a course exam) exerted the greatest effort at the next performance opportunity, drawing upon control theory's principle of dynamic homeostasis for explanation, or the motivated desire to align performance with goals. Similarly, but working from a social cognitive perspective, Bandura and Cervone (1983) found that individuals exerted substantially more effort in



subsequent attempts at goal attainment following goal failure, as long as they were efficacious and dissatisfied with their previous performance.

Another possible explanation for finding that larger negative GPDs were associated with greater effort concerns the incentive within the present study. Because participants knew from the start of the study that they were able to earn an additional extra-credit point by performing at a certain level in the final trial (the level remained unspecified until the beginning of that trial), it is possible that during earlier performance trials individuals were primarily interested in maximizing their overall performance. In this way, participants may have felt a need to focus their attention on the task for which they were performing at a lower level in order to elevate their performance on that task so they would be able to achieve the performance level required to earn the additional extra-credit point in the final trial.

The idea of participants striving for a performance level they personally felt would lead to satisfaction with performance was mentioned above with respect to results from hypothesis one. The same alternative explanation applies to results from hypothesis four, as well. It is quite possible that instead of striving for maximum performance, participants instead strove for slightly lower levels of performance for which they would be personally satisfied. With respect to hypothesis four, participants may have tended to focus greater effort on the task for which they had the larger GPD because their performance on the other task had already surpassed the level required for personal satisfaction.

#### *Hypothesis 5.*

Proposed by the fifth hypothesis was a relation between self-efficacy and task-related effort, such that greater effort would be exerted on the specific task for which an individual was more efficacious. Tests of this hypothesis were performed using each of the self-efficacy measures included in the present study; as previously stated, significant results were only associated with efficacy measure A. Moreover, although these results indicated that self-efficacy significantly predicted the task for which participants exerted the greatest amount of effort, the nature of this relation was in the opposite direction than had been predicted. In this way, greater task-related effort was associated with the task on which participants were less efficacious. Although the observed results were not predicted, they are still reconcilable with the resource allocation perspective. If an individual is already efficacious with respect to one task and their intention is to perform acceptably well on both tasks, they would be expected to exert greater

effort on the task for which they were less efficacious. After all, their high efficacious level with respect to the original task should result in the feeling that at some future point they could return their attention to that task and still perform at a high level.

Recently published empirical work concerning the effects of self-efficacy can offer a potential explanation for this finding (Vancouver, Thompson, & Williams, 2001; Vancouver, Thompson, Tischner, & Putka, 2002), despite the fact that a few prominent researchers have rebuked this work (Bandura & Locke, 2003). Results from this research by Vancouver and colleagues runs counter to the commonly held view that efficacy relates positively to performance. These authors propose that a negative relation between efficacy and performance occurs in instances where efficacy levels are high, leading to complacency or overconfidence in one's belief in their ability to perform a particular task. Drawing indirectly from this perspective in interpreting results from the current study's fifth hypothesis suggests the possibility that participants in the current study switched their focus to the task on which they were not performing as well in an effort to seek a greater challenge. If performing one task was perceived as exceedingly simple and therefore boring, it would not be surprising for participants to focus on another task if afforded the opportunity to do so. The negative efficacy – performance relation as shown by Vancouver et al. has only been demonstrated in single-goal studies so far, however, and for that reason it is currently unknown whether high levels of efficacy possibly lead to complacency when individuals work toward multiple task goals at the same time, and how this complacency effect within a single task might affect behavior on a second task for which an individual may or may not be overconfident.

The more general test of hypothesis 5 proposed that efficacy and task-related effort would relate in such a way within each task that participants would exert the greatest amount of effort when they were most efficacious. This hypothesis was tested within each task using both efficacy measures, although significant results were only found within the film-scheduling task. Complicating the issue, though, was the fact that the nature of this relation was different depending on the efficacy measure used. While analyses using efficacy measure A indicated a positive association between efficacy and effort (the proposed relation), analyses using efficacy measure B indicated that participants exerted greater effort when they were less efficacious. Although possible explanations exist for both of these findings (resource allocation perspective

for the first, and the challenge-seeking perspective for the latter), the unavoidable fact remains that two measures of the same construct indicated opposite relations among the variables.

A closer look at these two efficacy measures indicates that they assess slightly different interpretations of efficacy. Measure A consisted of the commonly recommended (Bandura, 1986; Lee & Bobko, 1994) strength and magnitude assessment of efficacy relative to multiple performance levels; measure B assessed how participants felt their performance would compare to that of other participants (yet no participants received normative feedback in this study), as well as the extent to which participants felt their likely performance level would be satisfactory or adequate, and whether they would require significant practice to perform well. Moreover, the two efficacy measures failed to correlate with one another to the degree we would expect, given their purported measurement of the same construct. Although correlations of the two measures within each task were significant, the correlation coefficients were still unusually low; within the film-scheduling task  $r_{A-B}(156) = .375, p < .001$ , and within the media-request task  $r_{A-B}(156) = .464, p < .001$ . In light of these semantic and statistical characteristics of the two measures, the construct validity of at least one of the measures should be questioned. As previously argued in the above discussion concerning the stability attribution scale used to test hypothesis two, the extent to which a measure may suffer diminished construct validity necessarily affects conclusions drawn from related analyses. If the construct validity of either of the efficacy measures used in the present study were questionable, one would naturally expect that measure to demonstrate curious relations with other, perhaps more valid measures of the same construct.

#### *Hypothesis 6.*

The sixth hypothesis proposed that GPD and efficacy would interact in identifying the task on which participants exerted the greatest effort. Results indicated that efficacy did not moderate the GPD – task-related effort relation in the way that had been proposed. While only nonsignificant results were associated with analyses using efficacy measure B within each of the tasks, measure A was found to significantly moderate the GPD – task-related effort relation, but in such a way that the greatest amount of effort was exerted by highly efficacious participants facing large negative GPDs. Greater task-related effort having been exerted in cases of greater efficacy is reconcilable with the resource allocation perspective in that we would expect individuals to more fully invest their finite resources when they are relatively confident that such efforts will result in goal attainment. Given the results from hypothesis four (greater effort when

faced with large negative GPDs), it is not entirely surprising that highly efficacious individuals exerted the greatest effort when they experienced substantial negative GPDs. The social cognitive theory framework would support this finding in the sense that, as long as an individual feels confident in their ability on a particular task, a large negative GPD should trigger a strong reaction.

The broader interpretation of hypothesis 6 stated that efficacy and GPD size would interact in explaining task-related effort within each task, such that greater effort was expected when participants reported greater efficacy and faced smaller GPDs. Perhaps surprisingly, significant results were found using both measures of efficacy within each of the experimental tasks, but as previously mentioned, these results were not entirely in support of the hypothesis. The forms of these significant interactions, however, were consistent across all analyses and tended to indicate that greater task-related effort was exerted in association with greater efficacy and larger GPDs within each experimental task. Again, the specific nature of these interactions was not in the predicted form, but they do coincide with already reported relations among these variables from the present study (e.g., greater effort associated with larger GPDs). As just mentioned, social cognitive theory would suggest that individuals are likely to invest effort on decreasing large GPDs as long as they are efficacious with respect to the particular task. Indeed, Bandura and Cervone (1983) reported that participants increased their exerted effort in an attempt to reduce an existing GPD when they were efficacious on the task. It must also be noted, though, that the amount of explained variance associated with each of these interaction terms was remarkably small, particularly within the film-scheduling task ( $\Delta R^2 = .004$  in analyses using both efficacy measures), indicating that it is possible these significant effects were driven more by the statistical power within the present study, rather than meaningful interrelations among the variables.

#### *Hypothesis 7.*

The final hypothesis stated that individuals would exert the greatest amount of effort on the task for which they were experiencing the fastest rate of progress toward their task goal across successive performance trials. The significant results in support of this hypothesis coincide with the work of Carver and Scheier (1990) and the resource allocation perspective, both of which were drawn upon in specifying this hypothesis. In the present study it was found that individuals were more likely to invest greater effort when experiencing a faster rate of

progress toward their task goal, presumably because a higher rate of progress results in both positive affect and greater expectancies of success (Carver & Scheier, 1990). Indeed, expectancies were significantly related to rate of progress within both the film-scheduling task ( $r(624) = .178, p < .01$ ) and the media-request task ( $r(624) = .258, p < .01$ ). Because the resource allocation perspective maintains that individuals are most likely to invest resources when goal attainment is most probable (i.e., in cases of greater expectancy), these results are in keeping with these theoretical propositions, despite the fact that the observed correlations between expectancies and rate of progress were not exceptionally large.

Testing a more general interpretation of hypothesis 7 within each experimental task (i.e., greater effort would be associated with a greater rate of progress) resulted in significant findings in support of the hypothesis within only one of the experimental tasks (media-request task; nonsignificant results were associated with the film-scheduling task). Within the media-request task, results indicated that as with the more specific test of this hypothesis, individuals exerted significantly more effort when experiencing a faster rate of progress toward task goals across successive performance trials. As just stated, this finding coincides with the resource allocation perspective and with Carver and Scheier's (1990) work concerning rate of progress. This finding also fits with results from research specifically focusing on goal-directed self-regulation. Williams et al. (2000) found that within a sample of cross-country runners, the rate of progress an individual experienced with respect to a performance goal significantly affected how they reacted to a GPD. More specifically, during the first half of a performance trial (a competitive athletic season), participants resisted downward goal revision when faced with negative GPDs, presumably because they believed goal attainment could be achieved through greater effort. As the performance trial began to wind down and they still experienced a negative GPD, downward revision was significantly more likely.

#### *Omission of final performance trials.*

Results from testing hypothesis one without including data from trials four and five indicated results in line with original findings within the film-scheduling task (greater revision when encountering small GPDs), but significant results in the opposite (hypothesized) direction were found within the media-request task (greater revision when encountering large GPDs). No obvious explanation exists for why the omission of trials four and five generated these discrepant results, particularly compared to results from the original tests of the hypothesis. There is a

possibility, however, that because participants knew from the start of the study that their participation would include the completion of multiple performance trials, they established a higher-order goal somehow tied to the conclusion of the study. If this assertion were true to some extent, it would not be surprising for participants to have established a goal specifically concerning the final trial, and for their self-regulatory behavior to be directed toward this end. Although such a higher-order goal may have specifically concerned performance *within* the final trial (e.g., attaining the additional extra credit point by performing at a level they would not know until immediately before that trial began), participants may have instead set a higher-order goal concerning cumulative performance on both tasks across all performance trials. Therefore, to focus analyses on a subset of the total number of performance trials and to draw conclusions from these analyses is to fail to account for the potential influence of a higher-order goal. In fact, it is entirely possible that analyses excluding the final *three* trials would indicate somewhat different results compared to what was found when the final two trials were omitted. Likewise, excluding just the final trial may lead one to conclude slightly different relations among the variables for the reason that all such analyses described above would fail to account for the possible influence of a higher-order goal. Even though such a higher-order goal was not accounted for within the present study, outright rejection of its existence is unfeasible, its likelihood notwithstanding.

Results from testing hypotheses two and three with the abbreviated data set yielded results that were far more similar to those stemming from the original analyses; non-significant results were again found for tests of hypothesis two (stability attributions failed to interact with GPD in predicting goal revision), and results from tests of hypothesis three within the film-scheduling task indicated that controllability moderated the GPD – goal revision relation in the same negative manner as found in original tests of the hypothesis (significant results associated with the media-request task for hypothesis 3 failed to occur). Taken together, results from analyses dropping the final two trials provide even greater evidence that stability attributions did not interact with the GPD – goal revision relation in the present study, but that controllability attributions did moderate this relation, at least within the film-scheduling task. At the same time, it may provide evidence that goal revision was not measured with respect to the more important goal, in this case a higher-order goal.

Results from all tests of hypothesis four omitting the final trials coincided with results from original tests of the hypotheses. Although these results indicated a significant relation between GPD size and task-related effort, results continued to indicate that greater effort was associated with larger GPDs (the reverse of what had been hypothesized). More specifically, results from the logistic regression analysis still indicated that even when trials four and five were excluded, participants exerted the greatest effort on the task with the smallest GPD. Similarly, linear regression results from tests of the hypothesis within each task confirmed this relation, as well.

Testing hypothesis 5 without including the final performance trials yielded somewhat discrepant results from the original analyses in the sense that analyses using self-efficacy measure A indicated non-significant results using efficacy to predict the task on which participants focused greater effort (using efficacy measure B lead to the same non-significant results as in the original analyses). General tests of the hypothesis (using linear regression) within each experimental task yielded somewhat similar results to those originally found; support was found for the hypothesized relation within the film-scheduling task using measure A (non-significant results were again found within the media-request task), but results using efficacy measure B within the film-scheduling task indicated significant results in the opposite direction than predicted, which runs counter to results from the original hypothesis tests (these results unexpectedly indicated that greater effort was associated with less efficacy). Because results from analyses dropping trials four and five were mostly in agreement with results from the originally tested hypotheses, the fact that efficacy measure B lead to unique results within the film-scheduling task most likely indicates that these results should not be given too much weight, particularly in light of the relatively low correlation between the two efficacy measures.

Interestingly, results from tests of hypothesis six omitting the final performance trials indicated the same significant relation (in the same, non-hypothesized direction) using both efficacy measures, except for non-significant results associated with efficacy measure B within the film-scheduling task. These results tend to further support conclusions from original tests of the hypothesis indicating that self-efficacy does moderate the GPD – task-related effort relation such that more efficacious individuals exert greater effort, particularly when confronting larger GPDs.

Finally, analyses excluding trials four and five yielded results that coincided with the original results, indicating that participants exerted significantly greater effort on the task for which they were experiencing a greater rate of progress toward their respective task goals across successive performance trials. Surprisingly, however, more general tests of this hypothesis within each task found that results differed when trials four and five were dropped. In this way, although the original analyses had indicated that greater effort was associated with greater rates of discrepancy reduction, analyses using only trials one through three failed to yield significant results. This finding was not particularly surprising because the elimination of trials four and five left only two trials for these analyses (because the rate of progress variable requires a comparison of performance on two successive trials, this variable was only calculated for trials two through 5).

*Expectancy as a predictor of task prioritization.*

Results from the current analysis generally did not support those reported in Kernan and Lord (1990) regarding the role of expectancies predicting task prioritization. Although significant results were found for expectancy predicting the extent of effort exerted within the film-scheduling task, the present results were in the opposite direction than those previously reported. It was also found that expectancy interacted with GPD to significantly predict the amount of exerted effort on the media-request task, although the point was made that this result could have just as likely been due to the substantial statistical power within the current study as anything else.

Although the current analyses concerning efficacy generally failed to coincide with results from Kernan and Lord (1990), a couple of key differences exist between the two studies. Whereas participants in the present study set their own goal levels for all but the final trial, Kernan and Lord's (1990) participants received an assigned goal before the first of three trials, but were also allowed to set their own performance goals. Although participants in both studies worked toward an assigned goal to earn an extrinsic reward, an important difference was that Kernan and Lord's (1990) participants knew the required performance level at the beginning of their three-trial study, whereas participants in the current study were not aware of the reward-contingent performance level until just before the final (fifth) trial. In this way, Kernan and Lord's (1990) participants were able to focus attention entirely on one task after having met the goal on the alternative task. Although participants who attained the assigned goal on one task



were removed from Kernan and Lord's (1990) analyses for this very reason, the fact remains that the opportunity to potentially focus on a single task (thereby maximizing performance) very well might have influenced prioritization-related performance strategies, even within participants who did not meet the goal on one task, despite possibly having self-regulated in such a way as to have done so.

The other important difference between the two studies concerned the operationalization of task prioritization. Task prioritization was operationalized in the present study as the amount of exerted task-related effort (i.e., mouse-clicks), but Kernan and Lord (1990) operationalized prioritization as the difference in magnitude between self-set goals for two experimental tasks. It should not be surprising if the difference between the natures of these measures explained the fact that the two studies yielded different conclusions related to task prioritization. Given these differences between Kernan and Lord (1990) and the present research, it was not entirely unexpected that the same influence of expectancies on task prioritization was not observed.

#### *Limitations*

Several limitations exist with respect to the current study, some of which are likely to have had a more than minimal influence on the obtained results. Perhaps the greatest issue surrounds the way in which task effort was measured. As stated, task-related effort was assessed by the number of mouse-clicks used to perform a given task during a single performance trial. Although the intention had been to capture two other measures of task-related effort in addition to mouse-clicks (i.e., time spent working on each task and self-reported exertion of effort), regrettably mouse-clicks was the sole measure of effort that was collected. Of the three intended effort measures, however, mouse-clicks was arguably the most valuable of the three in the sense that clicks of the computer mouse were the single method by which participants performed both the film-scheduling task and the media-request task (i.e., neither keystrokes nor any other method were required to perform either of these tasks at any time). While knowing the amount of time a particular task was onscreen would have likely served as a beneficial second measure of task-related effort (particularly because only one task was displayed at a time), it was still the case that participants practically never sat motionless in front of the computer monitor during the performance trials. Instead, in practically every case participants were actively engaged in using the computer mouse to perform both tasks for the duration of each performance trial (i.e.,

participants seemed to spend practically zero time pondering performance strategies or engaging in other potentially important cognitive activities related to performance).

It remains somewhat problematic, however, that task performance efficiency could have confounded the results of analyses using task-related effort as a dependent variable (i.e., hypotheses 4 through 7). This is true to the extent that greater task performance efficiency would result in equal performance with fewer mouse-clicks compared to the number of mouse-clicks required by another individual performing at the same level, but less efficiently.

Another limitation in the current study was the occasional lack of congruence between the two measures of self-efficacy. This was most apparent in results of the more general interpretation of hypothesis five within the film-scheduling task, which proposed that greater amounts of effort would be exerted when participants reported greater efficacy. While this relation was found in the film-scheduling task using efficacy measure A, precisely the opposite was found using measure B. Trying to reconcile these findings is perhaps impossible, although the subtle differences between the aspects of efficacy assessed by the two measures may partially explain this occurrence. It is still suspected, however, that the different conclusions associated with the separate efficacy measures indicates less than ideal measurement of the efficacy construct within the present study.

A goal in designing the experimental tasks used in this study was to create experimental activities that more closely resembled things an individual might be likely to perform in a work context, because it was believed that the closer a lab activity resembled such 'real life' work tasks, the more generalizable the results would hopefully be from such a study. It is important to note, however, that while one might argue that the current experimental tasks more closely resembled employment-situation activities than those used in some previous empirical work, the context in which the tasks were performed within the current study did not closely simulate an actual employment scenario. More specifically, the biggest factor in this regard was that participants learned these tasks and performed them for approximately one and a half hours before leaving the lab and never performing the tasks after that point, hardly replicating a real-life work situation. Furthermore, participants worked on the tasks in 10-minute performance trials; one would be hard pressed to identify an employment activity in which someone set goals for themselves for performing two tasks in five successive 10-minute increments. Additionally, the lack of distractions, interruptions, and unanticipated setbacks also limit the extent to which

the current experimental tasks resembled ‘real life’ employment tasks. In light of these issues, results from the current study are still valuable insofar as they add to the existing body of research on these topics, which has included a wide array of experimental tasks. It is precisely this heterogeneity of experimental tasks that helps maximize our understanding of the ways in which goals affect performance, in addition to the influence of situational and cognitive variables on this process, and the manner in which individuals alter their goals over time as a function of these factors. Following the accumulation of numerous studies addressing these issues in multiple goal scenarios, we will then be able to determine how well results of studies in this area generalize to work settings.

#### *Implications and Suggestions for Future Research*

The implications for future research stemming from the current study are many. Because work motivation researchers are just now beginning to more fully address self-regulation in multiple-goal environments, the present study offers some preliminary indications as to the nature of these processes, while also highlighting a number of valuable empirical questions to be pursued in future research. Perhaps the greatest implication stemming from the current study is the likely possibility that individuals self-regulate in a different manner while simultaneously pursuing multiple goals, rather than a single goal. The frequency with which results from the present study contradicted those of single-goal studies bears this out. While the present investigation suffered limitations that must temper the confidence with which we interpret the results presented herein, multiple empirical questions have been raised that future research would do well to address.

Additional research investigating self-regulation in simultaneous, multiple goal environments should address whether individuals do generally raise performance goals to a greater extent when faced with large negative GPDs. If this finding proves replicable, gaining further insight into why this type of self-regulatory behavior occurs would be particularly informative. The assertion was put forth that such a reaction might have been an example of compensatory goal setting, yet neither confirming nor disconfirming this claim was viable within the bounds of the current investigation. It was also suggested that individuals might not have been striving for maximum performance levels in the present study, which would possibly explain some of the unanticipated self-regulatory behaviors observed. The ability of future

empirical work to assess the possibility of this sort of goal striving would be particularly beneficial.

Results from the present research also suggested that while simultaneously pursuing multiple performance goals, individuals allocate greater effort on tasks for which they experience the most goal-discrepant performance. While existing theoretical models can explain this behavior, it is unknown whether similar self-regulatory behavior would occur in different scenarios, and whether any additional factors influence the nature of this regulation. Should these results prove replicable in dissimilar environments using different experimental tasks, we would begin to conclude that individuals regulate their behavior differently depending on whether they are working toward single versus multiple goals.

The observed relations between self-efficacy and several self-regulatory behaviors in the present research (e.g., goal revision and effort allocation) remain particularly perplexing. It may be the case that the influence of self-efficacy on self-regulation in a simultaneous multiple-goal environment is such that individuals choose to exert greater effort on an alternative, more challenging task (greater GPD) if the focal task is too dull or tiresome. Further investigation into these findings would help explicate the role that self-efficacy plays in determining on which activity individuals focus most of their effort. Furthermore, moderators of these relations are likely to exist, particularly individual difference constructs such as goal orientation, for instance. It would not be wholly surprising to find that the types of goals an individual generally tends to pursue would interact with their efficacy levels in determining the activity on which they exert the greatest effort. Regardless, it is hoped that future work will begin to eliminate some of the confusion associated with the present study concerning the role of efficacy in the self-regulatory process over repeated attempts at multiple goals.

The somewhat consistent finding that rate of progress predicted task-related effort (not just the amount of effort, but also the task on which individuals exert greater effort) provides a fairly promising direction for future research. Future investigations should address the pathways through which research theorists have proposed that rate of progress affects performance. In other words, greater empirical evidence is needed to determine whether a high rate of progress truly results in positive affect and greater expectancies when someone works toward more than one task goal at a time. As previously stated with regard to additional findings in the present study, it is likely that this relation is influenced by moderating variables (e.g., expectancies, task

value) and is preceded by a number of meaningful antecedents. Identification of such variables would advance our understanding of self-regulation in situations where individuals strive for multiple task goals.

Future work investigating the ways in which the dependent variables (i.e., goal revision and exerted effort) relate to one another when individuals perform in a simultaneous, dual-task environment would be particularly interesting. More specifically, it would be worthwhile to more fully understand how individuals allocate effort on one task following various types of goal revision on another. Similarly, the ways in which individuals revise goals in light of effort exerted in previous trials would be of interest in this specific type of performance scenario.

Given the number of hypotheses that failed to receive support, the question could be raised concerning the extent to which the self-regulatory perspective helps us understand motivated behavior in a simultaneous, multiple-goal setting. Because self-regulation is primarily a framework through which we can attempt to understand motivated behavior as explained by theories such as SCT and CT, the self-regulatory perspective itself has not been diminished. Instead, what should be called into question are the existing theories and what they indicate goal-striving behavior should be like when individuals strive toward several goals at the same time. As mentioned earlier, the two theoretical perspectives drawn upon in the present study (SCT and CT) are not necessarily distinct theories; practically any motivated behavior can be explained equally well by both theories, yet different reasons for the observed behavior comprise these explanations. Perhaps a theoretical assimilation of the two theories is the biggest step toward making substantial progress in understanding the nature of motivated behavior in a simultaneous, multiple-goal environment.

Although the current study provided a valuable examination into the ways in which individuals self-regulate while working toward multiple task goals at the same time, additional research could continue to expand our knowledge in this area by investigating these relations in situations where individuals work toward more than two task goals. Given results from the current study suggesting that individuals may regulate their goal-directed behavior differently when simultaneously pursuing two task goals versus a single goal, it may be the case that self-regulation differs further when individuals simultaneously strive toward an even greater number of goals. In the same way that this study builds upon the knowledge gained from single-goal studies, research that examines situations in which individuals simultaneously strive toward three

or more goals would allow us to further increase our understanding of goal-oriented, self-regulatory processes.

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Tables

Table 1. *Descriptive Statistics for all Variables (Aggregated Within-Subjects)*

	Mean	SD	Variance	Range	Min	Max
Goal <sup>FS</sup>	6.16	1.56	2.43	7.60	2.60	10.20
Goal <sup>MR</sup>	7.29	2.00	4.03	11.6	2.60	14.20
Perform <sup>FS</sup>	6.11	1.71	2.93	8.20	2.20	10.40
Perform <sup>MR</sup>	6.33	2.01	4.06	10.80	.80	11.60
GPD <sup>FS</sup>	1.11	.47	.23	4.78	.62	5.40
GPD <sup>MR</sup>	.97	.31	.09	3.10	.52	3.62
Revise <sup>FS</sup>	1.06	.26	.07	1.68	.72	2.40
Revise <sup>MR</sup>	.96	.27	.07	1.77	.63	2.40
Effort <sup>FS</sup>	61.60	16.58	274.86	89.20	27.20	116.40
Effort <sup>MR</sup>	37.09	10.60	112.26	65.20	6.20	71.40
Rate <sup>FS</sup>	-.08	1.07	1.14	6.75	-4.00	2.75
Rate <sup>MR</sup>	.23	1.52	2.31	10.00	-3.00	7.00
SE-A <sup>FS</sup>	277.65	103.30	10,671.08	813.00	7.00	820.00
SE-A <sup>MR</sup>	339.90	116.11	13,482.55	713.00	105.00	818.00
SE-B <sup>FS</sup>	35.63	4.96	24.63	29.80	19.20	49.00
SE-B <sup>MR</sup>	36.05	4.96	24.60	29.00	21.00	50.00
Stable <sup>FS</sup>	13.24	3.75	14.08	24.00	3.00	27.00
Stable <sup>MR</sup>	13.22	3.75	14.09	24.00	3.00	27.00

Table 1 continued

	Mean	SD	Variance	Range	Min	Max
Control <sup>FS</sup>	15.54	3.71	13.75	24.00	3.00	27.00
Control <sup>MR</sup>	15.44	3.71	13.74	24.00	3.00	27.00
Expect <sup>FS</sup>	83.31	12.48	155.67	58.60	41.40	100.00
Expect <sup>MR</sup>	83.51	12.64	159.66	60.00	40.00	100.00
Intrst <sup>FS</sup>	11.12	4.80	23.06	18.00	3.00	21.00
Intrst <sup>MR</sup>	10.33	4.93	24.28	18.00	3.00	21.00
Switch	2.13	.92	.84	5.40	1.00	6.40

*Note.*  $N = 156$  for all variables. <sup>FS</sup> = film-scheduling task. <sup>MR</sup> = media-request task. Perform = performance. GPD = goal-performance discrepancy. Revise = goal revision. Rate = rate of progress. SE-A = self-efficacy measure A (based on Lee & Bobko, 1994). SE-B = self-efficacy measure B (based on Phillips et al., 1996). Stable = stability attribution. Control = controllability attribution. Expect = expectancy. Interest = task interest. Switch = number of switches between tasks throughout entire study.



Table 2. Intercorrelations Between Variables (Aggregated Within-Subjects)

Variable	1	2	3	4	5	6	7
1. Goal <sup>FS</sup>							
2. Goal <sup>MR</sup>	.52**						
3. Perform <sup>FS</sup>	.70**	.25**					
4. Perform <sup>MR</sup>	.18*	.65**	.21**				
5. GPD <sup>FS</sup>	-.34**	-.39**	.25**	-.10			
6. GPD <sup>MR</sup>	-.37**	-.33**	.00	.28**	.69**		
7. Revise <sup>FS</sup>	-.68**	-.42**	-.34**	-.10	.55**	.55**	
8. Revise <sup>MR</sup>	-.34**	-.59**	-.12	-.34**	.50**	.46**	.64**
9. Effort <sup>FS</sup>	.44**	.06	.65**	-.05	.20*	-.06	-.19*
10. Effort <sup>MR</sup>	.19*	.64**	.19*	.94**	-.12	.25**	-.05
11. Rate <sup>FS</sup>	.49**	.60**	.22**	.33**	-.37**	-.27**	-.47**
12. Rate <sup>MR</sup>	.52**	.68**	.29**	.20*	-.20*	-.28**	-.38**
13. SE-A <sup>FS</sup>	.62**	.24**	.53**	.08	-.03	-.12	-.21**
14. SE-A <sup>MR</sup>	.30**	.65**	.16*	.51**	-.14	-.10	-.09
15. SE-B <sup>FS</sup>	.33**	.27**	.31**	.24**	-.09	-.06	-.15
16. SE-B <sup>MR</sup>	.27**	.31**	.27**	.34**	-.08	-.02	-.10
17. Stable <sup>FS</sup>	.02	.14	.15	.13	.08	.05	-.06
18. Stable <sup>MR</sup>	.02	.09	.13	.10	.07	.07	-.05
19. Control <sup>FS</sup>	-.14	-.16	-.02	.02	.12	.17*	.16
20. Control <sup>MR</sup>	-.16*	-.16*	-.08	.04	.11	.18*	.17*

Table 2 continued

Variable	1	2	3	4	5	6	7
21. Expect <sup>FS</sup>	.08	.07	.19*	.12	.05	.12	.03
22. Expect <sup>MR</sup>	-.02	.07	.08	.18*	.08	.15	.08
23. Intrst <sup>FS</sup>	.07	-.02	.07	.00	.05	.07	.06
24. Intrst <sup>MR</sup>	.04	.12	.05	.17	-.03	.01	-.02
25. Switch	-.12	-.26**	.01	-.19*	.30**	.30**	.18*

Table 2 continued

Variable	8	9	10	11	12	13	14
8. Revise <sup>MR</sup>							
9. Effort <sup>FS</sup>	.05						
10. Effort <sup>MR</sup>	.33**	-.03					
11. Rate <sup>FS</sup>	-.43**	.12	.31**				
12. Rate <sup>MR</sup>	-.34**	.14	.20*	.39**			
13. SE-A <sup>FS</sup>	.09	.32**	.08	.25**	.34**		
14. SE-A <sup>MR</sup>	-.14	.05	.48**	.36**	.44**	.58**	
15. SE-B <sup>FS</sup>	-.04	.20*	.23**	.12	.25**	.38**	.37**
16. SE-B <sup>MR</sup>	-.06	.16*	.31**	.12	.25**	.35**	.46**
17. Stable <sup>FS</sup>	-.14	.01	.13	.06	.13	-.02	-.01
18. Stable <sup>MR</sup>	.06	.03	.09	.06	.14	-.02	-.05
19. Control <sup>FS</sup>	.17*	.14	.07	-.04	-.17*	.05	-.03
20. Control <sup>MR</sup>	.18*	.12	.08	-.03	-.20*	-.01	-.05
21. Expect <sup>FS</sup>	.08	.09	.14	.15	.08	.35**	.31**
22. Expect <sup>MR</sup>	.06	.02	.15	.08	.05	.21**	.36**
23. Intrst <sup>FS</sup>	.17*	.13	.05	.09	.05	.18*	.13
24. Intrst <sup>MR</sup>	.01	.13	.19*	.15	.07	.06	.18*
25. Switch	.37**	.07	-.19*	-.15	-.07	.09	-.05

Table 2 continued

Variable	15	16	17	18	19	20	21
15. SE-B <sup>FS</sup>							
16. SE-B <sup>MR</sup>	.95**						
17. Stable <sup>FS</sup>	-.04	-.06					
18. Stable <sup>MR</sup>	-.04	-.08	.90**				
19. Control <sup>FS</sup>	.07	.07	-.02	-.11			
20. Control <sup>MR</sup>	.03	.04	-.07	-.08	.91**		
21. Expect <sup>FS</sup>	.30**	.28**	.14	.15	.07	.01	
22. Expect <sup>MR</sup>	.27**	.33**	.05	.06	.03	.03	.78**
23. Intrst <sup>FS</sup>	.05	.07	.04	.01	.22**	.13	.09
24. Intrst <sup>MR</sup>	-.00	.08	.09	.04	.23**	.20*	.03
25. Switch	-.02	-.03	-.01	.04	.13	.18*	.09

Table 2 continued

Variable	22	23	24	25
22. Expect <sup>MR</sup>				
23. Intrst <sup>FS</sup>	.07			
24. Intrst <sup>MR</sup>	.10	.73**		
25. Switch	.08	-.05	-.06	

*Note.*  $N = 156$  for all correlations. <sup>FS</sup> = film-scheduling task. <sup>MR</sup> = media-request task. Perform = performance. GPD = goal-performance discrepancy. Revise = goal revision. Rate = rate of progress. SE-A = self-efficacy measure A (based on Lee & Bobko, 1994). SE-B = self-efficacy measure B (based on Phillips et al., 1996). Stable = stability attribution. Control = controllability attribution. Expect = expectancy. Interest = task interest. Switch = number of switches between tasks throughout entire study. \* denotes significant correlation at  $\alpha = .05$  level. \*\* denotes significant correlation at  $\alpha = .01$  level.

Table 3. Regression Examining the Contribution of Goal-Performance Discrepancy (GPD) on the Prediction of Goal Revision

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.088	.088	.388
	2	GPD	-.508***	-.397***	.169	.081	60.501**
MR	1	Participant vectors	--	--	.095	.095	.425
	2	GPD	-.337***	-.192***	.118	.023	16.254***

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 4. Regression Examining the Moderating Influence of Stability Attributions on the Relation Between GPD (GPD) and Goal Revision

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.088	.088	.388
	2	GPD	-.506***	-.396***	.178	.090	33.976***
		Stability	.027**	.150**			
	3	GPD x Stability	-.030	-.360	.182	.005	3.528
MR	1	Participant vectors	--	--	.095	.095	.425
	2	GPD	-.337***	-.192***	.124	.029	10.259***
		Stability	.022*	.122*			
	3	GPD x Stability	-.023	-.220	.127	.003	1.848

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 5. Regression Examining the Moderating Influence of Controllability Attributions on the Relation Between GPD (GPD) and Goal Revision

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.088	.088	.388
	2	GPD	.008	.006	.177	.089	33.562***
		Controllability	.066***	.363***			
	3	GPD x Controllability	-.034***	-.548***	.191	.014	10.786***
MR	1	Participant vectors	--	--	.095	.095	.425
	2	GPD	.254	.144	.125	.029	10.418***
		Controllability	.062***	.335***			
	3	GPD x Controllability	-.039**	-.486**	.135	.010	7.064**

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.



*Table 6. Logistic Regression Examining the Ability of Goal-Performance Discrepancy (GPD) to Predict the Prioritized Task*

Step	Variable(s) entered	Logged Odds ( <i>b</i> )	Std. Error ( <i>b</i> )	Wald Statistic	Exp( <i>b</i> )	95% CI ( <i>b</i> ) Lower -- Upper
1	Participant vectors	--	--	--	--	--
2	GPD	-3.048	.392	60.507***	.047	.022 -- .102

*Note.*  $N = 642$ .  $\text{Exp}(b)$  = the exponentiated coefficient (odds ratio for dummy coded independent variables). 95% CI (*b*) = 95 % Confidence Interval for logged odds. \* denotes a statistic that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 7. Regression Examining the Contribution of Goal-Performance Discrepancy On Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.381	.381	2.478***
	2	GPD	3.916*	.099*	.386	.005	5.106*
MR	1	Participant vectors	--	--	.529	.529	4.521***
	2	GPD	10.096***	.346***	.604	.075	118.247***

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

*Table 8. Logistic Regression Examining the Ability of Self-Efficacy to Predict the Prioritized Task*

Measure	Step	Variable(s) entered	Logged Odds ( <i>b</i> )	Std. Error ( <i>b</i> )	Wald Statistic	Exp( <i>b</i> )	95% CI ( <i>b</i> ) Lower -- Upper
A	1	Participant vectors	--	--	--	--	--
	2	Self- efficacy	-1.806	.501	13.004***	.164	.062 -- .438
B	1	Participant vectors	--	--	--	--	--
	2	Self- efficacy	.038	.010	.010	1.038	.497 – 2.171

*Note.*  $N = 564$  for efficacy measure A.  $N = 512$  for efficacy measure B. Measure = self-efficacy measure used. Exp(*b*) = the exponentiated coefficient (odds ratio for dummy coded independent variables). 95% CI (*b*) = 95 % Confidence Interval for logged odds. \* denotes a statistic that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 9. Regression Examining the Contribution of Self-Efficacy (Measure A) on Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.381	.381	2.478***
	2	Self-efficacy	.080***	.399***	.445	.064	71.488***
MR	1	Participant vectors	--	--	.529	.529	4.521***
	2	Self-efficacy	.005	.054	.530	.001	1.666

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 10. Regression Examining the Contribution of Self-Efficacy (Measure B) on Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.381	.381	2.478***
	2	Self-efficacy	-1.135***	-.247***	.398	.017	17.859***
MR	1	Participant vectors	--	--	.529	.529	4.521***
	2	Self-efficacy	.063	.026	.529	.000	.268

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 11. Logistic Regression Examining the Moderating Influence of Self-Efficacy on the Relation Between Goal-Performance Discrepancy (GPD) and Task Prioritization

Measure	Step	Variable(s) entered	Logged Odds (b)	Std. Error (b)	Wald Statistic	Exp(b)	95% CI (b) Lower -- Upper
A	1	Participant vectors	--	--	--	--	--
	2	GPD	5.415	1.501	13.015***	224.64	.0 – 224.64
		Self- efficacy	-.985	.917	1.153	.374	.283 -- .374
	3	GPD x Self- efficacy	-2.471	1.562	2.502	.085	.114 – .085
B	1	Participant vectors	--	--	--	--	--
	2	GPD	2.952	.830	12.662***	19.152	3.77 - 97.38
		Self- efficacy	.098	.717	.019	1.102	.271 – 4.492
		GPD x Self- efficacy	.500	1.038	.232	1.649	.216 – 12.61

Note.  $N = 483$  for efficacy measure A.  $N = 420$  for efficacy measure B. Measure = self-efficacy measure used.  $\text{Exp}(b)$  = the exponentiated coefficient (odds ratio for dummy coded independent variables).  $95\% \text{ CI}(b)$  =  $95\%$  Confidence Interval for logged odds. \* denotes a statistic that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 12. Regression Examining the Moderating Influence of Self-Efficacy (Measure A) on Relation Between Goal-Performance Discrepancy (GPD) and Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.381	.381	2.478
	2	GPD	5.323*	.135*	.470	.089	52.279***
		Self-efficacy	.079***	.392***			
	3	GPD x Self- efficacy	.019*	.160*	.474	.004	4.460*
MR	1	Participant vectors	--	--	.529	.529	4.521
	2	GPD	2.817	.097	.628	.099	82.687
		Self-efficacy	.003	.036			
	3	GPD x Self- efficacy	.035***	.472***	.657	.029	51.985***

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 13. Regression Examining the Moderating Influence of Self-Efficacy (Measure B) on Relation Between Goal-Performance Discrepancy (GPD) and Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.381	.381	2.478***
	2	GPD	-14.978	-.379	.405	.024	12.454***
		Self-efficacy	-1.758***	-.383***			
3	GPD x Self- efficacy	.561*	.502*	.409	.004	4.323*	
MR	1	Participant vectors	--	--	.529	.529	4.521***
	2	GPD	-11.490*	-.394*	.604	.075	59.184***
		Self-efficacy	-.514***	-.210***			
3	GPD x Self- efficacy	.633***	.783***	.614	.010	15.642***	

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.



Table 14. Logistic Regression Examining the Ability of Rate of Progress to Predict the Prioritized Task

Step	Variable(s) entered	Logged Odds ( <i>b</i> )	Std. Error ( <i>b</i> )	Wald Statistic	Exp( <i>b</i> )	95% CI ( <i>b</i> ) Lower -- Upper
1	Participant vectors	--	--	--	--	--
2	Rate of progress	1.571	.388	16.421***	4.809	2.250 – 10.280

Note.  $N = 535$ . Exp(*b*) = the exponentiated coefficient (odds ratio for dummy coded independent variables). 95% CI (*b*) = 95 % Confidence Interval for logged odds. \* denotes a statistic that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

Table 15. Regression Examining the Contribution of Rate of Progress on Task-Related Effort

Task	Step	Variable(s) entered	<i>b</i>	$\beta$	$R^2$	$\Delta R^2$	$F_{change}$
FS	1	Participant vectors	--	--	.454	.454	2.507***
	2	Rate of progress	.082	.009	.454	.000	.058
MR	1	Participant vectors	--	--	.586	.586	4.276***
	2	Rate of progress	.298**	.085**	.592	.006	6.998**

Note.  $N = 780$ . FS = film-scheduling task. MR = media-request task.  $b$  = the unstandardized regression coefficient for the variable of interest.  $\beta$  = the standardized regression coefficient for the variable of interest.  $R^2$  = the proportion of variance in the dependent variable accounted for by all predictors in the regression equation.  $\Delta R^2$  = the incremental variance accounted for by the predictor variables entered at each step.  $F_{change}$  = the F ratio to assess the significance of the incremental variance accounted for. \* denotes a statistics that is significant at the .05 level. \*\* denotes a statistic that is significant at the .01 level. \*\*\* denotes a statistic that is significant at the .001 level.

## Figures

*Figure 1. Classification of existing multiple goal studies.*

Classification Criteria	Study	
Multiple, distinct tasks	Kernan & Lord (1990)	Computerized requisition task and invoice processing task
	Phillips et al. (1996)	Four skills tests (easy verbal, easy math, difficult verbal, difficult math)
	Radosevich (1999)	Current college courses served as “experimental tasks”
	Donovan & Williams (2001)	Proximal and distal goals for track events
Simultaneous performance goals	Hoy (1986)	Quantity and quality goals during each performance episode
	Kernan & Lord (1990)	Requisition task and invoice-processing task goals for single performance episode
	Phillips et al. (1996)	Participants instructed to work on all four skills tests during performance episode
	Hoy (1986)	Participants chose degree of emphasis between quantity and quality goals
Inter-goal switching	Kernan & Lord (1990)	Participants worked on requisition or invoice-processing task as they saw fit
	Phillips et al. (1996)	Participants switched among four skills tests at their discretion
	Radosevich (1999)	Participants focused on individual courses at their discretion throughout semester

Figure 2. Hypothesized model of the current study.

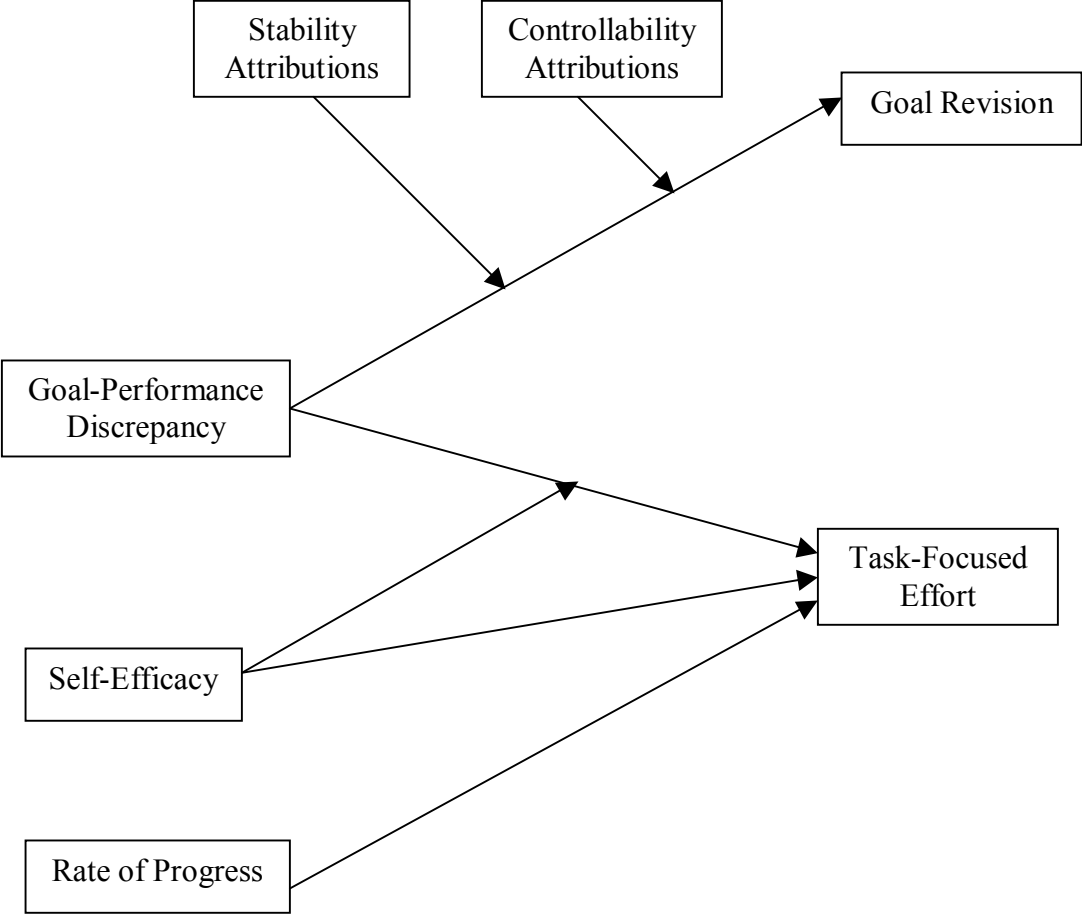


Figure 3. *Illustration of relation between operationalizations of goal performance discrepancy and goal revision, indicating the general nature of results from tests of hypothesis one.*

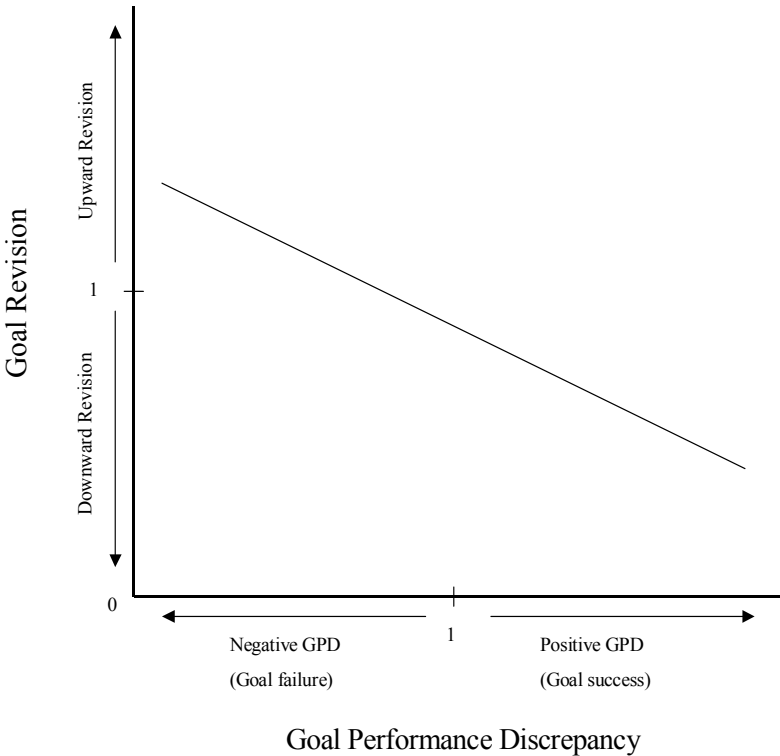


Figure 4. Moderating role of controllability attributions on the relation between GPD and goal revision within the film-scheduling task.

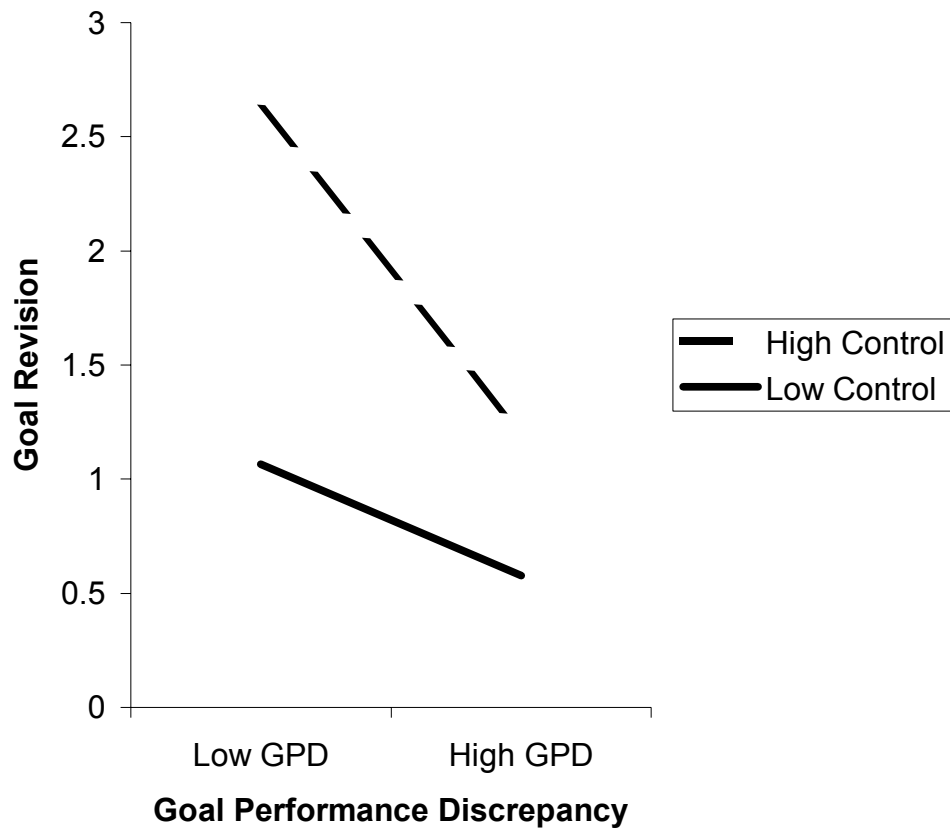


Figure 5. Moderating role of controllability attributions on the relation between GPD and goal revision within the media-request task.

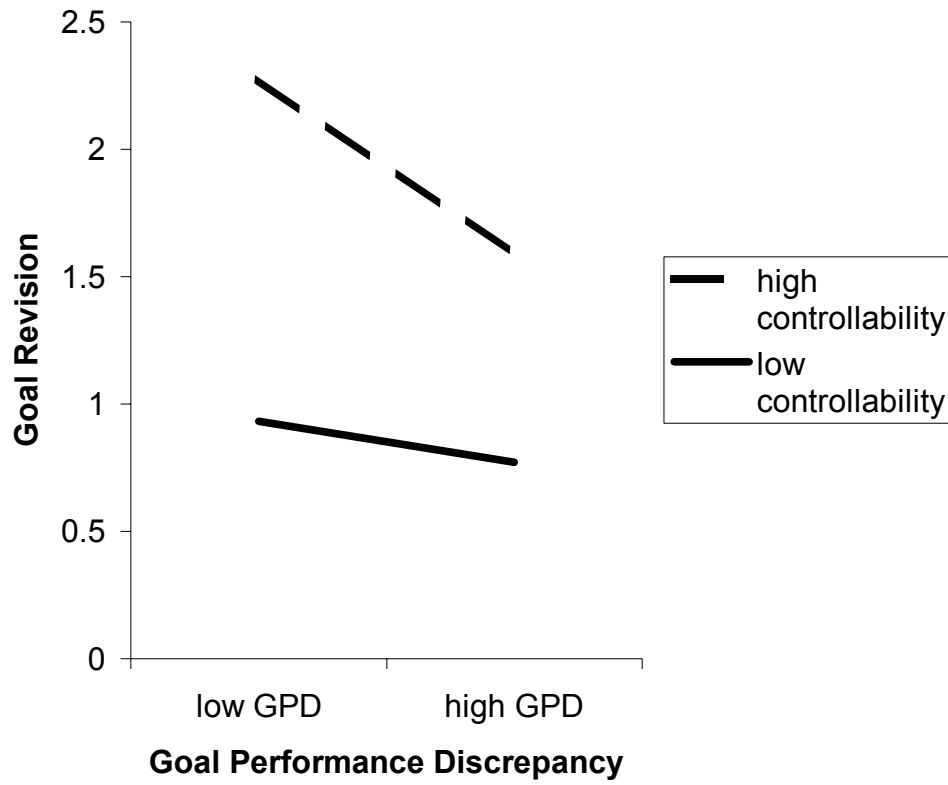


Figure 6. Moderating role of self-efficacy (measure A) on the relation between GPD and task-related effort on the film-scheduling task.

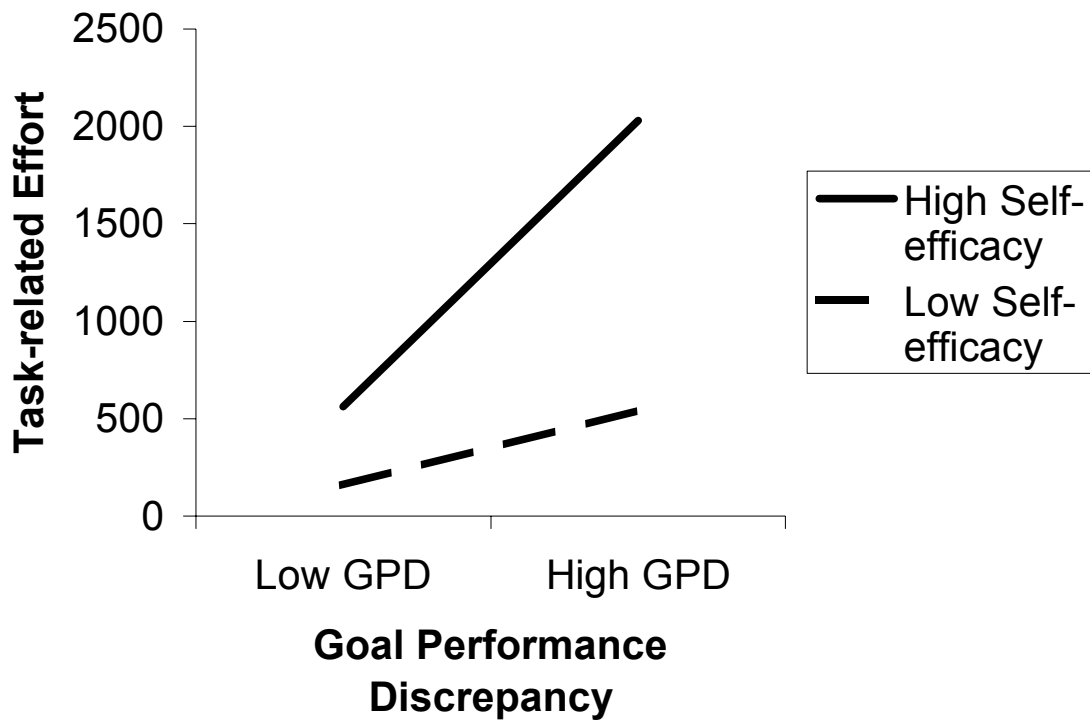




Figure 7. Moderating role of self-efficacy (measure B) on the relation between GPD and task-related effort on the film-scheduling task.

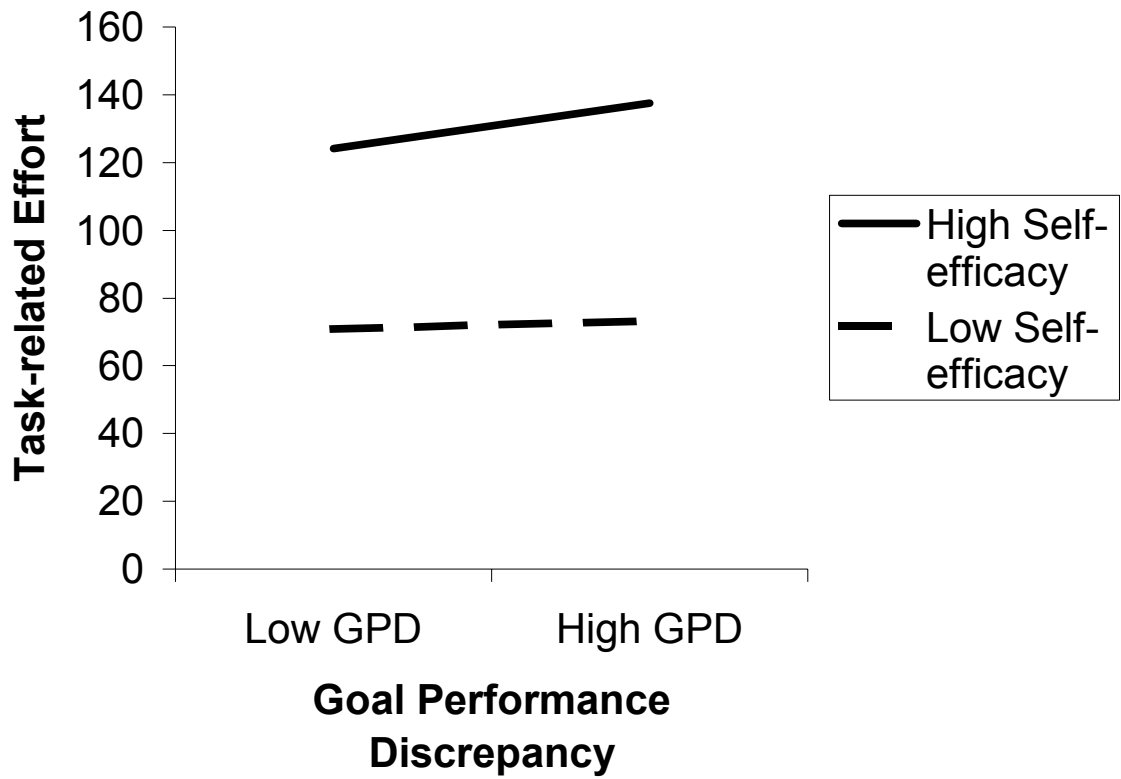


Figure 8. Moderating role of self-efficacy (measure A) on the relation between GPD and task-related effort on the media-request task.

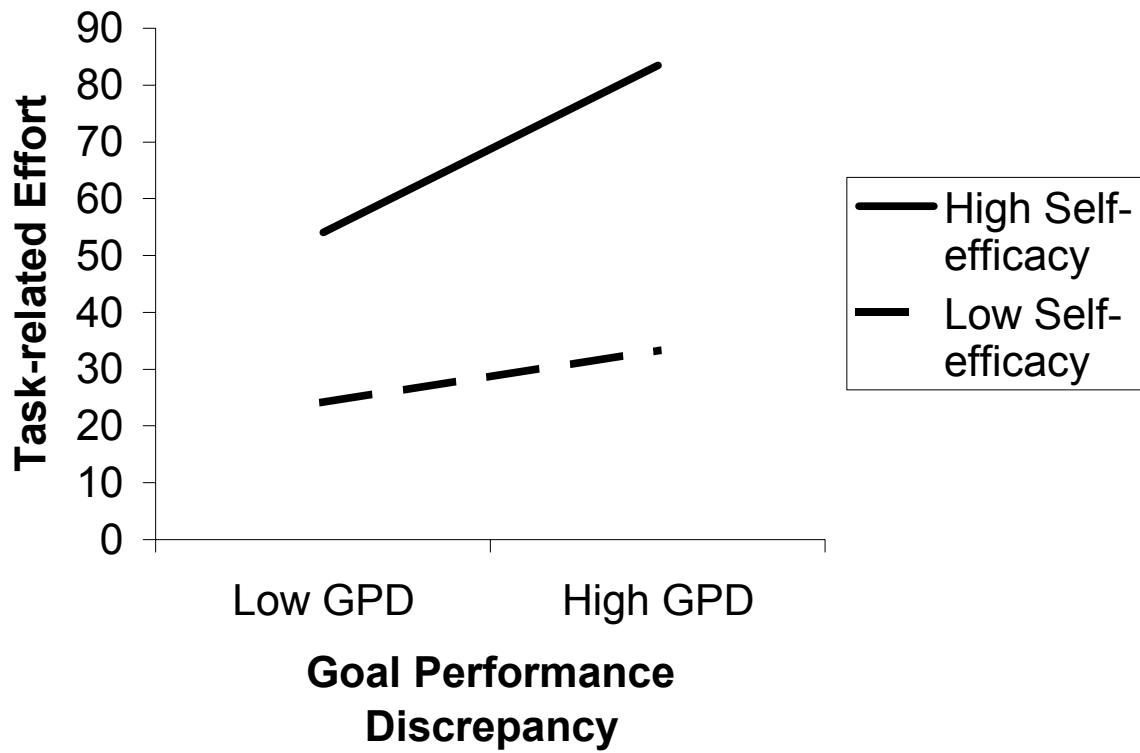


Figure 9. Moderating role of self-efficacy (measure B) on the relation between GPD and task-related effort on the media-request task.

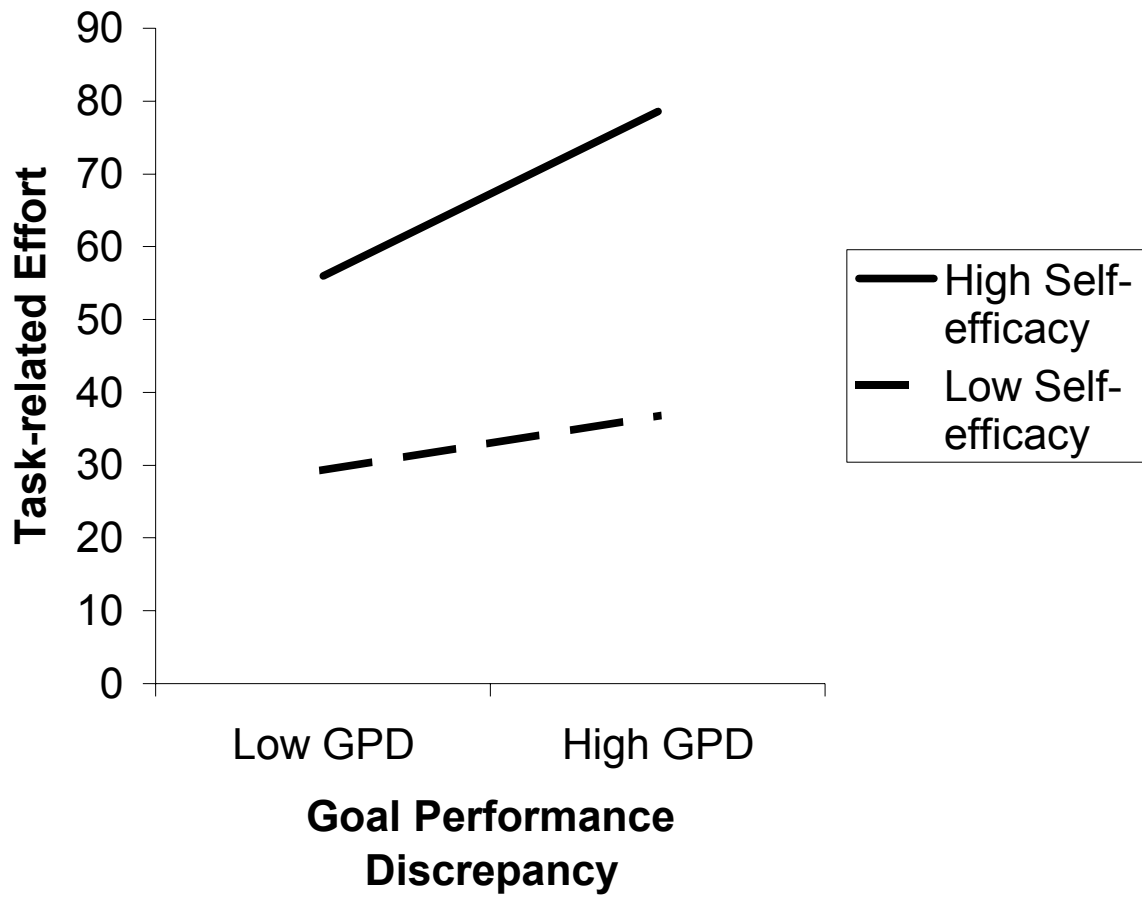


Figure 10. Moderating role of controllability attributions on the relation between GPD and goal revision within the film-scheduling task, omitting trials 4 and 5 from the analyses.

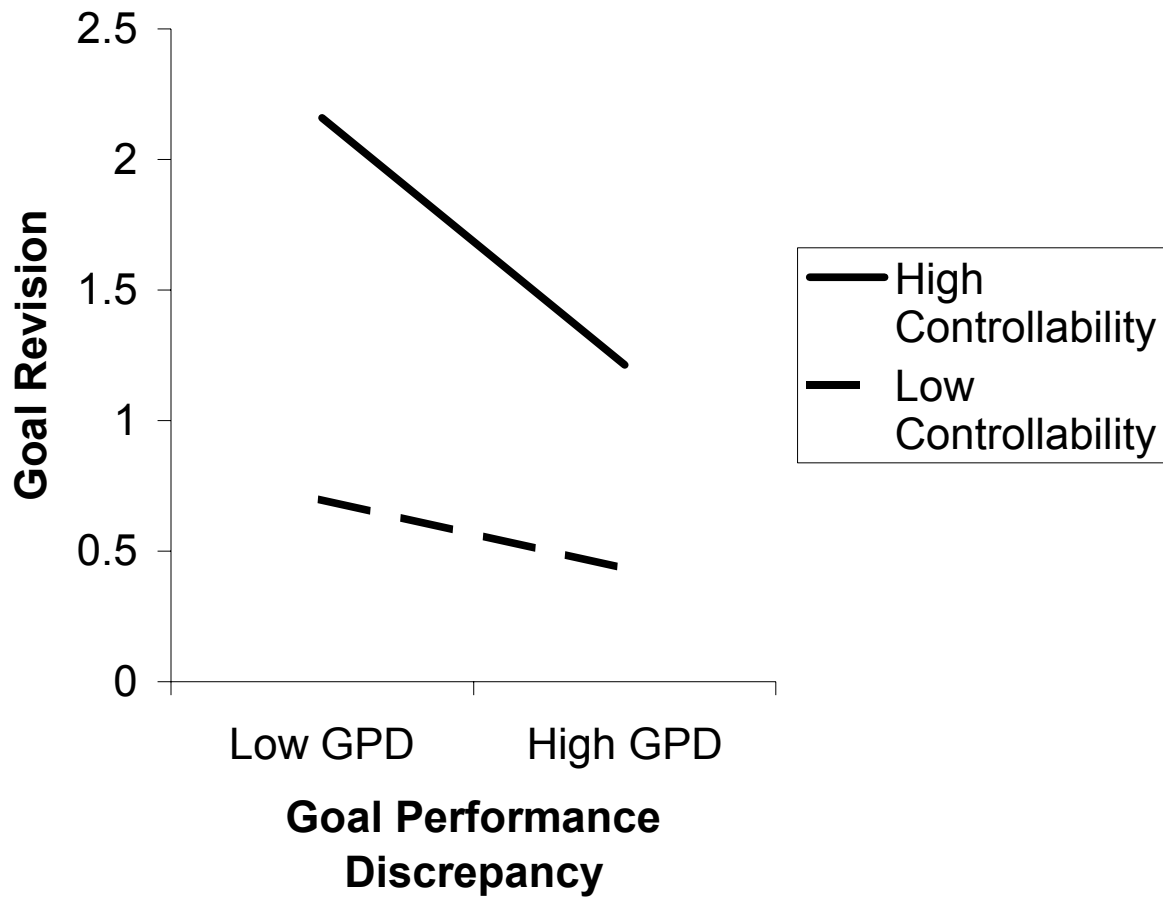


Figure 11. Moderating role of self-efficacy (measure A) on the relation between GPD and task-related effort within the film-scheduling task, omitting trials 4 and 5 from the analysis.

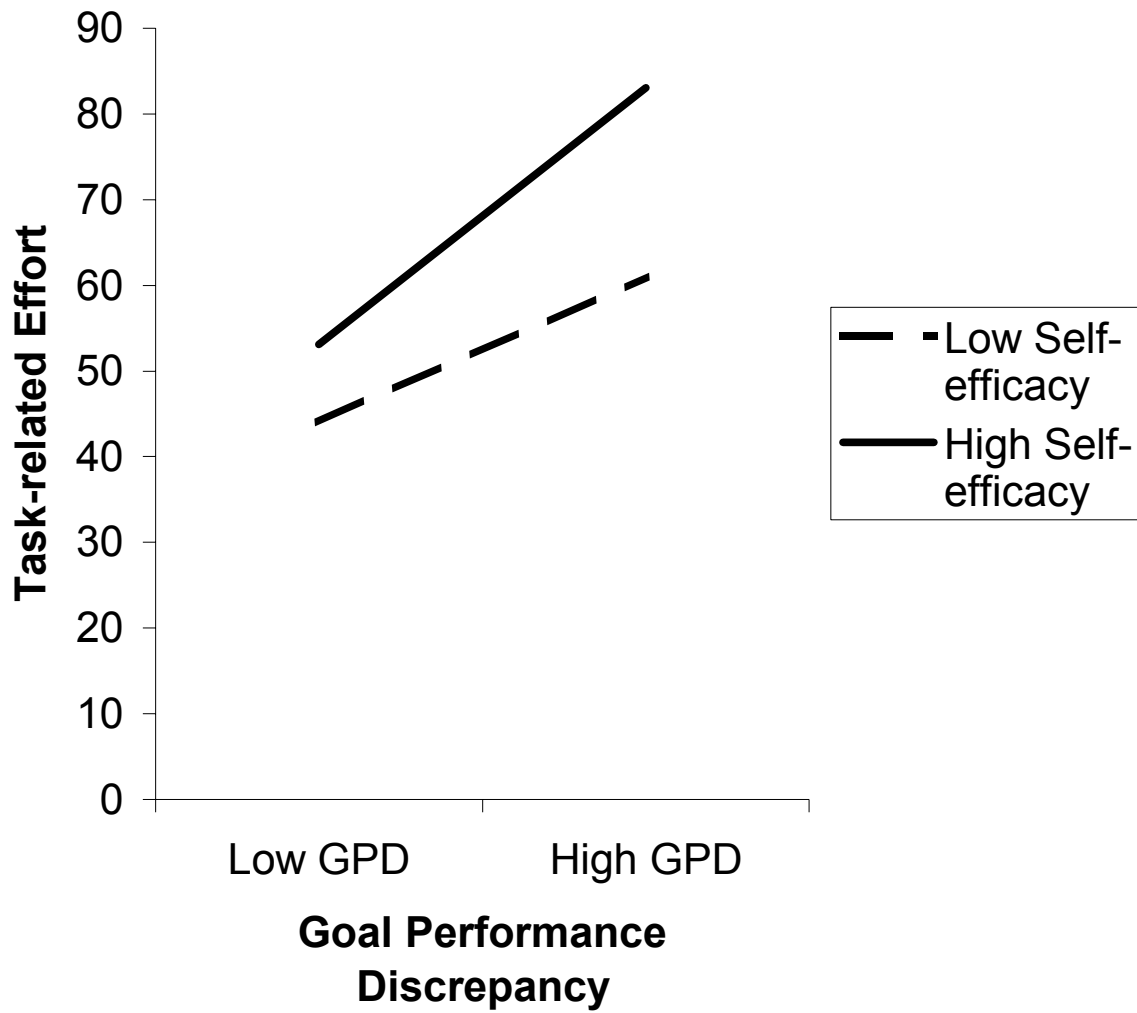


Figure 12. Moderating role of self-efficacy (measure A) on the relation between GPD and task-related effort on the media-request task, omitting trials 4 and 5 from the analysis.

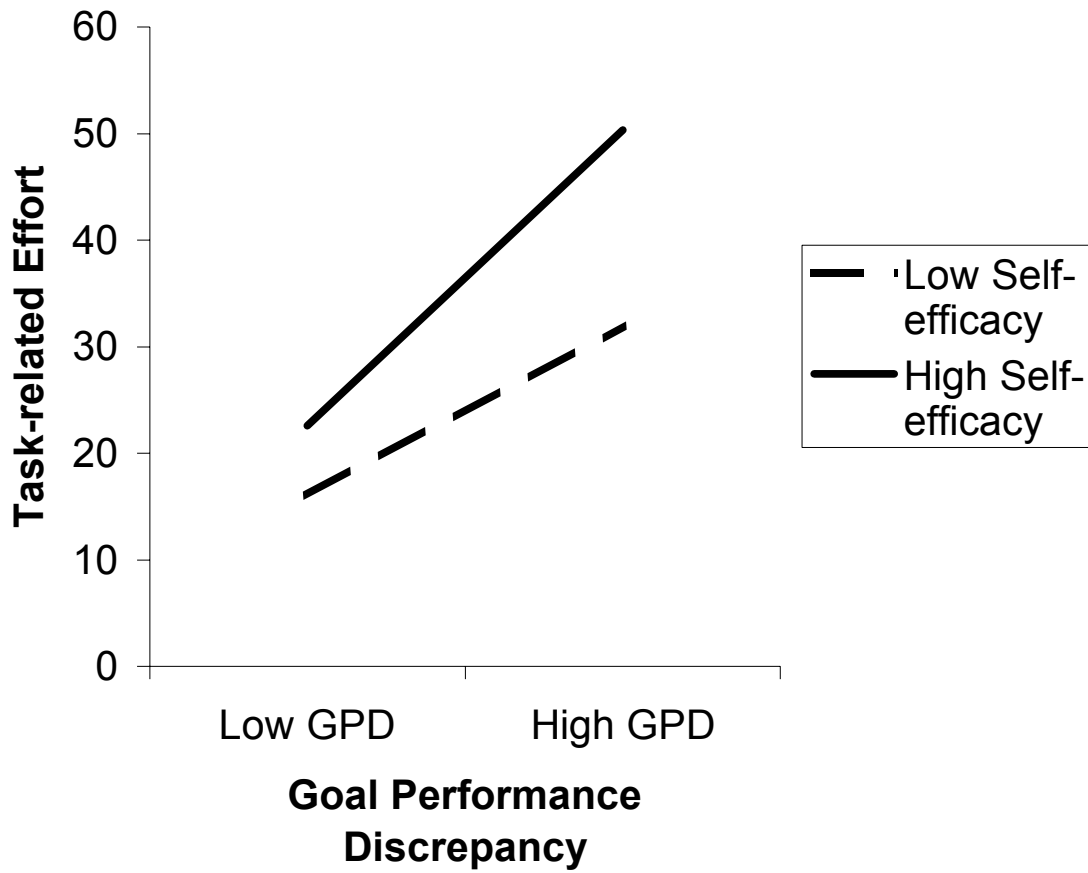


Figure 13. Moderating role of self-efficacy (measure B) on the relation between GPD and task-related effort on the media-request task, omitting trials 4 and 5 from the analysis.

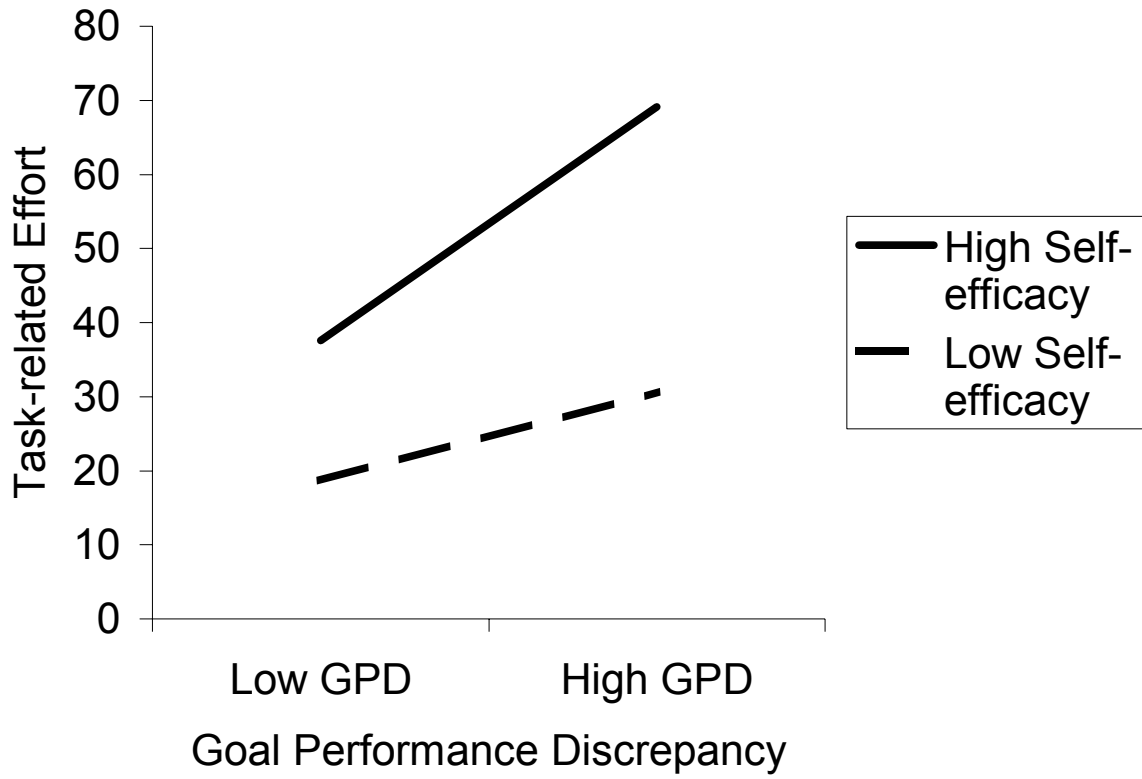
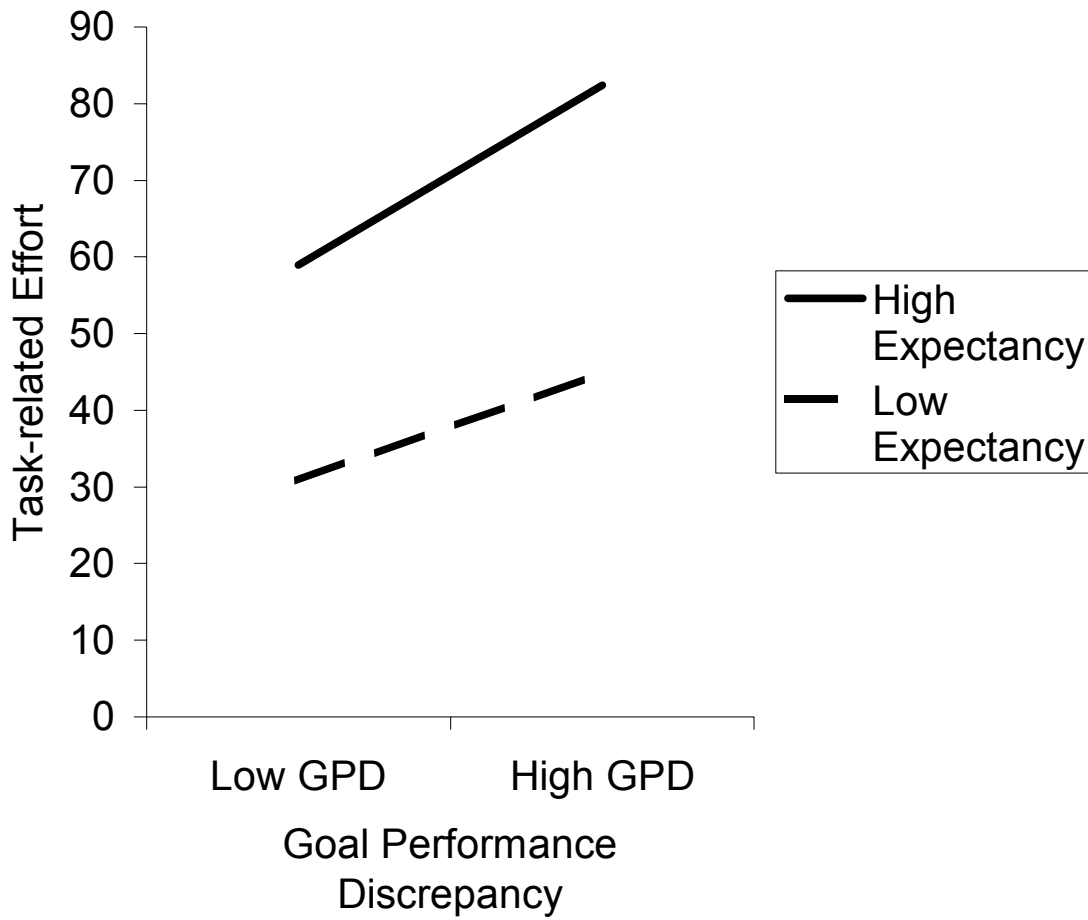


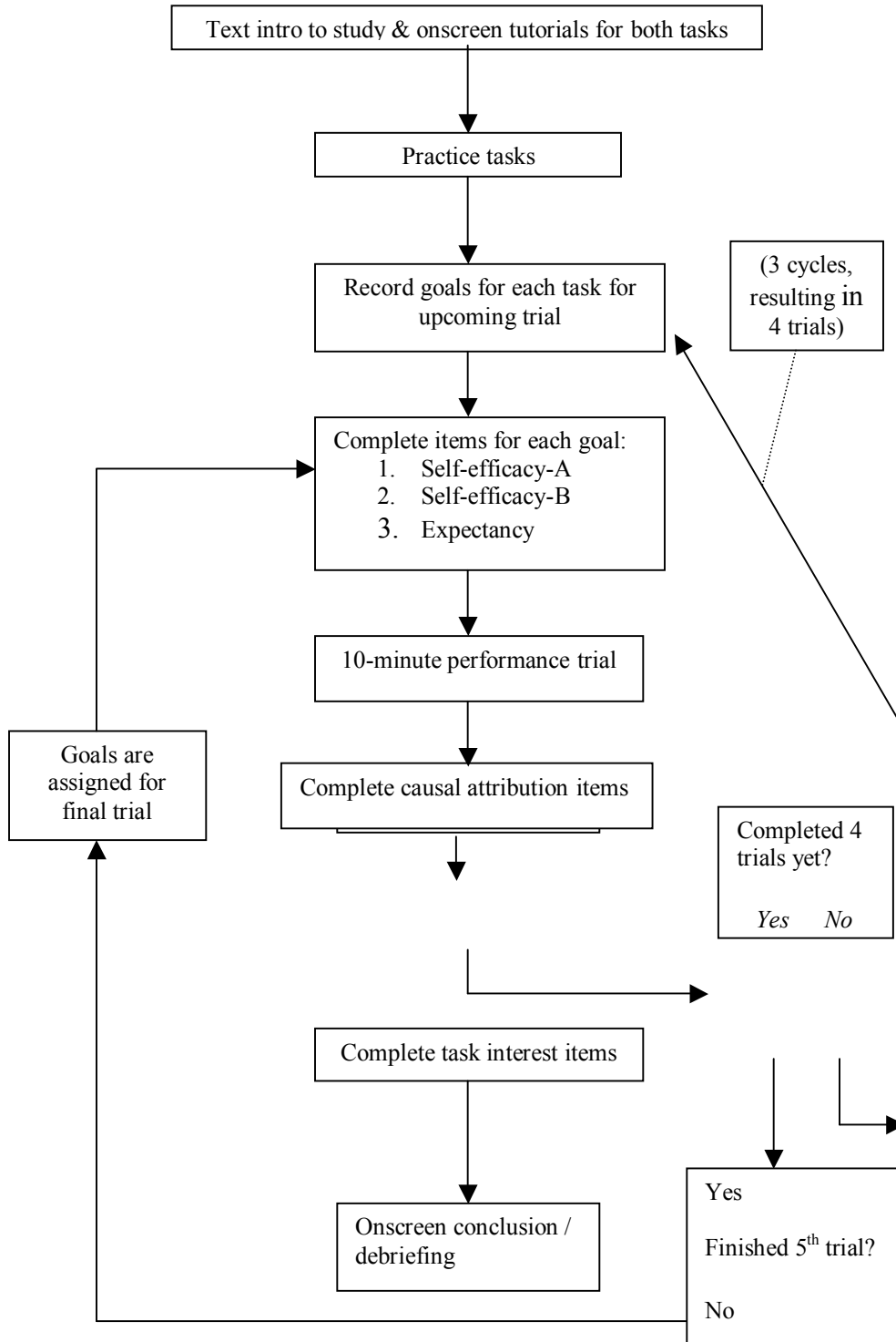
Figure 14. Moderating role of expectancy in goal attainment on the relation between GPD and task-related effort within the media-request task.





Appendices

Appendix A -- Procedural Flowchart



## Appendix B -- Self-efficacy Measure A

Please answer the following two questions concerning the film-scheduling task for the upcoming trial.

- 1) By indicating either 'yes' or 'no' for each number listed below, will you be able to correctly schedule:

At least 2 weeks of films?	Yes	No	At least 12 weeks of films?	Yes	No
At least 4 weeks of films?	Yes	No	At least 14 weeks of films?	Yes	No
At least 6 weeks of films?	Yes	No	At least 16 weeks of films?	Yes	No
At least 8 weeks of films?	Yes	No	At least 18 weeks of films?	Yes	No
At least 10 weeks of films?	Yes	No	At least 20 weeks of films?	Yes	No

- 2) On a scale from 0 –100 (completely unconfident to completely confident), how confident are you that you will correctly schedule the following week's worth of films?

At least 2 weeks of films?	0 – 100	At least 12 weeks of films?	0 – 100
At least 4 weeks of films?	0 – 100	At least 14 weeks of films?	0 – 100
At least 6 weeks of films?	0 – 100	At least 16 weeks of films?	0 – 100
At least 8 weeks of films?	0 – 100	At least 18 weeks of films?	0 – 100
At least 10 weeks of films?	0 – 100	At least 20 weeks of films?	0 – 100

*Note.* The version efficacy measure A used within the media-request task was exactly the same, except 'electronic requests' was used in place of 'weeks of films' in all cases. The same performance levels were used on both versions of efficacy measure A (i.e., 2 -- 20).

### Appendix C -- Self-efficacy Measure B

Please think about your upcoming performance trial on the film-scheduling task, and indicate your agreement with each of the following statements.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

1. I feel confident in my ability to perform well on the upcoming trial.
2. I think that I can eventually schedule a satisfactory number of films correctly.
3. I am not confident that I will do as well on this trial as I would like.
4. I don't feel that I am capable of performing as well on this trial as other participants.
5. Compared to other people, I am a fast learner for these types of tasks.
6. I am not sure I can ever do well on this trial, no matter how much I practice.
7. I would have to practice for a long time to be able to do well on this trial.
8. I think that my performance will be adequate on this trial.
9. I'm sure I can learn the techniques required for the next trial in a short period of time.
10. On average, other individuals are probably not as capable of doing as well on this activity as I am.

*Note.* Precisely the same questions and answer format were used for this measure within the media-request task, except for question two which replaced 'schedule a satisfactory number of films' with 'process a satisfactory number of electronic requests.'

Appendix D -- The Causal Dimension Scale (Russell, 1982)

Think about the reason(s) for your outcome in your most recent competition. The items below concern your impressions or opinions of this cause or causes of your outcome. Circle one number for each of the following scales.

1. Is the cause(s):

Controllable by you or by other people	9	8	7	6	5	4	3	2	1	Uncontrollable by you or by other people
--	---	---	---	---	---	---	---	---	---	--

2. Is the cause(s) something that is:

Permanent	9	8	7	6	5	4	3	2	1	Temporary
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3. Is the cause(s) something:

Intended by you or by other people	9	8	7	6	5	4	3	2	1	Unintended by you or by other people
--	---	---	---	---	---	---	---	---	---	--

4. Is the cause(s) something that is:

Variable over time	9	8	7	6	5	4	3	2	1	Stable over time
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5. Is the cause(s) something that is

Changeable	9	8	7	6	5	4	3	2	1	Unchanging
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## Curriculum Vita

### **Trevor Graydon Byrd**

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**Education**     M.S., Industrial/Organizational Psychology, received May 2003  
*Virginia Polytechnic Institute and State University*  
Blacksburg, VA 24061  
GPA 3.88 / 4.00

B.A., Psychology, and B.A., English, received May 1998  
*North Carolina State University*  
Raleigh, NC 27627  
Magna Cum Laude

**Experience**     Advanced Social Psychology Laboratory  
*Virginia Polytechnic Institute and State University*  
Graduate Instructor; 8/02 – 5/03

- Developed syllabus, course materials, and assignments
- Coordinated multiple research projects across four sections
- Provided writing workshops, including peer reviews
- Guided introduction to and use of statistical software
- Created online surveys to allow for data collection
- Average overall teacher rating: 4.0 / 4.0

Child Health Investment Partnership of Roanoke Valley  
*Virginia Polytechnic Institute and State University*  
Research Assistant; 8/02 – present

- Reviewed and organized nearly 200 patient health files
- Designed database and coded data from health files
- Will analyze data and present report to primary researchers

Psychology Undergraduate Information Center  
*Virginia Polytechnic Institute and State University*  
Graduate Assistant; 8/00 – 8/03

- Advised undergraduate psychology majors in the areas of course registration, graduation requirements, and graduate school/career options
- Oriented approximately 100 incoming freshmen per year to departmental and college curriculum requirements
- Assisted in coordinating the psychology department's annual graduation ceremony

### Introductory Psychology

*Virginia Polytechnic Institute and State University*

Graduate Teaching Assistant; 8/99 – 5/00

- Taught five sections of a one-hour lab (nearly 160 students)
- Assigned and graded weekly quizzes/essays
- Served as teaching assistant for faculty lecture instructors
- Average overall teacher rating: 3.7 / 4.0

### Ergonomics Research Lab

*North Carolina State University*

Undergraduate Research Assistant; 1/98 – 5/99

- Conducted research sessions for a study investigating the readability of over-the-counter medication labels
- Scored, entered, and assisted in analyzing data
- Assisted in the preparation of a conference paper and two journal submissions

### **Works in Progress**

Donovan, J. J., *Byrd, T. G.*, & Meacham, K. Individual Differences in Action State Orientation and Goal-directed, Self-regulatory Behavior.

*Byrd, T. G.* The Action-Control Scale: An Item-Level Analysis.

*Byrd, T. G.* Job Stress and Service Behavior: A Relation Moderated by 'Control' Constructs?

Donovan, J. J., & *Byrd, T. G.* The Effects of Goal Commitment on the Goal-Difficulty Performance Relationship: Clearing Up the Confusion.

### **Presentations**

Hauenstein, N. M. A., Bess, T. L., *Byrd, T. G.*, Swartz, D. E., & Wagner, T. A. (2001, April). Combining Predictor and Criterion Strategies to Eliminate Adverse Impact. Paper presented at the annual meeting of the Society for Industrial/Organizational Psychology, San Diego, CA.

### **Affiliations**

Society for Industrial and Organizational Psychology- 1997

American Psychological Association- 1997

Center for the Advancement of Research Methods and Analyses

Psi Chi National Honor Society in Psychology

Golden Key National Honor Society