

Construct Deficiency in Avoidance Motivation:
Development and Validation of a Scale Measuring Vigilance

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(ABSTRACT: ACADEMIC)

Two concerns dominate speculation about the lack of progress in motivational disposition research. First, truly unique dispositional constructs have not been identified since wide acceptance of the approach / avoidance distinction. Second, research has largely neglected to account for context in models of motivated behavior. Effective avoidance has systematically been unassessed in motivation research. Social cognitive theory was used to define an effective avoidance motivational trait, vigilance, as an antecedent to effective regulatory behaviors that are avoidant in nature and/or strategy. Two studies were conducted: First, development and psychometric evaluation of a scale measuring vigilance within the existing motivational trait framework (Heggestad & Kanfer, 2000). Exploratory and confirmatory analyses provided initial validity evidence for the vigilance construct; composed of diligence and error-detection facets. Convergent – discriminant analysis revealed that vigilance is significantly related to approach and avoidance motivational constructs identifying two possible sources of contamination in self-report measures of motivational traits. Measurement items may be contaminated with implied outcomes and measurement items may be contaminated with generalized self-efficacy. In the second study, a within-subjects experiment tested the predictive validity of the vigilance measurement scale for task-specific self-efficacy and performance on a task that rewards avoidance-oriented strategies. Vigilance predicted prevention task-specific self-efficacy ($\beta = .29$) in one of two experimental conditions. The validation study also offered construct validity evidence for the vigilance construct. Implications and future directions are discussed.

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(ABSTRACT: GENERAL AUDIENCE)

Motivation is defined as the force that energizes, directs, and maintains behavior. Researchers in the field of motivation continuously strive to understand individual differences in motivation levels (e.g., personality traits) and how those individual differences are related to task performance. Current consensus is that individuals differ on their levels of approach-oriented motivation (the motive to approach success) and/or avoidance-oriented motivation (the motive to avoid failure). Researchers tend to treat approach-oriented motivation as “good” and avoidance-oriented motivation as “bad”. The current study argues that, in a variety of contexts, avoidance-oriented motivation is actually good and that it leads to enhanced task performance. Thus, effective aspects of avoidance motivation were identified and used to define a new individual difference trait construct termed “vigilance”. Vigilance is defined as a predisposition for maintaining alertness, meticulousness, fastidiousness, and being heedful of overt warnings or obscure warning signs. Highly vigilant individuals are more likely to engage in careful planning, be good at error detection, and engage in safety-related behaviors. Results of this two-part study indicate that vigilance is a unique motivational trait construct and that it may be related to enhanced performance for some tasks. To the extent that vigilance is a valid motivational trait, it can be used to predict individual’s performance in on various tasks and help ensure that people are entered into jobs that they are likely to excel in. However, support for vigilance was mixed in these studies and further research is required.

Dedication

I would like to dedicate this dissertation to my entire family. To the best of my knowledge, this is the first Ph.D. for a Bateman or a Bailey and I owe all of my success to the hard work of those who came before me. Especially, I'd like to dedicate this to my Aunt Karen. You were a shining example of perseverance and I would have loved to celebrate this moment with you. I will always miss your laugh.

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Introduction

Motivation, generally defined as the force that energizes, directs, and maintains behavior, is perhaps the most critical non-ability determinant of task performance. Almost universally accepted in motivation research, an individual's establishment of goals/standards for behavior and the self-regulatory processes by which they pursue them are the critical components of motivated action (e.g., goal-setting, monitoring, feedback reactions, discrepancy-reduction, etc.). Researchers also agree that stable dispositions, at least in part, determine individual differences in goal establishment levels and goal-pursuit processes, otherwise known as self-regulation. Given the ubiquitous support for goal theory and self-regulation, it is no surprise that a large number of theories have attempted to describe the dispositional constructs that cohesively account for individual differences in motivation processes and regulatory behavior (for review see Kanfer, 1990; Latham, 2007; Pinder, 2008).

Research continues to yield significant theoretical advances and empirical support for the role of goals and self-regulation in models of motivated behavior. Yet, research focused on motivational dispositions is not progressing in kind. The most significant advancement in trait motivation theory derives from the work of Murray (1938) and subsequent research by McClelland, Atkinson, and colleagues' on the achievement motive. From this foundation, research has supported distinct approach and avoidance motives, identified antecedents of achievement goal types (e.g., theory of intelligence & locus of control), and differentiated between learning and performance goals (for review see Deshon & Gillespie, 2005). Virtually all contemporary theories of motivational traits and/or chronic orientations use the achievement motive paradigm to orient person constructs within the approach and avoidance domains (e.g., goal orientation-Dweck, 1986; achievement goals-Elliot & Church, 1997; BIS/BAS-Gray, 1991;

Motivational Traits and Skills-Kanfer & Heggstad, 1997; chronic regulatory focus-Higgins, 1997).

After discriminating between approach and avoidance motives, theoretical advances in dispositional motivation have largely stagnated. Constructs used in contemporary research (e.g., goal orientations, achievement goals, and motivational traits) bear striking resemblance to constructs described by Murray in 1938. Meanwhile, empirical support for the predictive power of motivational dispositions continues to be inconsistent and/or weak. Theorists continue to argue that approach *and avoidance* dispositions determine goal-directed self-regulatory behaviors but only approach-oriented person constructs that are characterized by mastery (e.g., learning goal orientation – Hurtz & Donovan, 2000; mastery goals – Payne, Youngcourt & Beaubien, 2007; personal mastery – Hinsz & Jundt, 2005) have demonstrated stable, albeit modest, relationships with goal-setting processes and self-regulation. In contrast, avoidance-oriented dispositions that are characterized by anxiety (e.g., performance-avoid goals, failure avoidance, etc.) rarely emerge as antecedents of regulatory behavior(s) or demonstrate stable relationships with motivational processes.

One central issue has likely contributed to the current torpor in motivational disposition research; very few novel constructs have emerged from recent motivation theory despite researchers frequently noting that new motivational dispositions are essential to fully understand the motivational system (e.g., Austin & Klein, 1996; Farr, Hoffman, & Ringenbach, 1993; Kanfer, 1990). After examining dispositional models of motivation, I believe one important aspect of the avoidance motivation domain has yet to be theoretically described or empirically explored; “effective avoidance”.

A second issue contributing to the lack of progress is that models of motivated behavior typically do not account for systematic links between specific situations and motivational dispositions. In my opinion the promotion and prevention regulatory systems (Lanaj, Chang, & Johnson, 2012) may serve as an effective link between motivational traits, outside of regulatory focus theory, regulatory behaviors/strategies, and tasks/contexts using commensurate regulatory systems (i.e., the approach/promotion and avoidance/prevention systems). However, I believe that predicting performance for tasks where effectiveness is predicated on avoidance-oriented behaviors (e.g., error detection and correction) that an effective avoidance dispositional construct will need to be added to the corpus of motivational dispositions.

Motivational traits and skills. The primary purpose of Kanfer and Heggestad's (1997) Motivational Traits and Skills (MTS) framework was to construct a cohesive account of proximal and distal person variables that determine motivated behaviors. Their work was a response to criticisms of existing models of motivation that argued dispositional constructs were stuck in a nomological net "limbo" whereby no viable framework has been made available to situate distal traits among proximal motivation processes and contextual features (Austin & Klein, 1996; Kanfer, 1990). Unlike its predecessors, the dispositions within MTS offer a cohesive account of the known approach and avoidance dispositional construct spaces. Additionally, MTS offers a basic framework that connects distal traits with regulatory behaviors and context through motivational skills; which are broad classes of proximal self-regulatory skills (Kanfer & Heggestad, 1997).

In the MTS model, emotion control and motivation control represent broad classes of self-regulatory strategies (e.g., cognitions, emotions, and behaviors) individuals use during goal striving. Competent emotion control skills protect motivation from the intrusive thoughts and

distractions that result from emotional responses to achievement situations (e.g., managing worry, on-task thinking, etc.). Effective motivation control skills help maintain persistence when motivation begins to erode by creating self-induced incentives or consequences (e.g., setting intermediate goals, contriving rewards, etc.). The motivational traits personal mastery (PM), competitive excellence (CE) and motivation related to anxiety (MRA) are broad dispositions in the approach and avoidance motivation domains. MTS posits that motivational traits determine individual differences in the development and use of the cognitive and behavioral self-regulatory strategies that individuals use during goal striving (i.e., motivational skills).

To specify PM, CE and MRA, Kanfer and Heggstad (1997) reviewed approach and avoidance motivational paradigms and measurement instruments (e.g., achievement motivation – Atkinson, 1957; achievement goals – Elliot & Church, 1997; status aspiration – Cassidy & Lynn, 1989; test anxiety – Alpert & Haber, 1960; anxiety – Digman & Inouye, 1986). Based on this review, the approach-oriented PM trait was defined as a self-referent, achievement striving disposition associated with personal improvement standards of excellence, persistence in the face of frustration, and goal-directedness. The approach-oriented trait CE was conceptualized as a normative-referent, achievement striving construct characteristically using standards of excellence and definitions of success in relation to peers. The avoidance-oriented trait MRA was characterized by active avoidance of failure-threatening situations and anxiety-induced cognitive interference. Following their construct identification process, Heggstad and Kanfer (2000) developed and validated the Motivational Trait Questionnaire (MTQ); an instrument that reliably measures PM, CE, and MRA.

Despite its conceptual rigor, empirical research on MTS has produced similar results to theories and instruments that preceded it; the approach-oriented construct characterized by

mastery (PM) is reliably related to self-regulation and performance while constructs characterized by competitiveness (CE) and anxiety (MRA) exhibit inconsistent relationships with motivated behavior. Although the MTQ construct space is more cohesively specified than other motivational orientation approaches, the motivational trait framework of has not increased the field's understanding of motivational orientations nor has it improved the predictive accuracy of motivational orientation measures. The empirical results are not surprising given that MTQ constructs are an amalgamation of existing dispositions (e.g., goal orientations, achievement goals, *nAch*, etc.) that all bear striking resemblance to each other and to Murray's original psychogenic needs.

Implied valence and deficient avoidance motivation constructs. Modest empirical support for Heggstad and Kanfer's (2000) motivational traits is likely the product of the motivational paradigms upon which MTS is based. Descriptive and lexical definitions of dispositions are extensional, that is to say, they are defined by the list of attributes that characterize them. Intentionally or not, many researchers have defined and/or operationalized approach and avoidance dispositions with implied positive or negative valence by describing them with adjectives that imply regulatory effectiveness or ineffectiveness. Most often, theorists have implied that approach-oriented traits are "good" and that avoidance-oriented traits are "bad" for regulatory effectiveness. Upon examination, motivation theories that underpin the MTQ traits all attach the same positive valence to approach-oriented dispositions and negative valence to avoidance-oriented dispositions.

The three-dimensional achievement goals model put forth by Elliot and Church (1997) is perhaps the most popular motivational disposition used in industrial/organizational psychology research. The underlying theory specifies chronic dispositions in the approach domain (i.e.,

mastery goals and performance-prove goals) manifest in challenge-seeking behaviors and persistence which are subsequently associated with effective regulation in achievement settings. Meanwhile, performance-avoidance goals (avoidance-orientation) manifest in anxiety, fear of failure, challenge avoidance, and termination of effort; all of which are associated ineffective regulation in achievement settings. The good/bad nature of the constructs within Elliot and Church's (1997) model, and many other theories of motivation, implies that approach-oriented constructs are antecedents of effective behaviors and outcomes while avoidance-oriented constructs determine only ineffective behaviors and outcomes.

Implied valence in self-report measures. Implied valences also manifest in the self-report scales used in empirical research. Self-report measures rely on adjectives or propositions for target stimuli that imbue items with implied regulatory effectiveness. Review of popular approach and avoidance motivation inventories, including the MTQ, reveal that items assessing approach-oriented constructs include a positive valence. Typical items from the MTQ's PM scale include, "*I set high standards for myself and work toward achieving them,*" and "*I work hard at everything I undertake until I am satisfied with the result.*" In contrast, note how typical items assessing MRA preclude regulatory ineffectiveness; "*I am unable to concentrate fully in stressful situations,*" and "*I lose sleep because I am troubled by thoughts of failure.*" This is not at all surprising considering that avoidance motivation is almost entirely described in terms of fear and anxiety in current theory. A more complete specification of avoidance motivation would include effective aspects of avoidance self-regulatory behaviors and the dispositions that precede them. Even measurement scales for chronic prevention focus (e.g., Higgins, Shah, & Friedman, 1998; Lockwood, Jordan, & Kunda, 2002), a construct that is theorized to be effective in certain contexts, do not include items that assess effective aspects of the avoidance motive.

Effective avoidance. It is easy to describe motivated behavior in terms of approaching desired end states. It is inaccurate, however, to assume that successful avoidance of negative outcomes is not a desired end state or that active avoidance requires less energy, direction, or maintenance than the pursuit of positive outcomes. Yet, avoidance-oriented dispositions are consistently described in clinical terms (e.g., anxiety, negative affect, interference, worry, etc.) and in association with negative outcomes such as termination of effort, quitting, and withdrawal. On the other hand, social-cognitive researchers (Higgins, 1997; Lanaj, Chang, & Johnson, 2012) have described chronic effective avoidance behaviors (e.g., safety-related behaviors, risk mitigation, threat assessment, etc.) that lead to the absence of negative outcomes, such as injury or property damage. It is likely that the pre-dominance of avoidance-oriented dispositions based on fear and anxiety has contributed to a literature that fails to appreciate that the absence of a negative outcome is actually a positively-valenced outcome.

There are many job families where risk assessment, mistake avoidance, and accuracy (over productivity) are the most important regulatory behaviors for success. Researchers (Perkins & Corr, 2005; Smillie, Yeo, Furnham, & Jackson, 2006; Wallace & Chen, 2006) have found that avoidance-orientation is positively related to effectiveness in the form of safety performance, managerial competency, and performance on an air traffic control simulation. Although these results suggest that avoidance orientation is effective in certain contexts, these researchers employed measures of dispositional avoidance orientation that only assessed fear and anxiety without measuring any aspects of effective avoidance. Given that effective avoidance is not typically considered or directly measured in models of motivated behavior, it remains unclear which aspects of the avoidance-motivation construct space may be responsible for effective

regulatory behavior(s), performance improvement, and in which contexts they are important determinants of performance.

Vigilance. An individual who is highly effective using avoidance strategies is most aptly described as vigilant. Further, social cognitive models of motivation describe effective behavioral tendencies that define vigilance as an effective motivational disposition that is avoidant in nature. According to Regulatory Focus Theory, chronic prevention focus (avoidance) is a preference toward the use of a distinct set of motivational principles designed to approach pleasure by increasing non-losses and prevent pain by decreasing losses. The prevention-focused individual is sensitive to potential negative outcomes and uses effective prevention strategies to avoid errors of commission. The outcomes of which include; positive emotions (e.g., quiescence), ensuring correct rejections, safety-related behavior, and threat monitoring (Higgins, 1997).

In RFT, effective avoidance strategies also increase accuracy at the expense of speed or productivity (Wallace & Chen, 2006). Occasionally, personality researchers have also identified components of the neuroticism construct associated with increases in effort and performance: caution, anticipation of threat, impulse control, error avoidance, and careful planning (Perkins & Corr, 2005; Smillie et al., 2006). All of which stands in contrast to the personality-based theory of motivational traits (e.g., Heggstad & Kanfer's, 2000) which concluded that the entire avoidance-orientation domain consists of achievement anxiety and failure avoidance. These positive behaviors and characteristics can be used to define vigilance as an effective avoidance motivational construct not characterized by anxiety or fear.

From social cognitive theory we define vigilance as a predisposition to maintain alertness, meticulousness, and fastidiousness, while being heedful of overt or obscure warning signs.

Vigilant characteristics include cautiousness, wariness, and self-discipline. Vigilance is likely derived from biologically-based threat sensitivity and the development of safety needs (Gray, 1970; Higgins, 1997) but it is conceptually distinct from anxiety in that it is not associated with incapacitation of self-regulation or termination of effort. Quite the opposite, the vigilance disposition is likely to result in effective regulatory behaviors and is likely to be positively related to desirable outcomes in a wide range of contexts that reward effective avoidance strategies.

Linking Motivational Traits and Task Performance

Research has yet to fully specify antecedents of effective regulation for contexts that reward avoidance-oriented strategies or for contexts that may reward both achievement and avoidance strategies. At least in part, this is because dispositional motivation theories and measures do not accurately conceptualize or measure effective aspects of the avoidance motive. Vigilance, as a unique addition to dispositional motivation constructs that is an antecedent of effective regulatory strategies, allows for the study of performance in contexts that reward avoidance strategies.

To systematically link motivational traits to unique contexts, the principles of Regulatory Fit (Cesario, Grant, & Higgins, 2004) may be simultaneously applied to dispositions and contexts using commensurate approach and avoidance dimensions. According to regulatory fit, operating from the promotion regulatory system (approach) is adaptive for achievement tasks where success is primarily based on increasing gains. Given that PM and CE are antecedents of approach-oriented behaviors and fit the parameters of a chronic promotion orientation, the principles of regulatory fit suggest that PM and/or CE will determine performance levels on such tasks.

In contrast, operating from the prevention regulatory system (avoidance) is adaptive for tasks where success is primarily based on increasing non-losses. As MRA and vigilance are antecedents of prevention-oriented behaviors and fit the parameters of chronic prevention focus, it also follows that MRA and/or vigilance will determine performance on such tasks.

Summary and Purpose

I believe progress in the area of dispositional motivation requires a fundamental re-consideration of the avoidance-motivation construct space. Most motivational theorists assume approach-oriented dispositions are antecedents of effective behaviors and that avoidance-oriented dispositions are antecedents of ineffective behaviors. Although some dispositional models of motivation (e.g., RFT & reinforcement sensitivity theory) do not assume dispositions are inherently associated with effective or ineffective behaviors, approach and avoidance motivation scales universally treat approach-oriented constructs as effective and avoidance-oriented constructs as ineffective. It is likely that avoidant regulatory strategies, and antecedent dispositions are required to understand effectiveness in many contexts. As a result, the current research literature is based on empirical findings that assume an incomplete definition of avoidance motivation and/or measure avoidance without consideration for vigilance.

The purpose of the current study is two-fold: First, I will construct and evaluate a vigilance scale within the MTQ framework, herein referred to as the MTQ+V. Second, I will validate the MTQ-V by empirically testing systematic relationships between approach and avoidance dispositions, regulatory behaviors, and performance on two distinct tasks: one that rewards gains and one that rewards non-losses.

Literature Review

Early Research on Individual Differences in Motivation

Motivation, defined within Murray's (1938) *Explorations in Personality*, is the phenomenon responsible for energizing, directing and selecting behavior. Murray described over 20 specific motives in the form of personality-based psychogenic needs: an organic readiness that serves to organize perceptions and guide actions toward a desired end state. Psychogenic needs were originally conceptualized as drives similar to physiological needs such as hunger and safety (Atkinson & McClelland, 1948). Murray's need for achievement (*nAch*) has had a lasting influence on contemporary motivation theory and is defined as the motive to increase one's competence in achievement settings, is satiated by success, and is aroused by failure (McClelland, Clark, Roby, & Atkinson, 1949).

Early motivation researchers (e.g., Atkinson, 1957; Heckhausen, 1967; McClelland, Atkinson, Clark, & Lowell, 1976) established *nAch*'s utility for explaining behaviors such as risk taking and others found relationships between *nAch* and student ability (Uhlinger & Stephens, 1960) and entrepreneurial success (Wainer & Rubin, 1969). It was through these early studies that *nAch* became established as an important individual difference in motivation and its influence on subsequent theories is ubiquitous. Murray also contended with theoretical issues with which contemporary motivation theorists continue to grapple.

Murray posited that individual difference constructs (i.e., *needs*) only exhibit motivational characteristics when activated by a perceived context or *press*. The *need–press* relationship, termed *thema*, is an interactionist perspective that emphasizes the role that context plays in and expressions of individual differences. Murray posited that motivation results from

the interaction between the active agent, with some level of *need*, and their response to a perceived *press* which produces behaviors aimed at satiating an unsatisfactory state.

Additionally, the dynamism between an often felt *need* and an often perceived *press* produces chronic responses such as a person with strong *nAch* who chronically experiences an internal force to perform well on tests due to the specific *thema* or interplay between their motive to increase competence and their perception of the achievement context. Murray's research was based largely on idiosyncratic data which allowed for very little generalization or expansion upon ideas such as *thema*. It is only Murray's *nAch* construct that has had a lasting impact on individual differences-based motivation research.

McClelland and colleagues (e.g., McClelland, Clark, Roby, & Atkinson, 1949) began work to refine the measurement of *nAch* and to utilize it as a dispositional construct within studies of behavior (Atkinson, 1957), performance (Uhlinger & Stephens, 1960; Wainer & Rubin, 1969), and self-regulatory processes such as goal-setting (Atkinson & Litwin, 1960). While few studies devoted attention to Murray's ideas of *press* or *thema*, research concerned with the construct validity of measures of *nAch* began to turn toward an important exploration of what is now known as the achievement motive.

Clarifying approach and avoidance motives. Clark, Teevan, and Ricciuti (1956) conceptualized *nAch* as a one-dimensional construct occurring along a single continuum from hope of success to fear of failure. Alternatively, Atkinson and Litwin (1960) presented evidence that *nAch* did not correlate with validated measures of dispositional anxiety (i.e., Test Anxiety Questionnaire: Mandler & Sarason, 1952). Their subsequent argument was that *nAch* and trait anxiety represent independent constructs rather than polar opposites of a single continuum. In the end, the independent constructs concept (i.e., separate achievement and anxiety) garnered

empirical support. Today, motivation researchers refer to these two distinct motives as the motive to approach success and the motive to avoid failure and the approach/avoidance distinction pervades all levels of motivation theory.

From the late 1960's to the early 1980's, motivation researchers focused their attention on situational and cognitive determinants of motivation (e.g., motivation-hygiene theory – Herzberg, 1964; job characteristics model – Hackman & Oldham, 1976; expectancy theory – Vroom, 1964). As goal-setting theory gained empirical momentum, however, researchers again began to explore the individual differences that determine goal-setting processes and self-regulation. Naturally, theorists directed their energy toward motivation constructs within the approach and avoidance domains and found modest relationships between approach-oriented dispositions, self-efficacy, and goal-setting mechanisms (e.g. Matsui, Okada, & Kakuyama, 1982; Yukl & Latham, 1978).

Subsequently, individual-difference constructs were borrowed from personality psychology and education psychology (e.g., extraversion – Eysenck & Eysenck, 1976; goal orientation – Dweck and Leggett, 1988) for use in models of achievement motivation; and *nAch* became more of a historical footnote (e.g., Tuerlinckx, DeBoeck, & Lens, 2002). What remains of Murray's original explorations in motivation, through the work of McClelland, Atkinson and colleagues, is the critical distinction between the approach and avoidance motives that form the foundation of nearly every contemporary theory of dispositional motivation.

Contemporary Research on Individual Differences in Motivation

Personality. In the 1980's and 1990's, researchers were using broad traits to describe personality, and in short time motivation researchers began to use them within models of motivated behavior. The Big 5 construct conscientiousness was labeled the most important

personality construct related to work motivation (Schmidt & Hunter, 1992). Though not a pure approach-oriented construct, conscientiousness is a broad trait that belies many positive behaviors (e.g., dependability, mindfulness, self-control, etc.) including approach-oriented tendencies such as achievement-orientation and hard-work (Barrick, Mount, & Strauss, 1993; Costa & McCrae, 1992). Motivation researchers also used temperaments and personality constructs such as extraversion (Eysenck & Eysenck, 1976) and impulsivity (Jackson, 1984), which are more closely related to the approach motive, within theories of motivated action (e.g., Kanfer & Heggestad, 1997).

Avoidance-oriented personality traits, most often neuroticism, were also incorporated into motivation theory as they belie avoidance behaviors such as worry, anxiety, and self-pity (Costa & McCrae, 1992). Researchers generally agree that it is through neuroticism's avoidance-oriented behaviors that motivated action becomes inhibited (e.g., Elliot & Thrash, 2002; Kanfer, Ackerman, & Heggestad, 1996). Note that the avoidance-oriented personality construct most often used in motivation research is characterized by anxiety, worry, or fear and is thought to impact motivation in a negative or inhibitory manner. It follows that empirical research using approach and avoidance personality constructs exhibit roughly the same pattern of results, approach-oriented constructs have a consistent, modest, positive relationship with motivated behaviors and task performance, while avoidance-oriented constructs demonstrate inconsistent or small negative relationships with the same behaviors (Barrick & Mount, 1991; Hogan & Holland, 2003; Hurtz & Donovan, 2000; Tett, Jackson, & Rothstein, 1991).

BIS/BAS. Jeffrey Gray, a student of Hans Eysenck, the originator of the Psychotocism, Extroversion, Neuroticism (PEN; Eysenck & Eysenck, 1976) theory of personality, put forth a physiological theory of motivation based on studies of approach and avoidance behaviors in

animals (Gray, 1970). Gray's theory postulates that physiological substrates (i.e., brain structures and neurotransmitters) form two neural reactivity systems of behavior: the approach system of behavior and the avoidance system of behavior.

The physiologically-based differences in the approach and avoidance systems determine individual differences in sensitivity to appetitive and aversive stimuli in the environment, respectively, and manifest as distinct personality traits (Smillie, Loxton, & Avery, 2011). These neurological systems have been termed the Behavioral Inhibition System (BIS) and the Behavioral Activation System (BAS); and trait manifestations of BIS/BAS have been utilized in the study of motivation from multiple perspectives (e.g., social-cognitive – Furnham & Jackson, 2008; achievement goals – Smillie, Loxton, & Avery, 2011).

Gray's reinforcement sensitivity theory (RST) is not a theory of personality, rather, it is a theory of two meta-neurological systems that underlie or determine personality. In empirical study, however, BIS/BAS is studied using temperaments that reflect the underlying neurological systems. Dispositional treatments of BIS/BAS are behaviors that reflect anxiety/impulsivity and chronic emotional reactions that reflect negative/positive affects (Carver, Sutton, & Scheier, 2000). BIS is an individual difference that determines sensitivity to environmental signals of potential punishment, non-reward, or novelty and is responsible for inhibition of behavior, anxiety, fear, frustration, and negative affect. BAS, on the other hand, is an individual difference that determines sensitivity to signals of potential rewards, and is responsible for activation of behavior, goal-directedness, and positive affect. Researchers generally believe that BIS causes inhibition of goal-pursuit while BAS is responsible for increasing movement toward goals (Carver & White, 1994).

Goal Orientation/Achievement Goals. Educational psychology researchers, Diener and Dweck (1978), Ames (1984), and Nicholls (1984) classified distinct behavioral patterns in children within achievement settings that closely aligned with approach and avoidance motivational tendencies. Diener and Dweck (1978) classified these behavioral patterns as helpless or mastery-oriented and found that students engaged them based on a tendency to neglect or emphasize effort in determining success or failure.

In the helpless-oriented behavior pattern, children attributed success/failure to uncontrollable factors, avoided challenges, and a subsequent deterioration of effort resulted in performance decrements. In the mastery-oriented behavior pattern, children attributed success/failure to controllable factors, engaged in solution directed behaviors, challenge seeking, and increased effort which resulted in performance enhancement. The goal classes and chronic behavioral tendencies were termed goal orientations (GO: Dweck, 1986) and dispositional variants of them have been used in a wide range of research to explain individual differences in motivation.

Two foundational models of GO form the theoretical underpinnings of the most often used GO theories and measures. First, Dweck and Leggett (1988) identified learning goal orientation (LGO) and performance goal orientation (PGO). It was their contention that GO's occur along a single goal classification dimension with LGO and PGO on polar ends of the same spectrum.

Second, Elliot and Church (1997) utilized classic approach and avoid motivation distinctions (e.g., Atkinson & Litwin, 1960; McClelland, Atkinson, Clark, & Lowell, 1976) to postulate an alternative model of achievement goals. In this model, achievement goals consist of three independent dimensions: Mastery goals, performance-approach goals, and performance-

avoid goals. Elliot and colleagues' alternative model holds that mastery goals, performance-approach goals, and performance-avoid goals more accurately reflect the achievement goal domain by aligning with the independent approach and avoidance motives put forth by Atkinson and Litwin (1960).

In 1993, Farr, Hofmann, and Ringenbach argued that GO may prove valuable for industrial and organizational psychologists attempting to understand the role of individual differences in goal-setting behavior. In short order, organizational psychologists constructed and psychometrically tested a two-dimensional measure of GO that mirrored Dweck's original theory (Button, Mathieu, & Zajac, 1996) and a three-dimensional measure of work-domain achievement goals (VandeWalle, 1997) that aligned with Elliot's theory (Elliot & Church, 1997). Whether Farr et al, Button et al. and VandeWalle intended it or not, empirical researchers used these instruments to treat GO/achievement goals as trait-like individual differences rather than context-dependent, mid-level phenomenon as they were originally cast. Today, organizational researchers continue to treat GO and achievement goals as motivational dispositions.

Alternative models of achievement goals based on approach and avoidance distinctions have emerged in motivation literature. Elliot and McGregor (2001) proposed a four-dimensional model that split mastery goals and performance goals into approach and avoidance dimensions. Additionally, Elliot and Thrash (2001) proposed a six-dimensional model where three competence goals (absolute, intrapersonal, & normative) were also split into approach and avoidance dimensions. Meanwhile, researchers developed alternative measurement strategies such as that of Horvath, Scheu, and DeShon (2001) who intended to capture achievement goals at their most broad and stable theoretical level. Despite these theoretical additions, the two- and

three-dimension operationalizations of goal orientation formulated by Button et al. (1996) and VandeWalle (1997) remain the most prominent in the motivation literature.

A large body of research has revealed that the two- and three-dimensional treatments of GO are indirectly related to performance (e.g., sales performance, learning, etc.) through proximal self-regulatory mechanisms (Chen, Gully, Whiteman, & Kilcullen, 2000; Colquitt & Simmering, 1998; Fisher & Ford, 1998; Ford, Smith, Weissbein, Gully, & Salas 1998; Koslowski, Gully, Brown, Salas, Smith, & Nason, 2001; Mangos & Steele-Johnson, 2001; Phillips & Gully, 1997; VandeWalle, Brown, Cron, & Slocum, 1999).

Validity generalization studies have summarized the empirical research. Most recently Payne, Youngcourt, and Beaubien (2007) found that LGO was related to goal-setting and self-efficacy within several performance categories, while Avoid-PGO was weakly correlated with goal-setting and self-efficacy within only a few performance categories. In motivation research, the empirical results for GO/achievement goals can be summarized much the same way as those studies that used nAch and personality; approach-oriented constructs are relatively stable and modest predictors of self-regulation and performance while avoidance-oriented constructs are inconsistently or not related to either.

Several issues remain unresolved despite the large body of empirical research. For instance, researchers remain uncertain of the appropriateness of using state or trait manifestations of GO/achievement goals in models of motivation (e.g., Chen, Gully, Whiteman, & Kilcullen, 2000; Breland & Donovan, 2005). As discussed previously, theorists continue to create new models or argue about the correct number of dimensions that represent GO/achievement goals. Additionally, in empirical study the psychometric quality of the most frequently used GO/achievement goals assessments has proven to be quite low (Hafsteinson, Donovan, &

Breland, 2007). None of which are more important than the finding that dispositional GO/achievement goals were modest and inconsistent antecedents of motivated behaviors (Payne et al., 2007).

Motivational traits and skills. In 1997, Kanfer and Heggestad attempted to organize the known theories of individual differences in motivation research into a taxonomic framework of motivational traits and skills (MTS). MTS theory was built upon the findings of Kanfer, Ackerman, and Heggestad (1996) that self-regulatory skills in the approach and avoidance domains, distinct from induced mechanisms (e.g., goal-setting and state goal orientation), account for differences in learning and task performance above and beyond ability constructs.

Kanfer et al. (1996) provided evidence that both state and trait constructs are important pieces of cohesive models of motivation, and Kanfer and Heggestad (1997) conceptualized an individual differences approach to work motivation that distinguished between motivational traits and motivational skills. In the (MTS) framework, motivational skills represent self-regulation competencies used during goal striving while motivational traits represent stable dispositions in the approach and avoidance domains. MTS theory posits that motivational traits are distal constructs that determine individual differences in the level of development and use of the more situation-sensitive motivational skills.

Motivational skills are defined as broad classes of cognitive and behavioral self-regulatory strategies employed by individuals during goal striving. Kanfer and Heggestad (1997) reviewed common self-regulation mechanisms and identified two overarching motivational skills constructs: emotion control that includes self-regulatory skills designed to protect effort expenditure from distracting emotional states (e.g., anxiety, worry, etc.) and motivation control that includes self-regulatory skills designed to maintain high effort and attention levels (e.g.,

goal-setting, positive self-talk, etc.). Motivational skills are developed across situational encounters and are partly determined by individual differences in motivational dispositions. Much like developing a “toolbox” of self-regulatory strategies, well-developed sets of motivational skills allow a person to maintain high levels of motivation and effectiveness for various contexts or tasks.

Additionally, Kanfer and Heggstad (1997) performed an exhaustive review of the approach and avoidance motivational paradigms and measurement instruments to define broad and stable motivational trait constructs. Their review included 19 theories with measurement scales in the achievement motivation research areas (e.g., achievement motivation – Atkinson, 1957; achievement goals – Elliot & Church, 1997), anxiety (e.g., test anxiety – Alpert & Haber, 1960; anxiety – Digman & Inouye, 1986), and personality (e.g., multi-dimensional personality questionnaire – Tellegen, 1982; NEO PI-R – Costa & McCrae, 1992; work and family orientation questionnaire – Spence & Helmreich, 1983). Two super-ordinate trait complexes were identified: the Achievement complex which contains personal mastery (PM) and competitive excellence (CE) motivational traits, and the Anxiety complex which contains the motivation related to anxiety (MRA) trait.

PM is defined as a self-referent, achievement-striving disposition with characteristics similar to *nAch* (Murray, 1938), mastery (Helmreich & Spence, 1978), and learning goal orientation (Dweck & Leggett, 1988). Increasing levels of PM is associated with personal improvement standards of excellence, persistence in the face of frustration, and goal-directedness. CE is based loosely on Jackson, Ahmed, and Heapy’s (1976) competitive acquisitiveness and status, Elliot and Church’s (1997) performance-approach goals, and Cassidy and Lynn’s (1989) Status Aspiration, Competitiveness, Acquisitiveness, and Dominance. CE is

conceptualized as a normative-referent, achievement striving construct. A person high on this trait is presumed to utilize standards of excellence and definitions of success in relation to their peers.

An initial review of the Anxiety complex identified failure avoidance (FA) and achievement anxiety (AA) motivational traits (Kanfer & Heggestad, 1997). FA was believed to manifest in avoidance behaviors similar to nInfavoidance (Murray, 1938) and fear of failure (McClelland et al., 1953). High FA was expected to be associated with active avoidance and anxiety caused by the possibility of failure.

AA was believed to manifest in interfering thoughts, much like the classic notion of test anxiety, with the distinction that it was adapted be salient in a breadth of failure-threatening situations. High AA is associated with anxiety in testing situations, deadline enforcement situations, and athletic competition. Subsequent factor analysis (Heggestad & Kanfer, 2000) found that FA and AA are not orthogonal constructs and load on a single avoidance motivation construct: Motivation Related to Anxiety (MRA). Note that all of the constructs reviewed by Heggestad and Kanfer as well as the broad MRA construct contain only those aspects of the avoidance motive characterized by fear and anxiety.

Subsequently, Heggestad and Kanfer (2000) reviewed every known measure of approach and avoidance dispositions, including but not limited to the Thematic Apperception Test (Murray, 1943), Debilitating Anxiety Questionnaire (Alpert & Haber, 1960), Aberdeen Academic Motivation Inventory (Entwistle, 1968), Achievement Motivation Questionnaire (Lynn, 1969), Fear of Failure scale (Good & Good, 1975), Test Anxiety Scale (Sarason, 1978), Work and Family Orientation Questionnaire (Helmreich & Spence, 1978), and the GO/achievement goal measures of Ames and Archer (1988), Button, Mathiew, and Zajac,

(1996), and Vande Walle (1997). Examination of measures for approach-oriented constructs revealed that most contained items related to PM and/or CE but did not specify separate scales for either. Similarly, measures of avoidance-oriented constructs either included items related to anxiety or included items related to fear of failure but seldom contained items related to both aspects of the avoidance motive. Again, it is noteworthy that none of the measurement instruments reviewed included positive aspects of the avoidance motive.

After their review of the literature, Heggestad and Kanfer (2000) developed and evaluated the Motivational Trait Questionnaire (MTQ) to cohesively assess the entire approach and avoidance motivational trait domain. Initial confirmatory factor analysis supported a four-factor structure; PM, CE, FA and AA. Subsequent item analysis identified and refined facets of each trait. PM contained three facets: determination, desire to learn, and mastery goals. CE contained two facets: other referent goals, and competition seeking. AA contained three facets: worry, emotionality, and interference. Finally, FA had one facet: active avoidance.

Further psychometric analysis did not support independent AA and FA constructs, and therefore they were merged into a single MRA construct. Reliability and correlational analyses supported the efficacy of the MTQ, and subsequent research has confirmed Heggestad and Kanfer's three-factor structure: PM, CE, and MRA (e.g., Diefendorff, Richard, & Robie, 2005; Kanfer & Ackerman, 2000).

Few empirical studies have been published that test the veracity of motivational traits within the MTS framework. Kanfer and Ackerman (2000) provided evidence for the construct validity of the MTQ finding that PM, CE, and MRA were correlated with appropriate personality scales from the Multi-dimensional Personality Questionnaire (MPQ; Tellegen, 1982), including social potency, social closeness, absorption, and traditionalism. Kanfer and Ackerman (2000) go

on to distinguish PM, CE, and MRA from both fluid and crystallized intelligence, demonstrating that motivational traits are non-ability constructs which support construct validity evidence.

Some studies have situated motivational traits in the larger nomological net of motivational mechanisms. Hinsz and Jundt (2005) examined motivational traits in a goal-setting study that revealed some correlational evidence of relationships between MTQ constructs, self-efficacy, self-set goal level, and performance on an idea generation task. Diefendorff, Richard, and Robie (2005) found that PM, CE, and MRA were significant predictors of self-regulatory behaviors, self-efficacy, and goal-levels; but only CE was a significant predictor of exam performance. In a study of counterproductive work behaviors (CWB), Diefendorff and Mehta (2007) found that PM was related to both the interpersonal deviance and organizational deviance components of CWB. MRA was only related to organizational deviance, and CE was unrelated to CWB entirely. Bateman and Donovan (2010) found that MRA and CE were related to self-efficacy and task performance on a computer-based puzzle task, but PM was not significantly related to either SE or task performance. Note the inconsistent nature of the relationships between motivational traits, self-regulation, and task performance.

Some studies have used specific scales from the MTQ to help explain individual differences in desired outcomes. For instance, Heimerdinger and Heinsz (2008) found that the failure avoidance facet of MRA was a significant predictor of performance on an idea generation task (mediated by self-efficacy and goal-setting processes). Ackerman, Kanfer, Shapiro, Newton, and Beier (2010) used the facet of mastery, competitiveness, and other-referenced goals within larger composites of *nAch* and competitiveness to successfully predict subjective cognitive fatigue. Kanfer, Wolf, Kantrowitz, and Ackerman (2010) used CE, PM, and MRA within larger trait composites to predict academic and job performance; PM predicted academic performance,

CE predicted job performance, and MRA was unrelated to all performance measures. Again, results reveal inconsistent relationships between motivational traits, self-regulation, and behaviors.

Because of the cohesiveness of the MTS framework, there is considerable conceptual overlap between motivational traits and popular motivational dispositions. Specifically: PM, LGO, and mastery goals all represent self-referent, approach-oriented motivational dispositions; CE and performance prove-GO represent other-referent, approach-oriented motivational dispositions; MRA and performance avoid-GO both represent avoidance-oriented dispositions. It is important to consider, however, that MTS's extensive theoretical underpinnings results in PM and CE accounting for unique aspects of the Achievement trait complex that are ignored by other dispositional paradigms including GO (e.g., hard work, *nAch*, competitive acquisitiveness, dominance, etc.). Similarly, MRA encapsulates many aspects of the Anxiety construct space that are ignored in other avoidance-oriented paradigms (e.g., *nInfavoidance*, debilitating anxiety, worry-emotionality, etc.). However, neither the paradigms reviewed by Heggstad and Kanfer nor the trait constructs derived from their review contain any aspects of vigilance as a dispositional construct.

Deficiencies in Dispositional Motivation Constructs

Implied valence. Dispositional motivation theory, from *nAch* to motivational traits, has systematically attached positive valence to approach-oriented traits and negative valence to avoidance-oriented traits. Theorists describe dispositions using a variety of adjectives and behavioral descriptions in an extensional manner and it is common that these adjectives and behavioral descriptors are imbued with positive or negative valence. Implying valence, however, runs counter to a critical assumption of dispositional approaches to research, that traits are

biologically-based constructs. Biological and evolutionary theories assume that dispositions will manifest in a range of behaviors that are *potentially* adaptive or maladaptive. Only when dispositions are put to the adaptive/maladaptive test, in light of a given task or context, do they become effective or ineffective (MacDonald, 2005; Nettle, 2006). Implied valence fundamentally disregards the possibility that a disposition can be potentially adaptive or maladaptive. More specifically, the implied negative valence attached to avoidance-oriented dispositions prohibits construct definitions that reflect positive or adaptive aspects of the avoidance motive.

Examples of implied valence pervade personality research. For instance, conscientiousness is described by behaviors in the positive agency domain: dependable, responsible, careful, hardworking, achievement-oriented, and persevering behavioral tendencies (Barrick & Mount, 1991; Heggestad & Kanfer, 2000), and extraverted individuals are described as active, sociable, and optimistic (Eysenck & Eysenck, 1976). Meanwhile, avoidance-oriented constructs such as neuroticism are described using inherently negative adjectives like anxious, worried, and insecure (Barrick & Mount, 1991; Kanfer, Ackerman, & Heggestad, 1996).

The same implied valence is present in Gray's RST theory, despite the fact that RST is grounded in physiology (where it is assumed that traits and behaviors have no inherent value, only evolutionary fitness). High BAS is associated with increasing levels of drive, goal-directed action, and positive affect. High BIS denotes a high level of sensitivity to environmental punishment cues, increasing levels of anxiety, fear, and negative affect as well as inhibition of goal-pursuit.

Dweck's original conceptualization of GO was the direct result of distinction between adaptive and maladaptive behavioral patterns, the antecedents of which were theory of

intelligence and broad classes of goals that students choose to pursue. By definition, LGO was identified as the direct antecedent of adaptive behaviors and PGO was identified as the direct antecedent of maladaptive behaviors – a theory that leaves no flexibility on the adaptive/maladaptive dimension for LGO or PGO. Within Elliot and colleagues' achievement-goals paradigm (e.g., Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Thrash, 2001), performance-avoid goal orientation is characterized by helpless behaviors, fear of failure, and anxiety that interfere with adaptation and task performance. Meanwhile performance-prove goal orientation and mastery goals are associated with mastery behaviors, challenge seeking, and cognitive immersion that facilitate adaptation, optimal task engagement, and performance.

Motivational traits (Heggestad & Kanfer, 2000) attach the same implied valences to approach and avoidance constructs as that of the theories that were reviewed to construct them. PM and CE are characterized by the motive to approach, pursue, and attain rewards through persistence and challenge seeking. PM and CE manifest in the pursuit of excellence, task mastery, and successful completion (Kanfer & Heggestad, 1997). Meanwhile, MRA is defined by the avoidance of goals, competition, and achievement situations. MRA is associated with anticipation of punishment, a desire to leave frustrating situations, worry, and debilitating anxiety. Regardless of the characteristics of the task or situation, MTS theory attaches negative valence to MRA and characterizes it as entirely ineffective.

The result of implied valence across motivational paradigms is that research has been conducted with a deficient definition of the avoidance motive. The positive characteristics of avoidance-oriented tendencies such as diligence, vigilance, safety-related behaviors, and increases in accuracy (over productivity) are missing from motivation research entirely. It is

critical that motivation research moves past narrow definitions of avoidance dispositions resulting from implied valence and considers the effective aspects of avoidance motivation.

Implied valence in self-report measures. The implied valence issue is also present in the self-report scales used to measure motivation constructs. When most self-report measures are developed, the content within them consists of adjectives or propositions that form the target stimulus. The valence of the target stimulus can be negative, neutral, or positive which also imbues items with implied regulatory effectiveness. Presented in Table 1 is a review of implied valence within 75 items from nine commonly used measures of dispositional avoidance-motivation. Measures included chronic regulatory focus, BIS, GO/achievement goals, and motivational traits. One popular scale used to measure performance goal orientation was omitted from review (Button et al., 1996) because it is not based on approach and avoidance distinctions and does not assume independent performance and learning goal orientation constructs.

Of the 75 items reviewed, 58 (77.33%) included target stimuli that attach negative valence to the avoidance construct, and 14 (18.67%) included target stimuli that were valence-neutral. Only 3 (4.00%) of the 75 items reviewed included target stimuli that attach positive valence to the avoidance construct. Even measures of chronic prevention focus use items that clearly attach negative valence to avoidance-oriented constructs despite the fact that RFT explicitly states it is a disposition associated with effectiveness in many contexts. Of the 16 chronic prevention focus items reviewed (Higgins et al., 2001 & Lockwood et al., 2002), 11 clearly used negative adjectives or propositions as the target stimulus, while only one item attached a positive valence to the avoidance construct.

Similarly, Carver and White's (1994) measure of behavioral inhibition sensitivity and Torrubia et al.'s (2001) measure of sensitivity to punishment do not contain any items that attach

a positive valence to the avoidance construct, but 24 of the 31 items in these scales clearly attach a negative valence to BIS. Neither measure of performance-avoid GO (Horvath et al., 2001; VandeWalle, 1997) include items with target stimuli that have a positive valence, nor does Elliot's (1999) measure of performance-avoidance goals. Two of the 19 items that comprise Heggstad and Kanfer's (2000) measures of worry and emotionality contain target stimuli with a positive valence; however, they are designed to be reverse scored. In comparison, 15 of the 19 worry and emotionality items attach a negative valence to the avoidance constructs. Typical MRA items include; "*I worry about the possibility of failure,*" and "*I lose sleep because I am troubled by thoughts of failure.*" In light of this review my supposition is that an effective avoidance dispositional construct is likely to make an important addition to the known motivational construct space, and a reliable and valid measurement scale would be an important addition to empirical research efforts.

Effective Avoidance as a Stable Person Construct

Defensive pessimism. Defensive pessimism is a cognitive regulatory strategy in which individuals set low expectations for an upcoming performance episode and consciously think about potential pitfalls in the performance context in vivid detail (Norem, 2008). In contrast to the debilitating effects of self-handicapping, research has shown that defensive pessimism is an effective regulatory strategy, especially for innately anxious individuals (Elliot & Church, 2003). Low expectations generated by defensive pessimism help cushion the blow of potential failure, while identification of potential pitfalls helps individuals plan how to avoid them during task performance (Norem, 2001).

As a singular cognitive strategy, defensive pessimism is rather narrow in definition. Defensive pessimism originates from a desire to reduce anxiety in a known context. The primary

outcome of defensive pessimism is alleviation of anxiety and the cognitive interference associated with anxiety. Alleviation is achieved by playing out failure scenarios and solving them mentally, thus, providing the anxious individual with enhanced feelings of control. Although defensive pessimism is associated with enhanced performance, it is negatively related to self-esteem (Norem, 2008). Further, defensive pessimism is only salient in contexts that are familiar for individuals, thus enabling them to visualize failure scenarios and plan for them.

For use across various and novel contexts, effective avoidance as a dispositional construct will represent a stable propensity to engage in a wide variety of effective avoidant regulatory behaviors. The origin of the stable and broad effective avoidance construct is likely biological in nature rather than being born out of a specific desire to alleviate anxiety. Although defensive pessimism may be an important strategy to alleviate anxiety in situations where individuals have previous experience, effective avoidance is likely associated with a multitude of positive outcomes across many contexts. In breadth of definition, outcomes, and salient contexts, effective avoidance would subsume any number of effective regulatory strategies, including but not limited to defensive pessimism.

Chronic prevention focus. Higgins's (1997) Regulatory Focus Theory (RFT) is a social-cognitive approach to the approach and avoidance motivational systems. According to RFT, individual differences, motivated behavior, and tasks/contexts co-occur within independent promotion (approach) and prevention (avoidance) regulatory systems. For individuals within achievement contexts, promotion or prevention regulatory focus is determined by the accessibility of either the promotion or the prevention system. Variability in access to either system may come from any source in the motivational realm including the person's chronic

preferences for a regulatory system, their desired end state, or the overarching performance context.

RFT describes dispositions (chronic regulatory focus) as strong chronic preferences for either the promotion or the prevention regulatory system (Higgins & Tykocinski, 1992). Chronic promotion focus develops from nurturance and growth needs, which drive individuals to pursue aspirations, advancement, and *ideal* end states. Promotion-focused individuals are driven by positive outcomes in the form of *gains* but are also driven to seek insurance against *non-gains*.

Alternatively, chronic prevention regulatory focus is born out of security and safety needs, which drive individuals to meet responsibilities, obligations, and *ought* end states. A chronic prevention focus is characterized by a drive to seek the absence of negative outcomes in the form of *non-losses*, while actively ensuring against negative outcomes in the form of *losses*. In RFT, positive outcomes (i.e., gains and non-losses) are actively pursued within either the approach (promotion) or avoidance (prevention) systems, while negative outcomes (i.e., non-gains and losses) are actively hedged against within either system.

Those with a chronic promotion focus are driven by discrepancies between their actual state and their *ideal* end state. To remedy discrepancies, promotion-focused individuals employ eager (approach-oriented) strategies designed to maximize *gains* and/or ensure against *non-gains*. Consider a typical stock purchasing scenario which requires individuals to determine the earning potential and anticipate the risk of buying stock in any given company. Chronically promotion-focused individuals are likely to choose an investment strategy based on a goal defined in terms of *gains/non-gains*, in this case, maximum profit. They will be driven by discrepancies between their actual rate of return versus their *ideal* (i.e., larger and faster) rate of return. Eager goal-pursuit strategies could include anticipating short-term stock price

movements, investing large sums of money based on earnings potential, and using leverage to maximize investments.

Chronically prevention-focused individuals are driven by discrepancies between their actual state and their *ought* end state. *Oughts* are synonymous with obligations or responsibilities, and therefore prevention-focused individuals choose goals defined in terms of *non-losses/losses*. In the case of the stock investment example, a prevention-focused individual is likely to choose regulatory strategies that maximize *non-losses* and ensure against *losses*. Prevention-focused individuals are driven by discrepancies between their actual probability of taking a loss on their investment and their *ought* probability of ensuring the safety of their investable capital. Prevention-focused individuals are likely to employ vigilant strategies such as research into the stability of each company, allowing a slower rate of return over a longer period of time, and hedging against risk by investing smaller amounts of money across a range of companies.

Because the principles of RFT specify effective and ineffective aspects of the avoidance disposition, RFT can help guide revisions to the theory and measurement of avoidance dispositions within other models of motivation to include positive valence. For instance, motivational dispositions can be revised to include adaptive avoidance simply by defining desired end states in terms of non-losses (a positive outcome). Further, motivational theories may add dispositions associated with effective prevention strategies, avoidance of errors of commission, and a variety of other positive outcomes that include: positive emotions (e.g., quiescence), ensuring correct rejections, safety-related behavior, threat monitoring (Higgins, 1997), and increased accuracy (Wallace & Chen, 2006).

To date, motivation researchers have not revised existing trait models to include effective avoidance. However, some personality researchers have identified components of avoidant trait constructs that are associated with enhanced effectiveness in specific contexts. Nettle (2006) reconsidered the Big-5 traits using evolutionary theory, evaluating each construct by weighing the fitness costs and benefits of increasing levels of each trait. In Nettle's revision, high neuroticism may be related to poor health and psychological well-being due to consistent stress and anxiety. However, neurotic characteristics such as diligence and wariness are also related to avoidance of predation and safety-related behaviors. In related empirical research, Perkins and Corr (2005) as well as Smillie et al., (2006) found that worry and neuroticism were positively correlated with workplace performance in the financial sector and performance on an air traffic control simulation, respectively. Together, RFT and personality research have set the stage for a meaningful revision of existing motivational trait paradigms to include effective avoidance as a disposition and to begin using it to predict performance in contexts that reward the pursuit of non-losses.

Vigilance. Using the principles of RFT and a theoretically strong model of approach and avoidance dispositional motivation, such as the MTS framework, it is possible to create a meaningful addition to the avoidance-oriented construct space. From MTS, the MRA construct would be retained with facets that imply negative valence (i.e., worry & emotionality), but a construct can be added that includes facets with implied positive valence, described with positive adjectives, and associated with the successful pursuit of non-losses (e.g., caution, anticipation of threat, error avoidance, and careful planning). An individual who is highly effective using avoidance strategies is most aptly described in terms of vigilance.

As an individual difference construct, vigilance is defined as a predisposition for maintaining alertness, meticulousness, fastidiousness, and being heedful of overt warnings or obscure warning signs. Vigilant characteristics include cautiousness, wariness, and self-discipline. Vigilance is likely derived from biologically-based threat sensitivity and the development of safety needs (Gray, 1970; Higgins, 1997). Yet, vigilance is conceptually distinct from anxiety or fear in that it is not associated with incapacitation of self-regulation or termination of effort. In those contexts that reward avoidant strategies, vigilance is likely to be positively related to desirable outcomes such as safety performance, accuracy, and risk assessment.

Predicting Task Performance in Specific Contexts

The most consistent finding in empirical research is that dispositions related to mastery demonstrate modest relationships with motivated behavior and performance (LGO-Payne et al., 2007; PM-Heinsz & Jundt, 2005; nAch-Matsui et al., 1982). Other constructs such as prove-GO, CE, and MRA demonstrate inconsistent relationships with self-regulation and performance (Bateman & Donovan, 2010; Diefendorff et al., 2005; Deifendorff & Mehta, 2007; Payne et al., 2007). Researchers have argued that these phenomena are the result of an empirical literature that has not accurately linked distal external constructs (task context), distal person constructs (traits), proximal person constructs (e.g., goals & self-efficacy) and task performance. (Austin & Klein, 1996; Diefendorff & Chandler, 2011; Donovan, Bateman, & Heggstad, 2013; Kanfer, 1990).

Many attempts to bridge the theoretical gap between distal traits and specific contexts are derived from the idea of “*press*” (Murray, 1938); dispositions only exhibit motivational force when activated by a perceived context or *press*. Situational strength, for one, is a broad feature of

the context that determines when dispositions are expressed (Meyer, Dalal, & Boncacio, 2009). In strong situations, the expression of dispositions is mitigated by the demands of the context and vice versa for weak situations. In much the same way, trait activation theory posits that the strength of job demands, distracters, constraints, releasers, and facilitators determines if/when a disposition can significantly impact individual levels of performance (Tett & Burnett, 2003).

Press, situational strength, and trait activation specify a multitude of idiosyncratic moderators of the relationship between traits and performance. They do not provide a systematized link between distal traits and performance that can usefully connect them across *a range of contexts/tasks*. Such a mechanism requires a common source of variance on which traits, behaviors, and situations all simultaneously operate.

In regulatory fit theory, the promotion and the prevention regulatory systems represent common sources of variance that characterize all aspects of the motivational system (Cesario, Grant, & Higgins, 2004). Regulatory fit emphasizes the motivational significance of the nature of the relationship between dispositions, behaviors, and subsequent performance (Higgins, 2012), where the relationship between motivational elements is characterized in terms of congruence or non-congruence. Regulatory fit is a state of congruence between an individual's regulatory focus and their goal-pursuit strategy.

Higgins and colleagues (e.g., Avnet & Higgins, 2003; Freitas & Higgins, 2002) argue that when in a state of regulatory fit the goal-pursuit strategy sustains and/or increases a person's orientation toward the goal. The general result of fit is an increase in engagement and motivational intensity toward goal-pursuit, as well as an affective "feels right" sensation that sustains motivated behavior. In cases of non-fit (i.e., when a person's regulatory focus is

incongruent with their goal-pursuit strategies), self-regulation is disrupted and goal commitment suffers.

Regulatory fit provides a link between traits and performance beyond the simple moderators proposed by *press*, situational strength, and trait activation theory. Regulatory fit proposes that commensurate approach and avoidance systems provide the common source of variance upon which traits, behaviors/strategies, and tasks/situations operate, whereas the motivational link between them is a matter of congruence or fit. Motivational traits, including vigilance, can be classified in terms of individual differences in the propensity to initiate either the promotion or prevention regulatory systems. Behavioral manifestations of traits (including goal-pursuit strategies) can also be cast in terms of the promotion or prevention strategies. To the extent that any given task or context can be also be described in terms of those that reward promotion strategies or prevention strategies, the systematic link between traits and performance becomes a matter of regulatory fit.

The performance tasks/contexts that any individual may encounter are wide-ranging in content and may change from one episode to the next. Yet, within an episode it is possible to characterize a task as one that rewards either the promotion or prevention regulatory system: Tasks that reward the promotion regulatory system inherently define outcomes in terms of gains or non-gains and reward eager goal-pursuit strategies. Tasks that reward the prevention regulatory system inherently define outcomes in terms of non-losses and losses and reward vigilant goal-pursuit strategies.

Chronic initiation of the promotion regulatory system (approach-oriented trait levels) is likely to manifest in behaviors that are more adaptive for tasks that reward promotion strategies (gains). Meanwhile, traits associated with chronic initiation of the prevention regulatory system

(avoidance-oriented traits) are more likely to manifest in behaviors that are adaptive for tasks that reward prevention strategies (non-losses). In the generic conditions described above, individuals are likely to experience enhanced motivation for goal-pursuit due to the experience of regulatory fit between their standing on motivational traits, their goal-pursuit strategies, and the nature of the promotion/prevention task at hand.

The role of self-efficacy. Self-efficacy is defined as an internal judgment of how effectively one can act in a given situation (Bandura, 1982). It is generally agreed that distal trait constructs influence achievement striving through more proximal person constructs such as instrumentality, expectancy, and task-specific self-efficacy (e.g., Diefendorff & Chandler, 2011; Kanfer, 1990). It is empirically established that increasing levels of task-specific self-efficacy are associated with increasingly difficult goal levels and enhanced task performance (e.g., Bandura & Cervone, 1983; Bandura, 1989; Locke & Latham, 2002). Motivation research has established that self-efficacy can serve as a critical pathway through which distal person constructs influence goals and behavior (e.g., Arshadi, 2009; Bateman & Donovan, 2010; Diefendorff et al., 2005; Heimerdinger & Hinsz, 2008; Hinsz & Jundt, 2005). The manner in which self-efficacy operates under conditions of fit/non-fit between individuals' chronic orientations and promotion/prevention tasks has yet to be explored. Generically, the experience of fit should serve to strengthen efficacy beliefs, whether they are positive or negative, and the experience of non-fit should serve to weaken efficacy beliefs.

Overview

Research in the field of dispositional motivation has reached a period of stagnation characterized by a large body of empirical research with inconsistent and/or modest relationships between traits, behaviors, and task performance. I argue this is partly because contemporary

approaches to motivation have confounded approach-oriented constructs and avoidance-oriented constructs with positive and negative outcome effectiveness, respectively. The purpose of the current study was two-fold: First, biologically-based and social-cognitive theory was used to generate and psychometrically evaluate a measure of vigilance within the existing motivational trait paradigm. The vigilance measure assesses previously un-measured aspects of the avoidance motivation construct space associated with increasing non-losses and effectiveness.

Second, the principles of regulatory fit were used to design an empirical validation study of the expanded motivational trait model. The empirical study used motivational traits as distal person constructs to predict proximal person constructs and performance on two laboratory-based achievement tasks. The principles of fit aligned distal and proximal constructs with performance on tasks based on whether they rewarded gains or non-losses.

Study 1: Measuring Vigilance

The MTQ contains 19 items that measure MRA, 17 of which imply regulatory ineffectiveness. Vigilance, however, is an effective-avoidance dispositional construct that results in diligence, safety-related behaviors, and enhanced performance in situations that reward the pursuit of non-losses. All of the items in initial item pool for the vigilance construct used descriptions of avoidant regulatory strategies (e.g., forecasting threats, finding errors, contingency planning), and implied that the strategy was effective in a regulatory sense (e.g., successfully avoided negative outcomes, feel most at ease, avoid bad choices). It is important to note that all target stimuli and scenarios used in item generation conveyed the effective pursuit of non-losses and the effective avoidance of losses. Thus, each item assessed the effective pursuit of non-losses using avoidant strategies, while none of the items used approach-oriented strategies or

framed effectiveness in terms of gains/non-gains which would have assessed approach-oriented effectiveness.

Where worry and emotionality represent facets within the MRA trait, vigilance is a unique addition to the avoidance motive that is likely to emerge as a multi-dimensional construct with sub-facets of its own. Dimensions of vigilance are likely to exhibit relative independence from worry and emotionality and to emerge as unique factors. Yet, all vigilance and MRA facets are in the avoidance motive construct space and are likely to exhibit modest associations with one another.

Dimensions of vigilance are also likely to be unique from the sub-facets of approach-oriented MTQ traits (e.g., PM's desire to learn & mastery goals facets; CE's other referenced goals & competition seeking facets). Items assessing vigilance facets and items from PM and CE facet scales all imply regulatory effectiveness. Thus, a modest relationship is likely to emerge that is driven by positive valence. A summary of a revised MTQ measurement model that includes the vigilance initial item pool is contained in Table 2 and termed the MTQ+V.

Method: Psychometric Study

Study 1 served to psychometrically evaluate vigilance as a dispositional construct that fits within the broader framework of motivational traits. The original psychometric evidence presented for the MTQ was presented at the facet level and the present study will follow suit. According to Heggestad and Kanfer (2000), MRA is a cohesive trait construct encompassing the entirety of the avoidance motivation domain with the sub-facets worry and emotionality. PM is a trait encompassing the self-referent aspects of the approach motivation domain with desire to learn and mastery goals sub-facets. CE is a trait encompassing the other-referent aspects of the approach motivation domain with other referenced goals and competition seeking sub-facets.

Dimensions of vigilance are a unique addition to the avoidance motivation construct space and the motivational trait measurement framework. As such, items assessing vigilance dimensions were evaluated as a meaningful addition to the MTS measurement framework.

Participants

The current study was carried out on a sample of 709 college students enrolled in courses at a large southeastern university. In exchange for participation subjects received extra course credit. The sample consisted of 182 (26%) male and 524 (74%) female subjects. Five (1%) subjects self-identified as American Indian or Alaskan Native, 68 (10%) as Asian or Pacific Islander, 22 (3%) as Black or African American, 33 (5%) as Hispanic or Latino, and 558 (79%) as White or Caucasian. Overall, the sample was representative of the student population at the large southeastern university from which it was extracted.

To conduct exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) the sample was randomly split into two samples: an initial sample consisting of 355 subjects and a holdout sample consisting of 354 subjects. No significant differences were present in the proportion of males and females in each sample nor were any differences detected between each samples' proportions of racial/ethnic groups.

Procedure

All subjects completed a battery of measurement scales online using Qualtrics® survey software. Subjects completed the battery on their personal computers using a web-enabled browser. Per the recommendations of Meade and Craig (2012), three instructed response items (e.g., "Respond with "UNTRUE of ME" for this item") and one self-reported diligence item ("You should use my data because I responded honestly to all of these items") were included as

attention checks. Prior to analysis, the four attention-check items were used to identify and remove careless responses and ensure high quality data for psychometric analysis.

Measures

Motivational Traits + vigilance. The original MTQ (128 items; Heggstad & Kanfer, 2000) was shortened to 48 items by Kanfer and Ackerman (2000) and termed the Motivational Traits Questionnaire Short Form (MTQ-S). The MTQ-S assesses three broad motivational dispositions, each with two facets: Personal Mastery (PM) with desire to learn (8 items) and mastery goals (8 items) facet scales; Competitive Excellence (CE) with other referenced goals (7 items) and competition seeking (6 items) facet scales; and Motivation Related to Anxiety (MRA) with worry (10 items) and emotionality (9 items) facet scales. For the current study, the initial vigilance item pool (22 items) was added to the MTQ-S. The resulting instrument was termed the Motivational Trait Questionnaire plus vigilance (MTQ+V). Items responses were collected with a 6-point likert response scale ranging from 1 (*very UNTRUE of me*) to 6 (*very TRUE of me*). The complete instrument is contained in Appendix A.

Personality. Ten-item International Personality Item Pool (IPIP; Goldberg, 1999) scales reflect Big-5 personality domains identified by Costa and McCrae (NEO PI-R; 1992). The current study included Extraversion ($\alpha = .86$), Neuroticism ($\alpha = .86$), and Conscientiousness ($\alpha = .81$) scales from the IPIP. All three scales are highly correlated with corresponding NEO measurement scales; Extraversion $r = .88$ [corrected], Neuroticism $r = .92$ [corrected], and Conscientiousness $r = .92$ [corrected]. Items responses were collected with a 6-point likert response scale ranging from 1 (*very UNTRUE of me*) to 6 (*very TRUE of me*). The complete instrument is contained in Appendix A.

Chronic Regulatory Focus. Lockwood et al. (2002) developed two 9-item self-report scales, one measuring chronic promotion focus ($\alpha = .81$), and one measuring chronic prevention focus ($\alpha = .75$). Both scales have been used effectively in empirical studies (e.g., DeCreamer et al., 2009; Righetti, Finkenauer, & Rosbult, 2012). Both measurement scales were used in the current study and all items utilized a 6-point likert response scale ranging from 1 (*very UNTRUE of me*) to 6 (*very TRUE of me*). The complete instrument is contained in Appendix A.

Analysis Plan

Item and exploratory factor analysis (EFA). Item analysis and EFA was used to refine the vigilance initial item pool and determine their underlying factor structure. Distributional properties of each item were analyzed as well as inter-item correlations, item-total correlations, and coefficient alpha if item deleted. Vigilance items flagged for removal included those with non-normal distributions, those that were not appropriately related to other items in the pool, and those that introduced a significant amount of unreliability into the vigilance scale.

Concurrently, items underwent EFA procedures using the initial sample of subjects ($n = 355$). Common factor analysis, using Principal Axis Factoring (PAF), was used to refine the vigilance initial item pool and determine the underlying factor structure. After refinement was completed, a broader EFA was initiated to evaluate the extent to which vigilance facets were unique from the empirically established MTQ facet scales. The second EFA used the same sample as that used to refine the initial vigilance item pool. Researchers have used the same sample to run narrow EFAs for instrument refinement and wider EFAs to establish the instrument's standing within a larger group measurement items (e.g., Heggstad & Kanfer, 2000; Horvath, et al, 2001).

The efficacy of PM, CE, and MRA's multi-dimensional measurement scales have all been established in empirical research (e.g. Bateman & Donovan, 2010; Heggstad & Kanfer, 2000; Hinsz & Jundt, 2005; Kanfer & Ackerman, 2000). Whether vigilance items reflect truly unique construct(s) depended, in part, upon their ability to emerge in an EFA that included items from empirically established MTQ facet measures. To the extent that vigilance items did not measure unique factors, the refined set of items would have loaded with items measuring the established MTQ facets. In such a case, factor structure from EFA of the initial vigilance item pool would have become distorted or would not have emerged in the same. According to best practice, a completely different sample was used to confirm the MTQ+V measurement structure.

Confirming vigilance and MTQ+V measurement model. Confirmatory Factor Analysis (CFA) was used to analyze the efficacy of the vigilance measurement scale and the overall MTQ+V measurement model using the hold-out sample ($n = 354$). The factor structure of the vigilance scale that emerged from EFA was confirmed using CFA, followed by CFA of the larger MTQ+V measurement model as they emerged from EFA.

In structural models, path coefficients between observed variables (items) and latent factors (i.e., PM, CE, MRA, and vigilance) represent factor loadings (λ) and will be analyzed for appropriate magnitude ($\lambda \geq .30$). Three indicators of goodness of fit were evaluated for each model using guidelines that simultaneously reduce the probability of Type-I and Type-II errors; χ^2 , SRMR $\leq .09$, RMSEA $\leq .06$, and CFI $\geq .95$ (Hu & Bentler, 1999). Alternative models were constructed and tested based on the findings of EFA and CFA procedures including highly correlated latent factors, modification indices, and localized areas of strain (standardized residual errors).

Study 1: Results

Item Analysis and EFA of Vigilance Initial Item Pool

Item and EFA analysis of vigilance items used the initial sample of 355 subjects and were guided by commonly used recommendations (Conway & Huffcutt, 2003; Fabrigar, Wegener, MacCallum & Strahan, 1999). Summary statistics and distribution indices for all 22 items are contained in Table 3. For 19 of 22 items, respondents used every point on the 6-point response scale. Exceptions were items 1, 3, and 17 where no respondents used the 1 = “Very UNTRUE of Me” response option. Means (3.86 – 4.78) and standard deviations (0.80 – 1.17) for all 22 items were not extreme for responses on a 6-point scale. Response distributions for all items approached symmetry with skewness values $< \pm 1.00$. Three items (6, 8, & 16) had large proportions of responses near the mean, resulting in distributions with “high-peaks” (i.e., kurtosis $> \pm 1.00$). However, histograms and P-P plots indicated that response distributions did not deviate severely enough from normal to justify item removal. Based on item and distribution analysis, all 22 items from the initial vigilance item pool were retained and included in EFA.

EFA procedures for vigilance items were performed using Principle Axis Factoring (PAF) to obtain parameter estimates with oblique (direct oblimin) rotation, assuming that emergent factors would be correlated. Items with communality estimates smaller than $\pm .30$ were removed under the assumption that common factors did not explain sufficient variance in such items (Fabrigar et al., 1999). After removal of each item, EFA was re-computed using the remaining items. Nine items of 22 (36%) items were removed with communality estimates below the $\pm .30$ threshold, leaving 13 vigilance items. The deleted items are presented in (Table 4).

Factor loadings, visual inspection of the scree plot, and theoretical interpretation were used to select factors underlying the remaining 13 vigilance items. To achieve simple structure,

items with primary loadings above .40 and no cross-loadings above .30 were retained (Swisher, Beckstead, & Bebeau, 2004). Inspection of the pattern matrix (Table 5) revealed strong primary factor loadings ranging, from .55 to .78, and no cross-loadings above .30. The pattern of factor loadings, combined with visual inspection of the scree plot (Figure 1), supported a two-factor solution that accounted for 54.26% of the variance in vigilance items. The first factor was labeled “diligence” (10 items) and accounted for 42.30% (Eigenvalue = 5.50) of the common variance. The second factor was labeled “error detection” (3 items) and accounted for an additional 11.96% (Eigenvalue = 1.56) of common variance.

EFA of MTQ+V

The 13 vigilance items were included with 48 MTQ items measuring PM, MRA, and CE in an EFA of the MTQ+V instrument (61 items). Data from the initial sample of 355 subjects were used, yielding a ratio of 5.49 subjects per measured variable. Assuming moderate final communalities (i.e., .40 and higher), a sample size of more than 200 is adequate to perform EFA (Fabrigar et al., 1999). Although a larger ratio of subjects to items would be preferred, Bartlett’s test of sphericity ($\chi^2 = 100084.75$, $df = 1770$, $p = .000$) and Kaiser-Meyer-Olkin measure of sampling adequacy ($KMO = .874$) both indicated that EFA procedures were appropriate with the sample of 355.

EFA was performed using PAF and oblique (direct oblimin) rotation. Items with communality estimates smaller than $\pm .30$ were removed from analysis, as were items with cross-loadings larger than $\pm .30$ (Fabrigar et al., 1999). The following items were removed from each MTQ+V scale; three CE items (9 remaining), eleven MRA items (8 remaining), seven PM items (9 remaining), and one vigilance item (12 remaining). Examination of the emergent structure

(Table 6) revealed that eight factors represent MTQ+V items, accounting for 60.12% of their shared variance.

The emergent MTQ+V structure is as follows: vigilance composed of diligence (9 items) and error detection (3 items) facets, CE composed of other referenced goals (3 items) and competition seeking (6 items) facets, MRA composed of worry (4 items) and emotionality (4 items) facets, and PM composed of mastery goals (5 items) and desire to learn (4 items) facets. Overall, EFA results support vigilance's addition to the MTQ and the MTQ+V measurement model. Additionally, the number of items retained measuring PM, CE, and MRA was reduced substantially. The sample may have contributed to low communality estimates observed for PM, MRA, and CE items but this is unlikely given that tests of sphericity and sampling adequacy indicated that the sample was adequate for EFA. The emergent factor structure and item sets from the current EFA were used as empirically-derived scales that best-represent vigilance, PM, MRA, and CE in the current sample.

Confirming the Vigilance Factor Structure

Confirmatory factor analysis (CFA) was used to test the 12-item vigilance scale using the hold-out sample of 354 respondents. The two-factor solution derived from EFA (Figure 2) was estimated using the covariance matrix as input and maximum likelihood estimation. Model fit was assessed using standardized root mean square residual (SRMR), root mean squared error of approximation (RMSEA), and comparative fit index (CFI). The following guidelines for optimal model fit were utilized: $SRMR \leq .09$, $RMSEA \leq .06$, and $CFI \geq .95$ (Hu & Bentler, 1999). Due to the large sample, χ^2 values are reported but they were not used as stand-alone indicators of model fit.

CFA confirmed the two-factor latent structure of the vigilance construct (Figure 2). Strong factor loadings were observed between items and the diligence and error detection factors (.55 to .79). Also, diligence and error detection were positively related ($r = .59, p < .05$). The estimated model demonstrated optimal fit [$\chi^2(53) = 90.85, p < .01$; SRMR = .04; RMSEA = .05; CFI = .98; AIC = 140.85]. One alternative model was estimated that included a single vigilance factor determining all the variance in items. The alternative model exhibited poor fit [$\chi^2(54) = 241.07, p < .01$; SRMR = .07; RMSEA = .10; CFI = .89; AIC = 289.07]. AIC values indicated that the two-factor model of vigilance is a better fit than the one-factor model (smaller AIC values indicate better overall model fit; $AIC_{\text{one-factor}} = 289.07 > AIC_{\text{two-factor}} = 140.85$). Overall, CFA using the holdout sample supported the two-factor vigilance construct composed of error detection and diligence facets.

Confirming the MTQ+V Measurement Model

Using the same hold-out sample ($n = 354$), CFA was conducted to evaluate the MTQ+V measurement model. One model included the empirically-derived MTQ+V with vigilance facet scales (diligence, 9 items; error detection, 3 items), CE facet scales (other referenced goals, 3 items; competition seeking, 6 items), MRA facet scales (worry, 4 items; emotionality, 4 items), and PM facet scales (mastery goals, 5 items; desire to learn, 4 items). A competing model was also estimated with the theoretical MTQ+V measurement model including the original PM (16 items), CE (13 items), and MRA (19 items) measurement scales along with vigilance (12 items). As before, covariance matrices served as input and each model was estimated using maximum likelihood estimation.

Initial estimation of the empirical model allowed all factors to freely correlate. Overall model fit was poor for the empirical MTQ+V model [$\chi^2(674) = 1563.59, p < .01$; SRMR = .07,

RMSEA = .06, CFI = .86, AIC = 1775.59]. To revise the model, factor correlations and modification indices were utilized. Eight factor intercorrelations approached zero, were not statistically significant, and were removed in the revised model. Modification indices also revealed that four items from the competition seeking scale (CS3, CS2, CS6, and CS5) demonstrated significant collinearity (i.e., correlated disturbance factors). In the revised model, these items were allowed to freely associate. The revised empirical MTQ+V measurement model (Figure 3) demonstrated adequate fit [$\chi^2(680) = 1483.29, p < .01$; SRMR = .07, RMSEA = .06, CFI = .87, AIC = 1683.29]. Additionally, χ^2_{diff} test and AIC values indicate that the revised empirical model is a significantly better fit to the data than the initial model [$\chi^2_{diff}(6) = 80.30, p < .05$; $AIC_{initial} = 1775.59 > AIC_{revised} = 1483.29$].

The revised empirical MTQ+V model was compared to the theoretical MTQ+V model that contain more PM, CE, and MRA items. In the theoretical model, the identical pattern of factor and disturbance correlations were retained as those in the revised empirical model. Overall, the theoretical model did not fit the data well [$\chi^2(1688) = 3801.34, p < .01$; SRMR = .09, RMSEA = .06, CFI = .80, AIC = 4085.34]. Also, AIC values indicate that the revised empirical MTQ+V model was a significantly better fit than the theoretical MTQ+V model [$AIC_{theoretical} = 3801.34 > AIC_{revised} = 1483.29$].

Overall, CFA confirmed the empirical MTQ+V measurement model that emerged from EFA using an independent sample. From Figure 3, strong loadings are observed between items and factors: emotionality and worry (MRA; λ 's = .56 to .78), error detection and diligence (vigilance; λ 's = .56 to .79), other referenced goals and competition seeking (λ 's = .59 to .85), and mastery goals and desire to learn (λ 's = .48 to .81). Table 7 presents factor intercorrelations shown in Figure 3. Note that eight factor intercorrelations were not estimated in the final CFA

model and marked “*NE*” (not estimated). Facets within second order motivational trait constructs were also strongly related; worry and emotionality ($\psi = .69$), diligence and error detection ($\psi = .59$), competition seeking and other referenced goals ($\psi = .73$), and mastery goals and desire to learn ($\psi = .73$).

Vigilance was significantly and positively related to MRA, a relationship that was carried entirely by a positive correlation between error detection ($\psi = .28$) and diligence ($\psi = .46$). MRA’s emotionality facet was not significantly related to either error detection or diligence. In retrospect, the nature of vigilance and MRA’s relationship is not surprising given that emotionality is indicative of fear and anxiety-based emotional responses while vigilance is based on effective behavioral strategies outside of classic anxiety responses.

It was not expected that vigilance would be related to CE and neither diligence nor error detection was significantly related to the competition seeking facet scale. In contradiction to the assumption that vigilance is a purely avoidant construct, error detection and diligence were significantly related to other referenced goals ($\psi = .22$ & $.17$, respectively). The nature of this relationship is not entirely surprising given that the behaviors associated with other referenced goals, error detection, and diligence are all related to personal effectiveness. The relationships between vigilance facets and PM facets also stand in opposition to the assumption that vigilance is avoidant in nature. Specifically, error detection and diligence were strongly related to mastery goals ($\psi = .53$ & $.67$, respectively) and desire to learn ($\psi = .50$ & $.53$, respectively).

Summary

Overall, results support vigilance as a meaningful addition to the MTQ measurement framework. EFA and CFA conducted with independent samples supported the latent structure of the MTQ+V. Vigilance emerged within the MTQ framework, a result suggesting that the

vigilance measurement scale captures aspects of the dispositional motivation construct space that are not assessed by MTQ facet scales. However, the fact that vigilance sub-facets were correlated with sub-facets of CE and PM is potentially problematic for the assumption that vigilance is an avoidant construct. To examine this issue further, a convergent – discriminant validity analysis was conducted to examine MTQ+V constructs in a broader nomological network; convergent and discriminant validity of MTQ+V traits in relation to extraversion, introversion, conscientiousness, chronic promotion focus, and chronic prevention focus.

Convergent – Discriminant Analysis

Using the combined sample of 709 subjects, *scale-level* (not item-level) intercorrelations were used as input for an EFA using PAF and oblimin rotation assuming correlated factors. A two-factor solution emerged that accounted for 61.09% of the variance amongst measurement scales (Table 8). The factors were labeled Approach and Avoidance, for distinct behavioral strategies associated with each construct, and factors were negatively correlated with one another ($r = -.11$).

From the pattern matrix (Table 8) most of study variables fell under approach and avoidance factors. PM and Promotion focus, both approach-oriented constructs, loaded strongly on the approach factor ($\lambda = .67$ & $.76$, respectively). MRA, Neuroticism, and Prevention focus as avoidance-oriented constructs loaded strongly on the avoidance factor ($\lambda = .77$, $.69$, & $.72$, respectively). Conscientiousness and Extraversion, which do not distinctly represent approach- or avoidance- oriented personality constructs, were not expected to load strongly on either the approach or avoidance factors. Extraversion supported that supposition by loading below $.40$ on both approach ($\lambda = .19$) and avoidance ($\lambda = -.38$). Conscientiousness, however, loaded significantly on the approach factor ($\lambda = .65$), suggesting that loadings may be driven, in part, by

common endorsement of effective regulatory behaviors rather than underlying approach or avoidance behavioral strategies.

All of that sets the stage for a critical finding that did not support my argument that vigilance is an avoidant construct. Specifically, vigilance loaded more strongly on the approach factor ($\lambda = .70$) than the avoidance factor ($\lambda = .30$). An alternative presentation of factor loadings can be found in the factor plot (Figure 4). Visual interpretation revealed that the vigilance factor aligns more closely with approach motivational traits than avoidance motivational traits. In total, convergent – discriminant analysis did not support the foundational argument that vigilance is reflective of a purely avoidant construct or indicative of chronic preferences for the prevention regulatory system.

Study 1: Discussion

Results of the Study 1 provided mixed support for the underlying expectation that vigilance is a truly novel motivational disposition in the avoidance-motivation domain. Under EFA, vigilance emerged as a reliable construct distinct from the broad and cohesive constructs included in the motivational trait framework (MTQ). As a stand-alone finding, EFA results suggest vigilance is a new and unique addition to the already cohesive motivational trait framework.

On the other hand, results from CFA of the MTQ+V and convergent – discriminant validity analysis (EFA) indicated that vigilance may not be a purely avoidance-oriented trait construct. The observed pattern of relationships suggests vigilance may be more strongly related to approach-oriented traits than avoidance-oriented traits. At least three explanations exist for the results observed in Study 1. First, counter to underlying arguments used to create the vigilance scale, vigilance may actually be an approach-oriented motivational trait. Given that vigilance

was defined, and measurement items were constructed, with positive outcomes framed in terms of non-losses (rather than gains) it is unlikely the measurement scales created herein reflect purely approach-oriented trait constructs.

Second, it may be that responses to vigilance and PM items are contaminated with an implied outcome effect. As noted in the literature review, approach-oriented items contain a positive valence as a result of content that implies a positive outcome of approach behaviors. Vigilance items were also designed to include positive valence with avoidant behaviors that imply a positive outcome. Thus, it may be that responses to vigilance items and PM items are contaminated by the positive valence implied by the positive outcomes within measurement items. The implied outcome effect, therefore, may be responsible for the strong relationship that vigilance has demonstrated with PM and other approach-oriented construct measures.

A third explanation is that all of the constructs included in the convergent – discriminant analysis are more accurately differentiated along axes of regulatory effectiveness and ineffectiveness. This includes conscientiousness, extraversion, and motivational dispositions (PM, CE, MRA, Chronic Promotion Focus, & Chronic Prevention Focus) that are typically differentiated along axes of approach and avoidance. Under this explanation it can be argued that the MTQ+V is measuring more than approach and avoidance motives and that the framework is also measuring broad judgements of motivational capabilities such as generalized self-efficacy.

Although initially conceived as a validation study for the vigilance measurement scale, Study 2 affords the opportunity to clarify the results of Study 1. More specifically, the validation paradigms in Study 2 will provide additional construct validity evidence for the vigilance measurement scales. Results will shed light on whether vigilance is best thought of as an avoidance motivational trait, or not, as well as the extent to which MTQ+V measurement items

reflect contamination as a result of implied outcomes. The validation study will provide evidence for whether motivational traits capture inherent preferences for approach or avoidance motives as hypothesized or if they capture highly specified aspects of a broader generalized self-efficacy construct. To clarify, “highly specified” in this instance would assume that PM and vigilance are sub-facets of generalized self-efficacy.

Study 2: Validating the Vigilance Construct

Validation Study Overview

The validation study tested alternative causal models reflecting relationships between motivational trait constructs, self-regulatory processes, and performance on tasks aligned with underlying approach and avoidance motivational systems. Two task protocols were designed: one aligning with the promotion regulatory system and one aligning with the prevention regulatory system. Using two unique task paradigms and a within-subject design, one hypothesized model and three alternative models were specified.

All models included the hypothesis that task-specific self-efficacy mediates relationships between motivational traits and task performance in accordance with regulatory fit expectations. For the promotion task, the hypothesis was that promotion task-specific self-efficacy mediates the relationship between PM and performance on promotion tasks (all positive relationships). Likewise for prevention tasks, prevention task-specific self-efficacy mediates the relationship between vigilance and performance on prevention tasks (all positive relationships).

The four models were differentially-based on different specifications of the role of MRA, potential for partial mediation instead of full mediation, and whether PM and vigilance are better conceptualized as complimentary dimensions measuring generalized self-efficacy (i.e., vigilance

and PM together assess generalized efficacy levels) instead of motivational traits that align approach and avoidance domains.

All four models in the validation study were specified prior to conducting psychometric analyses in Study 1. Given the findings from our first study, Model 1 and Model 4 take on more critical importance in helping shed light on the true axial dimension(s) that underlie the MTQ+V measurement model. Model 1 is consistent with the foundational argument that MTQ+V measurement scales assess distinct approach and avoidance motivational systems. Further, Model 1 assumes that MTQ+V constructs will differentially affect task performance based on congruence/fit between trait constructs and the nature of the task at hand.

Model 4, on the other hand, is consistent with the argument that MTQ+V measurement scales actually capture self-assessments of regulatory effectiveness or ineffectiveness in the form of specific aspects of generalized self-efficacy. Model 4 assumes that MTQ+V constructs do not differentially affect task performance but that all motivational traits will affect all tasks regardless of the promotion or prevention nature of the task.

Model 1: Hypothesized model. Figure 5 presents the hypothesized model which is also the most parsimonious explanation of the effect motivational traits have on task performance. In Model 1, motivational traits operate within distinct promotion and prevention regulatory systems, only affecting aligned task self-efficacies that fully mediate relationships with aligned task performance. Further, MRA was predicted to have unique, negative effects on both promotion and prevention-task self-efficacies.

Model 2: MRA as a moderator. The primary difference between Model 1 and Model 2 (Figure 6) is that MRA moderates relationships between motivational traits and task-specific self-efficacies rather than directly affecting efficacy levels. In Model 1, MRA directly affects

task-specific self-efficacies, whereas in Model 2 high levels of MRA negatively attenuate relationships between PM, vigilance, and corresponding task-specific self-efficacies. Product indicators (PM x MRA; vigilance x MRA) were created and included in the path model. Significant path coefficients between product indicator(s) and task-specific self-efficacies served as indicators that MRA functions as a significant moderator.

Model 3: Partial mediation model. Models 1 and 3 (Figure 7) only differ in that Model 3 posits that task-specific self-efficacies *partially* mediate relationships between motivational traits and task performance. Task-specific self-efficacy is the logical mediator choice, but it is possible that motivational traits have significant direct effects on task performance. Further it is possible motivational traits affect task performance through mediating variables that are not specified in the current set of structural models.

Model 4: Assuming alternative axial dimensions. The primary difference between Models 1 and 4 (Figure 8) is that PM and vigilance are predicted to affect efficacy levels for both tasks. As suggested in the results of Study 1, motivational traits may fall along axes of self-regulatory effectiveness and ineffectiveness rather than the originally hypothesized approach (promotion) and avoidance (prevention) dimensions. If effectiveness is the salient axial dimension, then it would be expected that vigilance and PM will positively affect efficacy and performance for all tasks, regardless of the extent to which the task is aligned with approach or avoidance motivational orientations. Though there are only two additional paths in Model 4, it does assume that PM and vigilance are complimentary motivational constructs providing an assessment of generalized self-efficacy rather than distinct approach and avoidance motives.

Method: Validation Study

Participants

For Study 2 data was collected from a sample of 238 college students enrolled in psychology and business courses at a large southeastern university. To be eligible for the experimental sessions in Study 2, subjects must have previously completed the battery of measurement scales in Study 1. Once complete, subjects were allowed to schedule an experimental session for which they received additional extra course credit. Because of the inherent flexibility of structural equation modeling (SEM), sample size requirements for adequate power in testing structural models are difficult to determine (Muthen & Muthen, 2002; Wolf, Harrington, Clark, & Miller, 2013). Recent research (Wolf et al., 2013) indicates that sample size requirements for testing any given structural model depends on a variety of factors, including: number of indicators per factor, magnitude of factor loading per indicator, number of hypothesized relationships in the model.

For the current study, adequate sample size was determined based on the simulations presented by Wolf et al. (2013) for regressive latent variable SEMs. Previous motivational traits research suggested that standardized regressive paths would likely vary between $\beta = .25$ and $\beta = .40$ for which Wolf et al. recommend a sample size between 180 and 440. High estimates of reliability for latent factors in the hypothesized models reduce sample size requirements. Thus it was assumed that 200 subjects would provide adequately stable model estimation. Responses from 238 subjects were collected to guard against incomplete or missing data.

Ninety five percent of subjects (225 of 238) completed the battery of measurements scales from Study 1, passed the attention-checks in the measurement scales, and completed all in-lab performance trials. Groups of up to 10 subjects participated in the same experimental

session under the same protocol. Each group of subjects were randomly assigned to either Condition 1 (promotion tasks followed by prevention tasks) or Condition 2 (prevention tasks followed by promotion tasks) to counterbalance the order of task presentation. Roughly equivalent numbers of subjects underwent Condition 1 (n=121) and Condition 2 (n=116). Prior to analysis, 4 (3%) Condition 1 subjects and 8 (7%) Condition 2 subjects were deleted due to incomplete experimental sessions or invalid questionnaire responses. In total 117 subjects provided complete data under Condition 1 and 108 provided complete data under Condition 2 yielding 225 responses for SEM analyses.

The entire sample consisted of 66 (29%) male and 159 (71%) female subjects. 3 (1%) subjects self-identified as American Indian/Alaskan Native, 22 (10%) as Asian or Pacific Islander, 6 (3%) as Black or African American, 13 (6%) as Hispanic or Latino, and 179 (80%) as White or Caucasian. Again, the demographic proportions were representative of the university population from which the sample was obtained. No differences were detected in the proportion of males and females across experimental conditions and the proportions of subjects within racial/ethnic categories across experimental conditions.

Tasks

Two very similar task paradigms were presented to all participants. Subjects were given a vignette presenting a hypothetical organization, assigning them to a specific role in that organization, and introducing them to a hypothetical supervisor. Following the vignette, email communications from the hypothetical supervisor introduced the task at hand and presented subjects with specific instructions for the task. All task material was presented via web-based survey software that timed each task trial. Vignettes and hypothetical email communications established either promotion or prevention contexts around the relatively simple performance

tasks. In the past, researchers have successfully used similar vignettes in the empirical study of motivational dispositions (e.g., Forster, Higgins, & Bianco, 2003; Frietas, Liberman, & Higgins, 2002; Kruglanski et al., 2000).

Promotion task. For three consecutive trials, subjects completed a brainstorming task in which they generated as many new and unique uses for simple office supply products (e.g., binder clip) as possible. The task is based on the “brick task” used in past regulatory focus studies (e.g., Freidman & Forster, 2001; Seibt & Forster, 2004). Effectiveness on creative tasks require eager strategies such as breaking mental sets, re-encoding of stimuli, and broadening memory searches (Amabile, 1996; Schooler & Melcher, 1995). Contextual information provided during the task protocol (via email communications) reinforced the idea that improved performance was associated with increasing gains.

Prevention task. For three consecutive trials, participants were directed to individually search for and mark discrepancies (in the form of typos) between an electronic master document and a paper document. This performance task is based on error detection tasks that have used successfully in dispositional psychological research (e.g., Forster, Higgins, & Bianco, 2003; Kruglanski et al., 2000; Revelle, 1987). In contrast to the promotion task, contextual information provided to participants during the prevention task (via email communications) reinforced the idea that improved levels of performance are associated with increasing non-losses.

Procedure

The validation study was carried out using a within-subjects design; all participants completed both the promotion and prevention tasks as an individual without the help of any of their peers or study personnel. Procedures took place in a proctored computer laboratory where participants were provided sufficient time to read and understand an informed consent form

describing the experimental session. After consent was given, subjects were provided with an oral description of the experimental session that explained the series of events they would complete. When all subjects acknowledged that they understood the experimental session events, they were instructed to begin their session using the computer terminal in front of them. All tasks were completed via Qualtrics® survey software with the exception of mark-up documents and red pens provided to participants for the prevention task trials. All sections of the protocol were timed to automatically move participants forward in the promotion and/or prevention task protocol. Including reading time, completion of the in-lab session took no longer than 1 hour to complete.

The first event subjects completed was a short demographic survey. In both conditions, participants were presented with the vignette describing an organization, assigning them an employee-role, and introducing the supervisor. Next, participants were presented with an email from their hypothetical supervisor that described the task at hand, provided instructions for completing the task, and introduced contextual information conveying either the promotion or prevention nature of the task.

Participants were then asked to set a nominal goal for the task (e.g., find 15 of 20 errors) and to complete a 10-item task-specific self-efficacy questionnaire. On the next screen, the performance trial commenced. Thereafter, subjects underwent the same sequence of events two additional times for three performance trials of either the promotion or prevention task. Between task protocols, a short break was given to participants. After the break, subjects were provided with the vignette introducing the second organization, assigning them a different employee-role, and introducing a different supervisor. The same sequence of events followed as for the first task

protocol: emails from the new supervisor providing a new set of instructions and new contextual information conveying either the promotion or prevention nature of the task.

Measures

Motivational traits + vigilance. The original MTQ-S (Heggestad & Kanfer, 2000; Kanfer & Ackerman, 2000) was completed by all study participants during Study 1 along with the initial vigilance item pool. However, MTQ+V scale scores are based on findings from the initial validation sample in Study 1. PM (9 items, $\alpha = .84$), MRA (8 items, $\alpha = .80$), and vigilance (12 items, $\alpha = .88$) scales were included in structural models. Items utilized a 6-point Likert response scale ranging from 1 (*very UNTRUE of me*) to 6 (*very TRUE of me*).

Task-specific self-efficacy. Likert-type measures of task-specific self-efficacy have demonstrated factor structure, reliability, and criterion validity in empirical studies of goal-directed behavior (Hafsteinsson, 2004; Maurer & Pierce, 1998; Phillips & Gully, 1997). Such scales were used to measure task-specific self-efficacy for the promotion task ($\alpha = .87$) and prevention task ($\alpha = .85$). Ten statements were adapted for each scale and demonstrated similarly high estimates of reliability as in previous research (e.g., Mone, 1994; Phillips & Gully, 1997; Wood & Locke, 1987). Responses were collected using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Task performance. For the promotion task, the indicator of task performance was the number of truly unique uses for office supply products generated by each respondent (Mean = 8.15 uses, SD = 3.55). Prior to data analysis each response was scored for redundancy and originality. Specifically, each use generated by participants was required to be new (not the original use of the office supply product) and unique (not redundant with other ideas generated by the subject). Where disagreement existed regarding the newness and/or uniqueness of each

item, two to three researchers discussed the discrepancy until consensus was reached. For the prevention task, the indicator of task performance was the number of accurately identified discrepancies that each participant marked on the paper form (Mean = 6.65, SD = 2.56). Only accurately identified discrepancies were used to determine the task performance measure.

Study 2: Results

Descriptive statistics and estimates of response distributions for composite variables and outcome variables are contained in Table 9. Response distributions for vigilance, PM, and MRA approximated normal (Skew. = -0.01 to -0.06; Kurt. = -.27 to .42). Response distributions for promotion and prevention-task self-efficacy scales were symmetric (Skew. = -.57 and -.80, respectively) as were response distributions for promotion and prevention task performance (Skew. = .84 and .11, respectively). Only two variables deviated from normal to any extent: prevention-task self-efficacy and promotion task performance were both heavy at the peak (Kurt. = 2.22 and 1.14, respectively) meaning that a high proportion of subjects returned values at or near the mean. Visual inspection of histograms for both variables (Figures 9 and 10) confirm that response distributions are “high at the peak” but that the overall distributions approximated normal. Given that both distributions were symmetric, it was decided that the observed levels of leptokurtosis did not justify transformation of the data prior to hypothesis testing.

Table 10 presents descriptive statistics and intercorrelations between study variables. Measurement scales demonstrated sufficient reliability with α 's ranging from .81 to .88. Promotion-task self-efficacy was positively related to promotion task performance ($r = .26$) as was prevention-task self-efficacy and prevention task performance ($r = .13$). Vigilance was not significantly correlated with self-efficacy or task performance measures ($r = -.02$ to $.06$). PM was significantly related to promotion-task self-efficacy ($r = .15$, $p < .05$) as well as prevention-task

self-efficacy ($r = .20, p < .05$). MRA was negatively related to promotion ($r = -.25, p < .05$) and prevention ($r = -.19, p < .05$) task self-efficacies.

Although it was not hypothesized, a significant relationship was found between promotion and prevention-task self-efficacies ($r = .27$). In retrospect, it was unrealistic to expect that subjects' efficacy judgments would be unrelated between the two task protocols. Individual differences in efficacy judgments likely exist across tasks due to generalized self-efficacy judgments (Chen, Gully, & Eden, 2001; Judge & Bono, 2001). As a result, promotion and prevention-task self-efficacy were allowed to covary in estimated models during the structural analyses presented below.

Multiple-groups analysis. Prior to estimating the hypothesized structural model and comparing it to alternative models, it was necessary to determine if the order of task presentation significantly impacted the configuration of study variables or any relationships between study variables. To test for the presence of an order effect using SEM, a multiple-groups analysis approach was employed (Kline, 2005). This approach estimated the structural model using data from two samples: subjects completing the promotion task first (Condition 1, $n = 117$) and subjects completing the prevention task first (Condition 2, $n = 108$). SEM software (AMOS 23, covariance matrices as input & maximum likelihood estimation) was used to conduct the multiple-groups analysis and test for the presence of an order effect.

The first step in multiple-groups analysis is a test of configural invariance of the structural model. Configural invariance exists when the overall set of variables and specified interrelationships included in the model adequately explain the observed data for both Condition 1 and Condition 2. In the test for configural invariance, all specified paths are free to vary (i.e.,

the unconstrained model) and the pooled covariance matrix from both samples is used to estimate global fit.

High levels of global fit indicate that the specified model adequately fits *for both groups/conditions* and that the configuration of variables and interrelationships are accurate for both groups. Low levels of global fit indicate the specified model, in its entirety, is not sufficiently represented by one or both groups. The multiple-groups analysis started with Model 1 because it is the most parsimonious model. Upon estimation, Model 1 provided adequate fit [$\chi^2(24) = 37.12, p = .04; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12$] and configural invariance was established for Model 1.

The next step in multiple-groups analysis is a test of order effects among individual path coefficients across conditions. To test for order effects in Model 1, seven different models were specified, one for each hypothesized path coefficient. Within each model, a single path coefficient was constrained to be equal across Condition 1 and Condition 2, disallowing variance in the path coefficient between conditions. For each of the seven constrained models, detection of an order effect is based on comparison of fit statistics between the constrained model and the unconstrained model. The Chi-Square difference test allows detection of significantly worse fit between the constrained model and the unconstrained model. Significantly worse model fit for any constrained model would mean the constrained path does vary significantly between conditions and there is a significant order effect for the constrained path.

Table 11 presents the results of the test for order effects for Model 1, including the Chi-Square fit statistic for the unconstrained model, the constrained path for each constrained model, the corresponding estimated path coefficients for Condition 1 and Condition 2, Chi-Square goodness-of-fit statistics for constrained models, and the associated Chi-Square difference test.

Only one structural path indicated the presence of a significant order effect; the VIG1 model which constrained the relationship between vigilance and prevention-task self-efficacy ($\chi^2_{\text{unconstrained}}^{(24)} = 37.12$; $\chi^2_{\text{VIG1}}^{(25)} = 41.50$; $\chi^2_{\text{diff}} = 4.39$ (1), $p < .05$). Upon further inspection, vigilance failed to affect prevention-task self-efficacy ($\beta_{\text{condition1}} = -.01$) for subjects completing the promotion task first, but was a significant predictor of prevention-task self-efficacy ($\beta_{\text{condition2}} = .29$) for subjects completing the prevention task first.

Given that the path between vigilance and prevention-task self-efficacy is estimated in all four models being tested, it was assumed that an order effect was present in all further analyses. Thus, path coefficients were estimated separately for each Condition when evaluating all four models. In SEM, sample sizes of less than 200 may result in artificially inflated standard errors for path coefficients which, in turn, may reduce the power of each path coefficient's significance test. Assuming that smaller sample sizes have increased the likelihood of Type-II errors, alpha for path coefficients' significance tests were relaxed from $p = .05$ to $p = .10$.

Comparing structural model fit. Global fit for Models 1 – 4 were evaluated using χ^2 , standard root mean residual (SRMR), comparative fit index (CFI), root mean squared error of approximation (RMSEA), and Akaike information criterion (AIC). The following cut-offs were used as criteria for adequate model fit; $\text{SRMR} \leq .09$, $\text{CFI} \geq .95$, and $\text{RMSEA} \leq .06$. Acceptable model fit was established if two of three fit statistics exceeded prescribed cut-offs (cf. Hu & Bentler, 1999). Competing models were compared with χ^2_{diff} calculations for nested models and AIC estimates for models with unique sets of latent variables. Significant χ^2_{diff} values and smaller AIC values were both considered indicators of superior model fit. A summary of model comparisons is presented in Table 12.

The hypothesized Model 1 (see Figure 5) achieved adequate fit [$\chi^2(24) = 37.12, p = .04$; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12]. A summary of Model 1's path coefficients (with significance levels) is presented in Table 13. Figures 11 and 12 present estimated structural models with path coefficients for participants in Condition 1 (promotion task first) and Condition 2 (prevention task first), respectively. When subjects completed the promotion task first (Figure 11) the proposed regulatory fit effect, where motivational traits and task-specific self-efficacies affect performance within commensurate promotion or prevention systems, was not supported. Specifically, PM levels did not significantly affect promotion-task self-efficacy levels ($\beta = .11, p > .10$) and vigilance levels did not significantly affect prevention-task self-efficacy levels ($\beta = -.01, p > .10$). MRA, on the other hand, did function as predicted; higher MRA levels were associated with lower levels of task-specific self-efficacy for both tasks ($\beta = -.26$ & $-.25, p < .10$).

When participants completed the prevention task first (Condition 2, Figure 12), estimates from Model 1 fully supported the proposed regulatory fit effects where motivation traits affect task-specific self-efficacies within commensurate promotion and prevention systems. Like in Condition 1, higher levels of MRA were associated with lower levels of task-specific self-efficacy ($\beta = -.27$ & $-.23, p < .10$). Unlike Condition 1, in Condition 2 increasing levels of vigilance were associated with increasing levels of prevention-task self-efficacy ($\beta = .29, p < .10$) and increasing levels of PM were associated with increasing levels of promotion-task self-efficacy ($\beta = .19, p < .10$). Across conditions, high levels of task-specific self-efficacies did lead to higher levels of promotion and prevention task performance ($\beta = .19$ to $.31, p < .10$). The sole exception was in Condition 2 where prevention-task self-efficacy was not a significant predictor of prevention task performance ($\beta = .09, p > .10$).

Model 2, with MRA specified as a moderator variable (see Figure 6), also demonstrated adequate fit [$\chi^2(40) = 55.14, p = .06$; SRMR = .07; CFI = .94; RMSEA = .04; AIC = 155.16]. However, comparison of AIC values for Model 1 and Model 2 in Table 12 indicated that Model 1 provided superior fit ($AIC_{Model2} = 155.16 > AIC_{Model1} = 101.12$). Model 3 was the same as Model 1 except that partial mediation was assumed instead of full mediation (see Figure 7). As seen in Table 12, Model 3 did not adequately fit the data [$\chi^2(16) = 31.02, p = .01$; SRMR = .05; CFI = .92; RMSEA = .07; AIC = 111.02]. Further, direct comparison of Model 3 and Model 1 via χ^2_{diff} test revealed that Model 1 had superior fit [Table 12; $\chi^2_{diff}(8) = 6.10 < 15.51^{crit.}$].

Model 4 evaluated the argument that PM and vigilance may be complimentary dimensions of a more specified measure of generalized self-efficacy instead of distinct approach and avoidance measures of motivational traits (see Figure 8). The only difference between Model 1 and Model 4 was the addition of paths between PM and prevention-task self-efficacy (positive relationship) and between vigilance and promotion-task self-efficacy (positive relationship). Model 4 provided acceptable levels of global fit [$\chi^2(20) = 28.42, p = .10$; SRMR = .06; CFI = .95; RMSEA = .04; AIC = 100.43]. However, direct comparison Model 1 to Model 4 indicated no significant difference in fit from Model 4 to Model 1 [Table 12; $\chi^2_{diff}(4) = 8.69 < 9.49^{crit.}$].

When comparing and selecting nested models, the best practice is to choose the most parsimonious (and restrictive) model (Mueller & Hancock, 2008) that offers no significant erosion in model fit. This guideline prevents researchers from favoring models that approach saturation or over specification and aids researchers in finding the most parsimonious explanation of the observed data. Additionally, in Model 4, estimated path coefficients from vigilance to promotion-task self-efficacy were not significant in either experimental condition – a

finding that did not support Model 4's argument that vigilance is a sub-facet of generalized self-efficacy.

Study 2: Discussion

Task-specific self-efficacy. The current study added to the corpus of empirical evidence that task-specific self-efficacy is a critical mediator between motivational traits and task performance. Task-specific self-efficacy was a significant predictor of task performance for both error detection and creativity tasks. The sole exception was in Condition 2 where subjects' efficacy judgments for the error-detection task were not related to task performance. Despite the non-significant path estimate, task-specific self-efficacy is widely accepted as a causal antecedent of task performance (Arshadi, 2009; Bandura, 1989; Bateman & Donovan, 2010; Diefendorff et al., 2005; Heimerdinger & Hinsz, 2008; Hinsz & Jundt, 2005; Locke & Latham, 2002) and this specific path coefficient is likely to be an aberration. Overall, the relationship between task-specific self-efficacy and task performance within commensurate promotion and prevention regulatory systems was stable.

Ineffective avoidance, effective avoidance, and self-efficacy levels. Several findings of interest emerged from the structural models tested. The most consistent of which was MRA's emergence as a robust causal antecedent of task performance through task-specific self-efficacy. MRA's consistency in Study 2 was surprising given that ineffective avoidance-oriented dispositions do not typically emerge as stable antecedents of self-regulation and performance. In Study 2, however, MRA was the only motivational trait construct causally linked to efficacy levels for the creativity task ($\beta_{\text{cond.1}} = -.26$, $\beta_{\text{cond.2}} = -.27$, $p < .10$) and the error-detection task ($\beta_{\text{cond.1}} = -.25$, $\beta_{\text{cond.2}} = -.23$, $p < .10$), regardless of the order of task presentation.

Vigilance, by comparison, was partially supported as a predictor of efficacy levels in Study 2. Vigilance affected efficacy for the error-detection task when the error detection task was presented first ($\beta_{\text{cond.2}} = .29, p < .10$), but vigilance had no effect on efficacy levels when the creativity task was presented first ($\beta_{\text{cond.1}} = -.01, p > .10$). MRA and vigilance each had a unique pattern of relationships with prevention-task self-efficacy, suggesting that they each account for unique variance when affecting efficacy levels. Thus, findings support the supposition that vigilance is a unique construct within the known avoidance-oriented motivational trait realm. Recognizing the current validity study has significant methodological limitations; results do support further inquiry into vigilance as an antecedent of effective avoidance strategies in models of motivated behavior.

Regulatory fit linking motivational traits and task performance. The results of Condition 2, where subjects completed the error detection task first, support promotion and prevention dimensions as a link between motivational traits, regulatory strategies, and tasks/contexts. Vigilance was a positive predictor of self-efficacy for an error-detection task that rewarded avoidance strategies ($\beta = .29, p < .10$), while PM was predictive of efficacy for a creativity task that rewarded promotion strategies ($\beta = .19, p < .10$). As a purely debilitating construct, MRA was a significant negative predictor of efficacy judgments for both tasks ($\beta = -.27, \beta = -.23, p < .10$). Additionally, competing structural models that crossed commensurate dimension did not provide any significant improvements to global model fit (Table 12). The findings of Condition 2 supported the use of promotion and prevention regulatory systems as a salient link between distal motivational trait constructs, self-regulatory processes, and performance on tasks that reward approach or avoidance strategies.

Order effect. Prior to analysis, it was assumed that the promotion task and prevention task protocols in Study 2 would provide unique experiences for subjects and mitigate possible order effects from the within-subjects design. However, multiple-group analysis revealed that the order of task presentation changed the relationship between motivational traits and task-specific self-efficacies. Tasks were carefully designed to mimic vignettes and low-fidelity simulations that have been used in previous studies of promotion and prevention regulatory strategies. Thus, we do not believe the nature of the tasks were responsible for the order effect. However, previous studies (e.g., Forster, Higgins, & Bianco, 2003; Friedman & Forster, 2001; Kruglanski, et al, 2000) did not use within-subjects designs that presented *both* promotion and prevention tasks to all subjects in a short period of time. In retrospect, the use of a within-subjects design was not the optimal strategy for validating the vigilance construct. In future study, a more rigorous test of vigilance's predictive validity may be achieved using between-subjects experimental designs.

Possible sources of measurement contamination. From Study 1, two possible sources of measurement contamination were detected as a result of adding vigilance to the motivational trait framework. To the extent that MTQ+V items are contaminated with an implied outcome effect, it would have been expected that vigilance and PM would not predict efficacy for the same task in Study 2. To the extent that MTQ+V items are contaminated with generalized self-efficacy, it would be expected that vigilance and PM predict efficacy levels for the same task in Study 2. Overall, results in this vein are indeterminate. Results supported Model 1 in Condition 2 which suggests the source of shared variance between vigilance and PM is not predictive of efficacy for the same task. That support is tenuous, however, because support for Model 1 is not stable across experimental conditions. Additionally, Model 4 also provided adequate fit to the

data, implying that PM and vigilance may predict efficacy levels for the same tasks and that measurement items may, in fact, be contaminated with generalized self-efficacy.

General Discussion

Vigilance as an approach or an avoidance construct

The vigilance construct was defined and measured in response to a potential construct deficiency in motivation research whereby effective aspects of the avoidance motive have mostly been ignored. The emergence of a vigilance construct suggests that vigilance is tapping heretofore unmeasured aspect of motivational traits. As such, the addition of vigilance to the corpus of motivational dispositions has the potential to enable researchers to link motivational dispositions to behaviors across a wider range of tasks and/or contexts.

However, vigilance scores demonstrated an unexpected pattern of convergent relationships with approach-oriented motivational constructs. Specifically, CFA indicated that vigilance facet scores were more strongly related to PM facet scores than to MRA facet scores. In addition, convergent – discriminant validity analysis revealed that vigilance scores were more meaningfully aligned with constructs that represent facets of approach-orientation (e.g., Chronic Promotion Focus and Conscientiousness) than with constructs that represent facets of avoidance-orientation (e.g., Chronic Prevention Focus and Neuroticism).

Vigilance's construct validity. There are several possible explanations of why vigilance aligns more strongly with approach-oriented constructs than with avoidance-oriented constructs. First, it may be that all measurement items are contaminated with a social desirability bias to endorse effective behaviors. However, the MTQ+V's emergent factor structure supports four independent constructs, rather than a unidimensional factor structure which would be an indicator of a strong social desirability bias in measurement items. Thus, it is unlikely that

pervasive social desirability in measurement items explain the unexpected alignment between vigilance and approach-oriented constructs.

A different source of measurement bias is more likely considering that vigilance measurement items were designed with an implied positive valence (all items imply regulatory effectiveness). As noted in the literature review, self-report items generally confound the implied valence of a hypothetical outcome with motivational orientation. Thus, it is possible that including implied positive outcomes in vigilance items has systematically contaminated them with the same implied valence as items assessing approach-oriented constructs like PM. Under the implied outcome assumption, all measurement scales using positively-valenced items are likely to demonstrate a positive relationship reflecting the implied valence of items rather than the approach or avoidance regulatory strategies described in each item.

In an attempt to evaluate if systematic bias was present in the MTQ+V measurement items, a post-hoc analysis was conducted in which all scores were standardized within subjects and factor correlations were re-analyzed. As described by McDaniel et al. (2011), standardizing scores within subjects eliminates spurious positive relationships between independent constructs that are measured with the same method. Assuming vigilance and PM are distinct constructs, standardized intercorrelations should be either insignificant or negative. Upon analysis, the correlation between diligence and desire to learn scores were no longer significant as was the correlation between error detection and mastery goals. The correlations between error detection and desire to learn scores remained significant ($r = .15$) as did the correlation between diligence and mastery goal scores ($r = .08$). Interestingly, the standardized correlations between vigilance facets and MRA facets were also negative or insignificant. Findings from this post-hoc analysis revealed that vigilance is unique from MRA but that it is likely to share some construct variance

with PM through error detection's relationship with desire to learn and diligence's relationship with mastery goals.

It may also be that the introduction of vigilance measurement items to the MTQ+V framework has exposed a systematic difficulty when using self-report measures to assess approach and avoidance motivation. Vigilance's alignment with PM implied that measurement items may be capturing approach or avoidance motivational preferences and simultaneously capturing individual levels of generalized self-efficacy as a contaminant. There is a substantive body of research demonstrating that higher levels of generalized self-efficacy predict higher levels of task-specific self-efficacy and higher levels of task performance (e.g., Chen et al., 2000; Chen, Gully, & Eden, 2001; Judge & Bono, 2001); a model which fits empirical findings from MTQ studies (e.g., Hinsz & Jundt, 2005) and the current MTQ+V validation effort. This is not to say that the approach/avoidance distinction is invalid, rather, that the addition of vigilance items to the MTQ+V has made it possible to detect a contaminating construct, most likely generalized self-efficacy, that has previously gone undetected.

Vigilance in Models of Task Performance

Results from Study 2 partially supported one of the original propositions of study and a pervasive proposition in motivation research; that motivational traits mediate task performance through task-specific self-efficacy. Reviews of motivation research (e.g., Diefendorff & Chandler, 2011; Kanfer, 1990) generally posit that distal person constructs, such as motivational traits, affect goal striving and motivated behavior through proximal person influences such as task-specific self-efficacy. More specifically, Diefendorff and Chandler's review (2011, pp. 91) indicated that task-specific self-efficacy levels determine effort levels and performance early in the goal adoption and performance cycle but that relationship may deteriorate over iterative

performance cycles. In the context of the present study, where subjects' efficacy levels were measured during their first attempt to perform the laboratory task, it is consistent with research that task-specific self-efficacy would determine performance levels.

Further, results from Study 2 supported Model 1, which specified that motivational traits (as distal person influences) influence task performance through task-specific self-efficacy levels (as proximal person influences). Alternative models specified MRA as a moderator (Model 2) and partially-mediated relationships between motivational traits and task performance (Model 3). Model 2 did not improve global fit over Model 1 and Model 3 did not provide adequate fit to the data. As such, results supported the supposition that task-specific self-efficacy levels are a critical proximal pathway through which distal constructs, like motivational traits, affect task performance; especially early-on in goal striving and performance.

Condition 2 in study 2 provided the strongest evidence for the hypothesized effects of motivational traits on task-specific self-efficacy and task performance (See Figure 12). The only path that did not emerge as expected was the link between prevention-task self-efficacy and task performance. The evidence that task-specific self-efficacy affects task performance is substantial (e.g., Arshadi, 2009; Bandura, 1989; Bateman & Donovan, 2010; Diefendorff et al., 2005; Heimerdinger & Hinsz, 2008; Hinsz & Jundt, 2005; Locke & Latham, 2002), therefore, the failure of this path to reach statistical significance is likely due to sampling error.

Results from Condition 1 did not support the hypothesized effects of PM and vigilance on task-specific self-efficacy and task performance (See Figure 11). Yet, both promotion- and prevention-task self-efficacies were related to performance as predicted. Any explanation of the order effect – performing the creativity task first versus performing the error detection task first significantly impacted estimation of path coefficients – is purely speculative. Nonetheless,

failure to support path coefficients in Model 1 under Condition 1 does raise concerns about the validity of supportive results found under Condition 2.

Methodological Limitations

The most significant methodological issue in Study 2 is the use of a within-subjects design and the resulting order effect. The order effect detrimentally affected the statistical power of all path coefficient estimations. Although the order effect did not degrade the stability of global fit estimates during SEM, it did degrade any capability to interpret relationships between motivational traits, efficacy, and performance without recognizing potential sampling error. In Condition 2 PM and vigilance were significant predictors of efficacy levels for aligned tasks, but in Condition 1 PM was not significantly related to promotion-task self-efficacy and vigilance's relationship with prevention-task self-efficacy approached zero. All that can be said with confidence is that Study 2 offered a minimum amount of support for the proposition that vigilance is a significant determinant of task-specific self-efficacy for prevention tasks and that additional research will be required to the predictive validity of vigilance using more robust between-subjects experimental designs.

Additionally, low fidelity experimental tasks were used in Study 2 and classified as promotion and prevention tasks. Although similar tasks have been used successfully in regulatory focus research, I do not believe that either has been used in tandem with the other in a single research study. Thus, it is possible that these two tasks were not sufficiently distinct to illicit strictly promotion-focused or strictly prevention-focused behavioral strategies. Rather, it may be the case that participants initiated the same, or similar, strategies for both tasks. Given the care taken to design each task and ensure that each rewarded gains or non-losses, it is unlikely that this is the case. Alternatively, if motivational trait measures are contaminated with

generalized self-efficacy then the promotion or prevention nature of each task would be rendered mute as traits would be related to efficacy and performance across all tasks.

Future Directions

Future psychometric studies. Results from Study 1 highlight two significant challenges facing researchers who wish to measure approach and avoidance motivational dispositions using self-report measures. First, measurement items may contain a systematic bias as a result of implied outcomes. Future research may consider revising items to include only behavioral descriptions (e.g., “I am careful”, “I consider risks”, etc.) and to remove positive and negative valences from items (e.g., “I am successful”, “I am good”, etc.). Thus, respondents may focus more on the approach or avoidance strategies that are described within each item. It is my opinion, however, that complete removal of item valences is not feasible because valence will be implied by respondents upon interpretation of each item.

A more simple psychometric approach may be considered by researchers who wish to account for potential contamination by implied outcomes. In CFA, it is possible to model the implied outcome effect as a super-ordinate factor across all measurement items. In this case, items would need to be classified based on whether they include a positive or a negative valence and then a valence factor can be modeled that accounts for the valence in the item responses. Thus, the remaining factor correlations would be estimated independent of the implied positive or negative outcomes within the item and a more specific set of factor intercorrelations amongst approach and avoidance constructs could be captured.

The second significant challenge is that results of the current study suggest approach and avoidance self-report items may also be capturing specific aspects of generalized self-efficacy. To evaluate this possibility, researchers may consider including a measure of generalized self-

efficacy (e.g., Judge, Bono, & Locke, 2000) with the MTQ+V in a single psychometric study. A simple EFA would be sufficient to determine if MTQ+V items are distinguishable from generalized self-efficacy items and provide a factor structure of the MTQ+V while accounting for the potential contamination of generalized self-efficacy. A follow-up CFA may also be used to validate the factor structure from EFA and confirm the measurement model of the MTQ+V independent of the effects of generalized self-efficacy. Also, a convergent – discriminant analysis including generalized self-efficacy, MTQ+V measures, and other approach/avoidance construct measures would provide important construct validity evidence for MTQ+V constructs. In sum, psychometric analyses of MTQ+V items with generalized self-efficacy items would help determine if items used to measure approach and avoidance dispositions are contaminated with generalized self-efficacy.

Future Causal Modeling Studies. First and foremost, future researchers should avoid the possibility of an order effect when using multiple-task paradigms and utilize between-subjects experimental designs to test the effects of motivational traits on efficacy and performance. Second, MTQ+V items may be contaminated with generalized self-efficacy, thus, future validity research will need to include a measure of generalized self-efficacy and control for that construct in some manner. Third, the current study used low-fidelity tasks to differentiate between promotion and prevention tasks. Future researchers may consider gathering data from applied settings for empirical study and categorizing tasks in terms of those that reward promotion or prevention strategies. For instance, a prevention task in an applied setting would be one that rewards safety-related behaviors with performance categorized in terms of achieving non-losses and avoiding losses. Conversely, a promotion task would be one that rewards

approach behaviors with performance categorized in terms of achieving gains and avoiding non-gains (e.g., learning or training behaviors).

Person-centered approaches. Researchers may choose to forego the use of a variable approach to empirical study of motivational traits and consider using a person- or pattern- approach to motivational traits. Researchers in leadership (e.g., Foti & Hauenstein, 2007; O’Shea et al., 2009) and personality (Conte et al., 2017) have used person-centric approaches to describe meaningful constellations of dispositional constructs that relate to outcomes such as leadership emergence, job performance, and attrition. Pattern- or person-centric approaches have not focused on motivational dispositions and have yet to integrate effective avoidance constructs such as vigilance into meaningful patterns. In motivation research, the addition of vigilance to the motivational trait framework allows researchers to identify of a greater variety of meaningful person-patterns. Consider, for instance high-performance profiles that include individuals who are high on effective avoidance (vigilance), effective approach (PM), and low on ineffective avoidance (MRA). It may be that patterns of motivational traits are more predictive of efficacy and performance across contexts than are individual levels of each motivational trait.

Goal-revision processes. A recent review of work motivation processes highlighted that discrepancy-reduction is a basic and universal motivational processes (Diefendorff & Chandler, 2011). The current study attempted to validate the vigilance construct using a within-episode design where a task description was provided, task-specific self-efficacy levels were assessed, and task performance was carried out. Diefendorff and Chandler (2011) may argue that this design misses a significant part of the motivation process; the effect of motivational traits on goal processes between performance episodes.

Thus, a more accurate study of the predictive validity of motivational traits, including vigilance, would focus on relationships with goal-revision processes from one performance episode to the next. Consider a situation where goals levels were much higher than task performance levels, creating a large negative goal-performance discrepancy. In this context, highly vigilant individuals are likely to reduce their task-specific self-efficacy levels and revise their goals downward severely. On the other hand, individuals with high standing on PM are not likely to reduce their task-specific self-efficacy levels or goal levels severely. In this type of study, the predictive validity of motivational traits would manifest in their ability to differentially affect proximal person processes (e.g., self-efficacy) and goal-revision processes between performance episodes.

A word about MRA and implications for future research. In most empirical research, approach-oriented constructs associated with regulatory effectiveness, such as PM, are the most consistent predictors of self-efficacy levels and task performance. In the current study, however, the ineffective-avoidance construct MRA was the most consistent predictor of efficacy levels and task performance. Where PM levels significantly predicted promotion-task self-efficacy levels under Condition 2 only, MRA was a significant predictor of promotion and prevention-task self-efficacy across both experimental conditions. Moving forward, researchers may need to reconsider the importance of avoidance-oriented motivational dispositions when explaining performance.

The findings presented herein are sufficient to suggest that avoidance-oriented traits are also consistent predictors of performance. Results also suggest that MRA and PM each bring unique predictive capabilities to different tasks, such as error detection, as well as the same task,

such as creativity. Additional research will be required to clarify which motivational traits are the most powerful predictors of self-regulation and performance in various situations.

Conclusions

Psychometric evidence supports vigilance as a meaningful addition to the motivational traits framework. Evidence suggests that vigilance items capture unique information that is not assessed by existing motivational trait items. Additional evidence provided a minimum amount of support that vigilance is capable of predicting task-specific self-efficacy for tasks that reward the prevention regulatory system. As a whole, the present studies provide minimal support for vigilance as a valid predictor of efficacy levels in models of motivated behavior and for the use of promotion and prevention regulatory systems as a link between motivational traits and task performance. Further research is required, using more robust between-subjects methodologies, to evaluate the predictive validity of vigilance and whether it is appropriate to use commensurate promotion and prevention regulatory systems to connect traits and situations.

Construct validity evidence for vigilance is open to a variety of interpretations at this point. The present study did not determine whether vigilance is best characterized as an avoidance-oriented construct or an approach-oriented construct. We did determine that vigilance is more strongly related to approach-oriented constructs than avoidance-oriented constructs but equivocal evidence suggests that this relationship may be the product of measurement contamination.

By adding vigilance items to the MTQ measurement framework, it became possible to detect two potential sources of measurement error that may pervade self-report measures of approach and avoidance motivational constructs. First, approach and avoidance items may be contaminated by an implied outcome factor where items written with positive or negative

regulatory outcomes are related to each other regardless of the approach or avoidance strategies described within them. Thus, the positive valence inherent in vigilance, PM, and items from other measurement scales with implied positive outcomes, result in strong factor correlations.

Second, it may be the case that approach and avoidance items are contaminated with a broader generalized self-efficacy factor. Again, this source of contamination would not have been detected prior to the addition of vigilance items to measures of motivational traits. In this case, it may be that respondents reflect on broad judgements of their ability to be effective across situations to respond to approach and avoidance motivational items. The result of which is that approach and avoidance items are not differentiated solely on motivational orientations but also on regulatory effectiveness or ineffectiveness.

In either the implied outcomes case or the generalized self-efficacy case, the results of the present study beg the question – “Is it possible to measure approach and avoidance constructs, and only approach and avoidance constructs, using self-report measures?” Suggestions put forth include the removal of item valence from self-report items and controlling for generalized self-efficacy in further psychometric studies. Until the contamination issue can be resolved, researchers should be advised to include measures of generalized self-efficacy in validation studies that use motivational traits, or other approach and avoidance constructs, to determine their unique predictive contributions over that of generalized self-efficacy.

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Appendices

Appendix A: Study 1 Measures

Motivational Trait Questionnaire (MTQ + vigilance Initial Item Pool)

Response Scale:

1 = “Very UNTRUE of Me”, 2 = “UNTRUE of Me”, 3 = “Somewhat UNTRUE of Me”, 4 = “Somewhat TRUE of ME”, 5 = ‘TRUE of Me”, 6 = “Very TRUE of me”.

Personal Mastery (PM)

Desire to Learn

1. When I become interested in something, I try to learn as much about it as I can.
2. When I am learning something new, I try to understand it completely.
3. Even when I have studied hard enough to get a good grade, I study more because I want to completely understand the material.
4. I like to take classes that challenge me.
5. I am an intellectually curious person.
6. I prefer activities that provide me the opportunity to learn something new.
7. I am naturally motivated to learn.
8. I thirst for knowledge.

Mastery Goals

1. I set goals as a way to improve my performance.
2. If I already do something well, I don't see the need to challenge myself to do better. (R)
3. When learning something new, I focus on improving my performance.
4. I compete with myself -- challenging myself to do things better than I have done before.
5. I set high standards for myself and work toward achieving them.
6. I work hard at everything I undertake until I am satisfied with the result.
7. I do not set difficult goals for myself. (R)
8. My personal standards often exceed those required for the successful completion of a project.

Competitive Excellence (CE)

Other Referenced Goals

1. It really upsets me when someone does something better than I do.
2. I tend to put extra effort into tasks that involve competition with others.
3. It is important for me to outperform my co-workers.
4. Whether or not I feel good about my performance depends on how it compares to the performance of others.
5. I am motivated to do things better than others.
6. I strive to do my job better than the people I work with.
7. I compare my performance to that of others.

Competition Seeking

1. I perform best when I compete with others.
2. I am not a competitive person. (R)

3. I try to avoid competitive situations. (R)
4. I would rather cooperate than compete. (R)
5. I like to turn things into a competition.
6. Even in non-competitive situations, I find ways to compete with others.

Motivation Related to Anxiety (MRA)

Worry

1. When working on important projects, I am constantly fearful that I will make a mistake.
2. I do not get nervous in achievement settings. (R)
3. I am unconcerned even if I know that other people are forming an unfavorable impression of me. (R)
4. Before beginning an important project, I think of the consequences of failing.
5. I am afraid of other people noticing my shortcomings.
6. I get nervous just thinking about having an important project evaluated.
7. I worry about the possibility of failure.
8. I get tense when other people assess my progress.
9. I worry about how others will view my work performance.
10. I am cautious about trying to do something that could lead to embarrassment.

Emotionality

1. If I know someone is judging me, I get so focused on how I am doing that I have difficulty concentrating on the task.
2. My heart beats fast before I begin difficult tasks.
3. I have trouble relaxing because I worry about things at work.
4. I am unable to concentrate fully in stressful situations.
5. I get headaches when I have a lot of important things to do.
6. I am able to remain calm and relaxed in stressful situations. (R)
7. I am able to remain calm and relaxed before I take a test. (R)
8. I get an uneasy feeling in my stomach when working toward something I really want to accomplish.
9. I lose sleep because I am troubled by thoughts of failure.

vigilance (Initial Item Pool)

1. I successfully avoid negative outcomes because I am good at forecasting threats.
2. I am often successful because I attend to details most people do not bother with.
3. I am good at successfully moving forward while reducing risk at the same time.
4. I like to make decisions only after I have given them their due diligence.
5. I find ways to succeed without taking unnecessary risks.
6. Even when things are going perfectly, I like to keep an eye out for ways to improve.
7. I like to wait to celebrate until I am absolutely certain that everything has been done correctly.
8. I help others make better choices because I account for threats they don't see.
9. I am often the first person to sense danger
10. Before I act, I like to take a moment to ensure that nothing bad will happen.
11. I often correct errors that others overlook.
12. I feel most at ease in situations where I have taken time to consider the risks.
13. I am good at making successful plans because I account for many different contingencies.

14. After I make a decision, I like to wait to act until I am certain it is the right thing to do.
15. I am often successful because I have carefully considered all the possible impacts of my decisions.
16. I like to plan ways forward that simultaneously reduce risk and achieve objectives.
17. I am good at finding errors that others usually miss
18. I am careful to consider all the possible outcomes of my actions so that I can ensure success.
19. I am often the first person to seek safety.
20. I successfully avoid bad choices because I simultaneously weigh the options of many different possibilities.
21. I am careful to give my decisions due diligence.
22. I enjoy finding errors that are buried in details.

International Personality Item Pool (IPIP; Goldberg, 1999)

Response Scale:

1 = “Very UNTRUE of Me”, 2 = “UNTRUE of Me”, 3 = “Somewhat UNTRUE of Me”, 4 = “Somewhat TRUE of ME”, 5 = ‘TRUE of Me”, 6 = “Very TRUE of me”.

Extraversion

1. I feel comfortable around people.
2. I make friends easily.
3. I am skilled in handling social situations.
4. I am the life of the party.
5. I know how to captivate people.
6. I have little to say. (R)
7. I keep in the background. (R)
8. I would describe my experiences as somewhat dull. (R)
9. I don't like to draw attention to myself. (R)
10. I don't talk a lot. (R)

Neuroticism

1. I often feel blue.
2. I dislike myself.
3. I am often down in the dumps.
4. I have frequent mood swings.
5. I panic easily.
6. I rarely get irritated. (R)
7. I seldom feel blue. (R)
8. I feel comfortable with myself. (R)
9. I am not easily bothered by things. (R)
10. I am very pleased with myself. (R)

Conscientiousness

1. I am always prepared.
2. I pay attention to details.
3. I get chores done right away.
4. I carry out my plans.
5. I make plans and stick to them.
6. I waste my time. (R)
7. I find it difficult to get down to work. (R)
8. I do just enough work to get by. (R)
9. I don't see things through. (R)
10. I shirk my duties. (R)

Chronic Regulatory Focus (Lockwood, 2002)

Response Scale:

1 = “Very UNTRUE of Me”, 2 = “UNTRUE of Me”, 3 = “Somewhat UNTRUE of Me”, 4 = “Somewhat TRUE of ME”, 5 = ‘TRUE of Me”, 6 = “Very TRUE of me”.

Chronic Prevention Focus

1. In general, I am focused on preventing negative events in my life
2. I am anxious that I will fall short of my responsibilities and obligations
3. I often think about the person I am afraid I might become in the future
4. I often worry that I will fail to accomplish my academic goals
5. I often imagine myself experiencing bad things that I fear might happen to me
6. I frequently think about how I can prevent failures in my life
7. I am more oriented toward preventing losses than I am toward achieving gains
8. My major goal in school right now is to avoid becoming an academic failure
9. I see myself as someone who is primarily striving to become the self I "ought" to be - to fulfill my duties, responsibilities, and obligations

Chronic Promotion Focus

1. I frequently imagine how I will achieve my hopes and aspirations
2. I often think about the person I would ideally like to be in the future
3. I typically focus on the success I hope to achieve in the future
4. I often think about how I will achieve academic success
5. My major goal in school right now is to achieve my academic ambitions
6. I see myself as someone who is primarily striving to reach my "ideal self" - to fulfill my hopes, wishes, and aspirations
7. In general, I am focused on achieving positive outcomes in my life
8. I often imagine myself experiencing good things that I hope will happen to me
9. Overall, I am more oriented toward achieving success than preventing failure

Appendix B: Study 2 Measures

Motivational Trait Questionnaire (MTQ + V)

Response Scale:

1 = “Very UNTRUE of Me”, 2 = “UNTRUE of Me”, 3 = “Somewhat UNTRUE of Me”, 4 = “Somewhat TRUE of ME”, 5 = ‘TRUE of Me”, 6 = “Very TRUE of me”.

Personal Mastery (PM)

Desire to Learn

1. I am an intellectually curious person.
2. I prefer activities that provide me the opportunity to learn something new.
3. I am naturally motivated to learn.
4. I thirst for knowledge.

Mastery Goals

1. I set goals as a way to improve my performance.
2. When learning something new, I focus on improving my performance.
3. I compete with myself -- challenging myself to do things better than I have done before.
4. I work hard at everything I undertake until I am satisfied with the result.
5. Even when I have studied hard enough to get a good grade, I study more because I want to completely understand the material.

Competitive Excellence (CE)

Other Referenced Goals

1. It really upsets me when someone does something better than I do.
2. It is important for me to outperform my co-workers.
3. Whether or not I feel good about my performance depends on how it compares to the performance of others.

Competition Seeking

1. I tend to put extra effort into tasks that involve competition with others.
2. I perform best when I compete with others.
3. I am not a competitive person. (R)
4. I try to avoid competitive situations. (R)
5. I would rather cooperate than compete. (R)
6. I like to turn things into a competition.
7. Even in non-competitive situations, I find ways to compete with others.

Motivation Related to Anxiety (MRA)

Worry

1. I worry about the possibility of failure.
2. I get tense when other people assess my progress.
3. I worry about how others will view my work performance.
4. I am cautious about trying to do something that could lead to embarrassment.

Emotionality

1. I have trouble relaxing because I worry about things at work.
2. I am unable to concentrate fully in stressful situations.

3. I am able to remain calm and relaxed in stressful situations. (R)
4. I am able to remain calm and relaxed before I take a test. (R)

vigilance

Diligence

1. I like to make decisions only after I have given them their due diligence.
2. Before I act, I like to take a moment to ensure that nothing bad will happen.
3. I feel most at ease in situations where I have taken time to consider the risks.
4. After I make a decision, I like to wait to act until I am certain it is the right thing to do.
5. I am often successful because I have carefully considered all the possible impacts of my decisions.
6. I like to plan ways forward that simultaneously reduce risk and achieve objectives.
7. I am careful to consider all the possible outcomes of my actions so that I can ensure success.
8. I successfully avoid bad choices because I simultaneously weigh the options of many different possibilities.
9. I am careful to give my decisions due diligence.

Error Detection

1. I am good at finding errors that others usually miss.
2. I enjoy finding errors that are buried in details.
3. I often correct errors that others overlook.

Task-specific self-Efficacy**Response Scale:**

1 = “Strongly Disagree”, 2 = “Disagree”, 3 = “Neither Agree nor Disagree”, 4 = “Agree”, 5 = “Strongly Agree”.

Items:

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

Appendix C: Promotion Task Protocol

Vignette

For the purposes of this portion of the experiment:

Assume that you are an employee working in the marketing department of a large office supply company called "Royal Staples Inc." You and several other employees report directly to the director of marketing C.J. Bartlett. You and your colleagues are frequently called upon to complete marketing and advertising-related tasks on an individual basis.

At the present time, your company is on the verge of releasing a series of new products and the marketing department is being called upon to design a new advertising campaign for each of the new products.

During the course of your regular work day, you receive regular email correspondence, prioritize tasks, and complete each task to the best of your ability. Today, you received several emails but decided to prioritize the following emails and the work outlined within them. **Please read each email carefully and follow the instructions contained within them.**

Performance Trail #1

Email from hypothetical supervisor

From: C.J. Bartlett (cjbartlett@mail.com)

Subject: New marketing campaigns

Hey [respondent name],

Royal Staples Inc. has created and is now producing a new and better binder clip. As such, the marketing department has been charged with creating the new advertising campaign for the binder clip. Right now, we are running on the following theme for all of our new products, including the binder clip: **“Our new products are so good that you’ll have to find something completely new and unique to do with your old product.”**

To get the ball rolling on these advertising campaigns, I’m having all the employees in the marketing department brainstorm as many new and unique uses for old and outdated binder clips as possible. I will collect all of the ideas from you and your colleagues, then, I will select five ideas to be used in our new national advertising campaigns. The author of each idea that makes the final five will receive a special reward and recognition.

Keep in mind that for every idea you submit, you increase the chances that one of your ideas will be selected for the final five, that you will receive a special recognition or reward and that your idea will be featured in a national marketing and advertising campaign on social media, on radio, on television, and in print!

Here is what I need you to do:

Answer the questions on the following pages.

Using the form provided, complete the brainstorming task.

In the task, you will have five minutes to record as many new and unique uses for an old style binder clip as you can.

You will only receive credit for each unique use you provide, redundant ideas will not be counted.

Thanks in advance,
C.J.

In five minutes, how many new and unique uses for an old stapler would you like to create and record?

Write the number of USES you would like to create here: _____

Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
| I don't feel that I am capable of performing as well on this task as others are. | | | | | |
| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

Performance Trial #1

[The following screen will remain for exactly 5 minutes. After five minutes, respondents will be automatically moved to the next screen; performance trial 2]

Using the spaces provided below, create and record as many new and unique uses as you can for the old paper clip pictured here.

No two uses can be the same

You have five minutes to complete this task.



- Use #1: _____
Use #2: _____
Use #3: _____
Use #4: _____
Use #5: _____
Use #6: _____
Use #7: _____
Use #8: _____
Use #9: _____
Use #10: _____
Use #11: _____
Use #12: _____
Use #13: _____
Use #14: _____
Use #15: _____
Use #16: _____
Use #17: _____
Use #18: _____
Use #19: _____
Use #20: _____

[If the respondent uses all 20 spaces in the time allotted, 20 more spaces will automatically pop up in the screen]

Performance Trial 2

Email from hypothetical supervisor

From: C.J. Bartlett (cjbartlett@mail.com)

Subject: Again - New marketing campaigns

Hey [respondent name],

Royal Staples Inc. has created and is now producing a new and better DVD disc. As such, the marketing department needs to create the new advertising campaign for our DVD disc. We are still running on the following theme for Royal Staple's new products, including the DVD disc: **"Our new products are so good that you'll have to find something completely new and unique to do with your old product."**

To get the ball rolling on these advertising campaigns, I'm having all the employees in the marketing department brainstorm as many new and unique uses for old and outdated DVD discs as possible. I will collect all of the ideas from you and your colleagues, then, I will select five ideas to be used in our new national advertising campaigns. The author of each idea that makes the final five will receive a special reward and recognition.

Keep in mind that for every idea you submit, you increase the chances that one of your ideas will be selected for the final five, that you will receive a special recognition or reward and that your idea will be featured in a national marketing and advertising campaign including social media, radio, television, and print!

Here is what I need you to do:

Answer the questions on the following pages.

Using the form provided, complete the brainstorming task.

In the task, you will have five minutes to record as many new and unique uses for an old DVD disc as you can.

You will only receive credit for each unique use you provide, redundant ideas will not be counted.

Thanks in advance,
C.J.

In the next five minutes, how many new and unique uses for old DVDs would you like to create and record?

Write the number of USES you would like to create here: _____

Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
| I don't feel that I am capable of performing as well on this task as others are. | | | | | |
| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

[The following screen will remain for exactly 5 minutes. After five minutes, respondents will be automatically moved to the next screen; performance trial 3]

Using the spaces provided below, create and record as many new and unique uses as you can for the old DVD disc pictured here.

No two uses can be the same

You have five minutes to complete this task.



- Use #1: _____
Use #2: _____
Use #3: _____
Use #4: _____
Use #5: _____
Use #6: _____
Use #7: _____
Use #8: _____
Use #9: _____
Use #10: _____
Use #11: _____
Use #12: _____
Use #13: _____
Use #14: _____
Use #15: _____
Use #16: _____
Use #17: _____
Use #18: _____
Use #19: _____
Use #20: _____

[If the respondent uses all 20 spaces in the time allotted, 20 more spaces will automatically pop up in the screen]

Performance Trial 3

Hypothetical email from supervisor

From: C.J. Bartlett (cjbartlett@mail.com)
Subject: Again - New marketing campaigns

Hey [respondent name],

Royal Staples Inc. has created and is producing a new and better staple remover. The marketing department will also be creating the new advertising campaign for the staple remover. We're still going to use the following theme for our new products, including the mouse: **“Our new products are so good that you’ll have to find something completely new and unique to do with your old product.”**

To get the ball rolling on these advertising campaigns, I’m having all the employees in the marketing department brainstorm as many new and unique uses for an old and outdated staple remover as possible. I will collect all of the ideas from you and your colleagues, then, I will select five ideas to be used in our new national advertising campaigns. The author of each idea that makes the final five will receive a special reward and recognition.

Keep in mind that for every idea you submit, you increase the chances that one of your ideas will be selected for the final five, that you will receive a special recognition or reward and that your idea will be featured in a national marketing and advertising campaign including social media, radio, television, and print!

Here is what I need you to do:

Answer the questions on the following pages.

Using the form provided, complete the brainstorming task.

In the task, you will have five minutes to record as many new and unique uses for an old staple remover as you can.

You will only receive credit for each unique use you provide, redundant ideas will not be counted.

Thanks in advance,
C.J.

In the next five minutes, how many new and unique uses for an old-style Staple remover would you like to create and record?

Write the number of USES you would like to create here: _____

Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|--|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
| I don't feel that I am capable of performing as well on this task as others are. | | | | | |
| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

[The following screen will remain for exactly 5 minutes. After five minutes, respondents will be automatically moved to the end of the survey]

Using the spaces provided below, create and record as many unique uses as you can for the old-style Staple remover pictured here.

No two uses can be the same

You have five minutes to complete this task.



Use #1: _____
Use #2: _____
Use #3: _____
Use #4: _____
Use #5: _____
Use #6: _____
Use #7: _____
Use #8: _____
Use #9: _____
Use #10: _____
Use #11: _____
Use #12: _____
Use #13: _____
Use #14: _____
Use #15: _____
Use #16: _____
Use #17: _____
Use #18: _____
Use #19: _____
Use #20: _____

[If the respondent uses all 20 spaces in the time allotted, 20 more spaces will automatically pop up in the screen]

Appendix C: Prevention Task Protocol

Vignette

For the purposes of this experiment:

Assume that you are an employee working for Hawthorne-Waverly Inc., a publishing firm that specializes in scholarly psychology research literature. You are on the verge of publishing the latest issue of a very well-established journal called Integrative Psychological Issues. You and several of your colleagues work in similar positions and are assigned independent tasks by your manager, Lynn Bailey. Typically, you are responsible for reviewing, selecting, and editing manuscripts that have been submitted to Integrative Psychological Issues prior to their publication.

During the course of your regular work day, you receive regular email correspondence, prioritize tasks, and complete each task to the best of your ability. Today you have prioritized the work in the following emails for immediate completion. **Please read each email carefully and follow the instructions contained in them.**

Performance Trial 1

Email from hypothetical supervisor

From: Lynn Bailey (lynn.bailey6@HawthorneWaverly.com)

Subject: Urgent-Immediate editing needed

Hey [respondent name],

You already know that Hawthorne-Waverly is about to publish the latest issue of Integrative Psychological Issues. Our team has reviewed and selected the articles that will be included in this issue. Right now, we are in the final push to make sure that our editing process is complete and that all of the manuscripts are in pristine condition before they are deemed “publication ready” and given to the printers.

Once printing has started, it becomes VERY expensive to stop the process, correct editing oversights, and re-print the affected manuscripts. **Each and every error that we correct right now will save Hawthorne-Waverly more money and will reflect positively on our department in particular.**

I’ve personally reviewed all of the manuscripts in electronic form and have made some editing corrections to a few of them. **Each of my electronic files should be considered “publication ready” and thought of as a master document.** Unfortunately, the paper version of these documents is what will be submitted to our printing department and they HAVE NOT been corrected yet.

Here is what I need you to do:

You have the paper version of a specific passage and the paper version needs to reflect my electronic master copy perfectly.

There are 20 errors in your paper version of this passage that do not reflect the master copy yet. I need you to compare the electronic master copy (in the coming screens) to your paper version and mark each of the errors in the paper version with a red circle.

I need these almost immediately so **you will have FIVE MINUTES to finish your paper mark-up once you begin.** Remember, each of the errors that you catch now will save our company money later and will reflect positively on our department. Before you get started, there are a few questions that I’d like you to answer and then you’ll be presented with the electronic master copy and start your mark-up immediately.

Thank you in advance,
Lynn Bailey

In the next five minutes, how many of the 20 errors in the paper passage will you be able to identify and circle in red ink?

| | | | |
|----------|-----------|-----------|-----------|
| 1 error | 6 errors | 11 errors | 16 errors |
| 2 errors | 7 errors | 12 errors | 17 errors |
| 3 errors | 8 errors | 13 errors | 18 errors |
| 4 errors | 9 errors | 14 errors | 19 errors |
| 5 errors | 10 errors | 15 errors | 20 errors |

Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|--|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
| I don't feel that I am capable of performing as well on this task as others are. | | | | | |
| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

[This screen will remain for exactly five minutes. After which, respondents will be directed to the next screen; Performance Trial 2]

Attraction contexts.

Data from speed-dating studies. Two speed-dating studies examined the predictive validity of ideal partner preferences. One study reported very weak associations between participants' ideal partner preferences and the qualities that influenced their actual choices at a speed-dating event (Todd, Penke, Fasolo, & Lenton, 2007). As an indicator of the extent to which an attribute influenced a participant's actual choices in this study, these researchers calculated a "choice score" that consisted of the average attribute level of the speed-dating partners to whom a participant said "yes." For example, the choice score for physical attractiveness would be the average physical attractiveness of the speed-dating partners whom the participant "yesed." The correlation between ideal partner preferences and the corresponding choice score in this study was quite small on average ($r = .06$). Importantly, the choice score metric is different from both the level metric logic and the analyses conducted by D. Wood and Brumbaugh (2009), as this procedure confounds the effect of interest (the association of the attribute with yesing; the revealed preference) with participants' selectivity. That is, a participant could receive a high value for the choice score either because he or she actually valued the attribute in a partner or because he or she said "yes" to only a few exceptionally desirable people. If ideal partner preferences are positively correlated with selectivity (as in Figure 3C), then the Todd et al. (2007) choice score calculation could have overestimated the association between stated and actual preferences, despite the fact that these authors concluded that any such association was tiny.

A second speed-dating study that examined the predictive validity of ideal partner preferences drew from the moderational, level metric logic (Eastwick & Finkel, 2008a). These researchers calculated revealed preferences (which they called "in-vivo" preferences) for physical attractiveness, earning prospects, and personability for each participant. In-vivo preferences were operationalized as the association (i.e., unstandardized regression beta) of a participant's judgment of each speed-dating partner's trait with the participant's romantic evaluation (e.g., romantic desire) of each partner calculated across the participant's nine to 13 speed dates. On average, participants' in-vivo preferences correlated negligibly with their ideal partner preferences ($r = .03$). These nonsignificant correlations even emerged when the traditional ideal preference items (e.g., "How much would you want your ideal partner to possess each of the following characteristics?") were substituted for items that specifically referenced the speed-dating event (e.g., "How much do you think the following characteristics will matter in your decision to 'yes' or 'no' someone after your 4-min date?"). Thus, the nonsignificant correlations between ideal and in-vivo preferences in the work of Eastwick and Finkel (2008a) imply that the data do not conform to any of the Figure 3 patterns but rather consist of parallel slopes for people with high and low ideal partner preferences. Although not published in the original Eastwick and Finkel article, the pattern metric match between ideals and each speed-

dating partner's qualities also failed to reliably predict romantic interest at the speed-dating event (average $r = .06$).

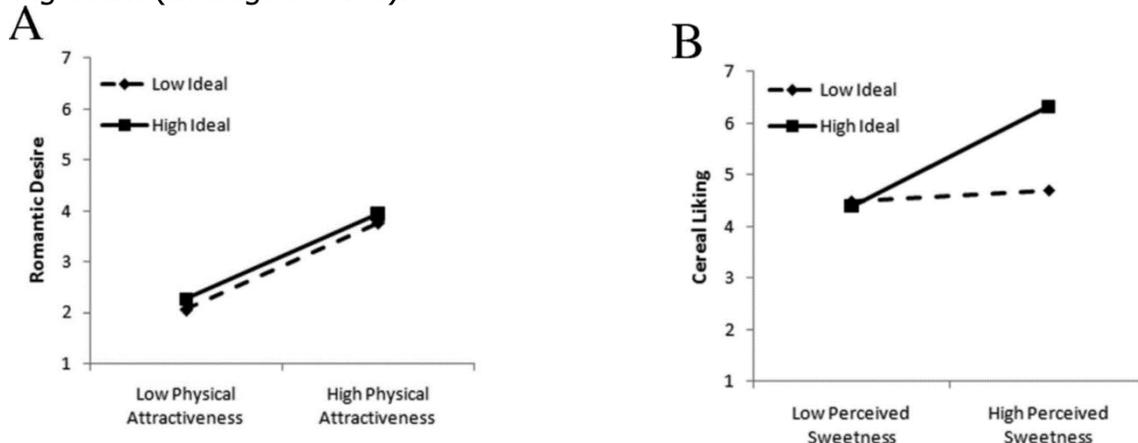


Figure 5. Actual data used to test for Ideal Preference X Trait interactions. Figure 5A depicts the positive association of physical attractiveness with romantic desire; this association does not vary by physical attractiveness ideals. Figure 5B depicts the association of cereal sweetness with cereal liking; this association is stronger for participants who ideally prefer sweet cereals than for those who do not.

Data on opposite-sex peers. However, the in-vivo/revealed preference approach is potentially limited because it condenses all nine to 13 of participants' data points into a single score, which could remove meaningful within-person variability (Kenny, Kashy, & Cook, 2006). (In a different portion of the Results section, Eastwick & Finkel, 2008a, reported that zero out of the nine Ideal Partner Preference X Partner Trait interactions that they examined were significant.) Eastwick (2009b, Study 2) used both the in-vivo and statistical interaction approach in the same study to examine whether the two approaches revealed similar conclusions. In this study, participants reported not on a set of opposite-sex speed-dating partners but instead on a set of opposite-sex peers whom they knew personally. Thus, these data tested whether the results of Eastwick and Finkel (2008a) and Todd et al. (2007) would generalize beyond speed-dating: If ideal partner preferences affect how people evaluate potential romantic partners in their everyday lives, then participants (on average) should be more attracted to opposite-sex friends and acquaintances who happen to match their ideals than to those who mismatch their ideals. In the Eastwick (2009b) study, single participants nominated 10 opposite-sex peers, some of whom were romantic interests and some of whom were not. However, as in the speed-dating studies reviewed above, ideal partner preferences exhibited little predictive validity.

Performance Trial 2

Hypothetical email from supervisor

From: Lynn Bailey (lynn.bailey6@HawthorneWaverly.com)

Subject: Urgent-Immediate editing needed

Hey [respondent name],

You already know that Hawthorne-Waverly is about to publish the latest issue of Integrative Psychological Issues. Our team has reviewed and selected the articles that will be included in this issue. Right now, we are in the final push to make sure that our editing process is complete and that all of the manuscripts are in pristine condition before they are deemed “publication ready” and given to the printers.

Once printing has started, it becomes VERY expensive to stop the process, correct editing oversights, and re-print the affected manuscripts. **Each and every error that we correct right now will save Hawthorne-Waverly more money and will reflect positively on our department in particular.**

I’ve personally reviewed all of the manuscripts in electronic form and have made some editing corrections to a few of them. **Each of my electronic files should be considered “publication ready” and thought of as a master document.** Unfortunately, the paper version of these documents is what will be submitted to our printing department and they HAVE NOT been corrected yet.

Here is what I need you to do:

You have the paper version of a specific passage and the paper version needs to reflect my electronic master copy perfectly.

There are 20 errors in your paper version of this passage that do not reflect the master copy yet.

I need you to compare the electronic master copy (in the coming screens) to your paper version and mark each of the errors in the paper version with a red circle.

I need these almost immediately so **you will have FIVE MINUTES to finish your paper mark-up once you begin.** Remember, each of the errors that you catch now will save our company money later and will reflect positively on our department. Before you get started, there are a few questions that I’d like you to answer and then you’ll be presented with the electronic master copy and start your mark-up immediately.

Thank you in advance,
Lynn Bailey

In the next five minutes, how many of the 20 errors in the paper passage will you be able to identify and circle in red ink?

| | | | |
|----------|-----------|-----------|-----------|
| 1 error | 6 errors | 11 errors | 16 errors |
| 2 errors | 7 errors | 12 errors | 17 errors |
| 3 errors | 8 errors | 13 errors | 18 errors |
| 4 errors | 9 errors | 14 errors | 19 errors |
| 5 errors | 10 errors | 15 errors | 20 errors |

Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
| I don't feel that I am capable of performing as well on this task as others are. | | | | | |
| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

[This screen will remain for exactly five minutes. After which, respondents will be directed to the next screen; Performance Trial 3]

The Vividness of the Happy Face

D. Vaughn Becker and Narayanan Srinivasan
Cognitive Science and Engineering, Arizona State University, and Centre of Behavioural and Cognitive Sciences, University of Allahabad

Abstract

An emerging literature reveals that happy faces are vivid: They automatically and rapidly engage cognitive processing at many different levels. They do this in part because their form has evolved to take advantage of preexisting efficiencies in visual perception. In addition to “happy advantages” at the earliest stages of perception, perceivers add their own benefits, with both attentional and memory mechanisms appearing to favor happy faces. These effects exist because for humans, prosocial communication is critical. Coevolution has sculpted both the signaler and the receiver to enhance the efficiency of this communication as a way to undergird our highly social nature.

Keywords

facial expression, evolutionary psychology, signal detection, happiness, prosocial communication

When our hunter-gatherer ancestors spotted an approaching stranger, the potential for intergroup conflict was high, but they had one important tool to preempt such conflict: the happy facial expression. The human happy face is a positive sign of prosocial intentions that is recognized in even the most remote cultures (Ekman & Friesen, 1971). This universality suggests an ancient origin that may have given natural selection ample time to sculpt perceptual mechanisms dedicated to detecting and processing the happy face. On the other hand, it is possible that the happy face itself, more than any other expression, changed its very form to signal more clearly—perhaps exploiting even older and more conserved perceptual mechanisms by adopting features that could be detected rapidly and at a distance. There is indeed a growing body of evidence that happy faces are particularly vivid at the earliest stages of perception, and additional work has suggested that the benefits persist beyond these detection advantages.

The Functionality and Phylogeny of the Happy Face

Hager and Ekman (1979) were the first to provide empirical evidence that at a distance, facial expressions of happiness are more discriminable than other expressions. The researchers had well-trained expression posers sit between 30 and 45 meters from participants and assume one of several facial expressions, which the participants had to discriminate. Not only did the happy expression (compared with sad, surprised,

disgusted, angry, and fearful expressions) show a clear detection advantage, but the benefit was the greatest at the farthest distance. Hager and Ekman extrapolated that this would allow clear signaling of prosocial intentions from outside the range of Olympic javelin-throwers, and hence of ancient hand-thrown projectile weapons.

The signal clarity that is so beneficial at a distance also facilitates the detection of happy faces when only the briefest flash of information is available (see Fig. 1). Both results speak to the potential of the happy face to defuse hostilities. This potential would have become much stronger as our ancestors began to walk upright and their faces—now able to look above high grasses and scan the horizon—assumed a more communicative role.

Our highly social nature may in fact drive this signaling efficiency, and it suggests why certain features of the happy face diverged from the function they serve in other animals. Consider that bared teeth in the animal kingdom generally signal threat. There is the indexical connotation of biting, but the signal is also widely dispersed because the sudden appearance of white teeth is easy to see. In contrast to most animals, primates began to use this white flash of teeth in another way:

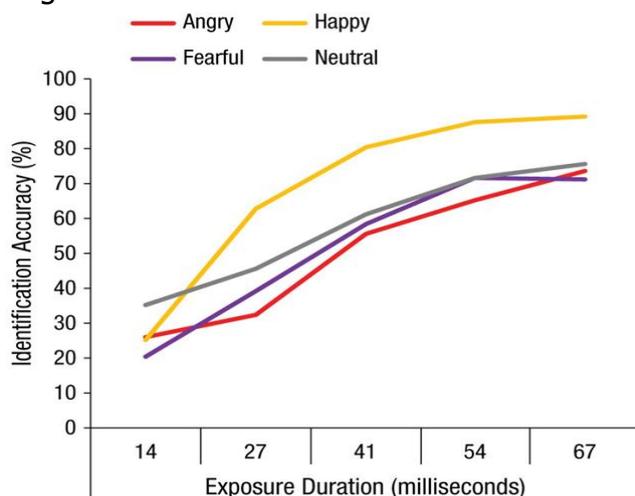


Fig. 1. Identification accuracy for facial expressions seen only briefly (in Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007, Experiment 5). When expressive faces are presented very briefly (and followed by a poststimulus mask to arrest any additional processing in sensory memory), the advantage for happy faces emerges at as little as 27 milliseconds of exposure and persists through more generous exposure durations (the mean accuracies shown here are for 27 participants across 8 faces).

The clenched-, bared-teeth display is a sign of submissiveness in primates, particularly those with a strict dominance hierarchy (see Parr & Waller, 2006). Even closer to humans, chimpanzees and other more egalitarian species use clenched teeth to signal not so much submission as an invitation to social affiliation. This display (see Fig. 2) lacks a key element of the full expression of human happiness (the cheek raising and crow's feet in the right-hand panel) but would work well to convey a lack of threat at a distance precisely because of the teeth. This signal clarity also facilitates the detection of happiness in another noisy environment: a crowd.

Performance Trial 3

Email from hypothetical supervisor

From: Lynn Bailey (lynn.bailey6@HawthorneWaverly.com)

Subject: Urgent-Immediate editing needed

Hey [respondent name],

You already know that Hawthorne-Waverly is about to publish the latest issue of Integrative Psychological Issues. Our team has reviewed and selected the articles that will be included in this issue. Right now, we are in the final push to make sure that our editing process is complete and that all of the manuscripts are in pristine condition before they are deemed “publication ready” and given to the printers.

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Thank you in advance,
Lynn Bailey

In the next five minutes, how many of the 20 errors in the paper passage will you be able to identify and circle in red ink?

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Using the scale provided, please indicate the extent to which you agree or disagree with each of the following statement

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| I feel confident in my ability to perform well on this task. | | | | | |
| I think I can complete this task in a satisfactory time. | | | | | |
| I am not confident that I will do as well on this task as I would like. | | | | | |
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| I am a fast learner for these types of tasks, in comparison to other people. | | | | | |
| I am not sure I can ever do well on these kinds of tasks, no matter how much I practice. | | | | | |
| I would have to practice for a long time to be able to do well on this task. | | | | | |
| I think that my performance will be adequate on this task. | | | | | |
| I am sure that I can learn the techniques required for this task in a short period of time. | | | | | |
| On average, other individuals are probably not as capable of doing as well on this task as I am. | | | | | |

[This screen will remain for exactly five minutes. After which, respondents will be directed to the next screen; Thank you message]

One answer is that the mental processes that give rise to behaviors, such as tuning in to a TV show, are not always accessible to conscious awareness ([Dijksterhuis, 2004](#); [Nisbett & Wilson, 1977](#)). A similar argument can be made about why it is so hard to predict the success of health interventions or efforts to get people to save for retirement: People are notoriously limited in their ability to consciously identify why they do what they do. However, the mental processes underlying behavior are nonetheless represented in the brain. In this article, we argue that knowledge gained from decades of work in cognitive neuroscience about the mapping between mental process and brain function ([Cabeza & Nyberg, 2000](#); [Kober et al., 2008](#); [Lieberman, 2010](#); [Montague & Berns, 2002](#)) can be leveraged to predict meaningful outcomes beyond the laboratory ([Fig. 1](#)). Indeed, we recently found that viewers' brain activation while watching a set of commercials in a "neural focus group" predicted the success of the commercials in the media markets where they were aired, and did so better than viewers' reports of the ads' effectiveness ([Falk, Berkman, & Lieberman, 2012](#)).

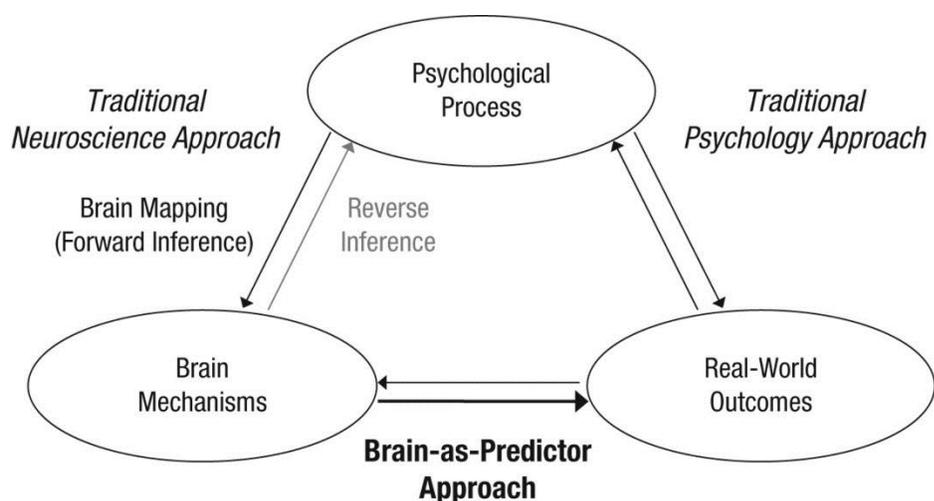


Figure 1. The brain-as-predictor approach. Traditionally, psychologists have been interested in mapping the relationship between psychological processes (e.g., cognitions, emotions) and real-world outcomes (e.g., health behaviors, discrimination). In contrast, neuroscientists have traditionally used neuroimaging tools to map the relationship between psychological process and brain mechanisms. The brain-as-predictor approach integrates these methods by using brain systems that previously have been linked to specific psychological processes to predict meaningful outcomes beyond the confines of the laboratory. This approach offers new ways to explain previously unaccounted variance in behavioral outcomes and to test whether hypothesized psychological processes (via their neural associates) are predictive of those outcomes. Bidirectional arrows emphasize that each construct is likely to affect the others and that the brain-as-predictor approach complements existing methods for studying the other relationships shown. Note that arrows in this figure indicate conceptual relationships between independent and dependent variables rather than causality; manipulation of brain function (e.g., using transcranial magnetic stimulation or in clinical lesion studies) is necessary in order to establish causal relationships between brain measures and behavior.

The brain-as-predictor approach. Traditionally, psychologists have been interested in mapping the relationship between psychological processes (e.g., cognitions, emotions) and real-world outcomes (e.g., health behaviors, discrimination). In contrast, neuroscientists have traditionally used neuroimaging tools to map the relationship between psychological process and brain mechanisms. The *brain-as-predictor* approach integrates these methods by using brain systems that previously have been linked to specific psychological processes to predict meaningful outcomes beyond the confines of the laboratory. This approach offers new ways to explain previously unaccounted variance in behavioral outcomes and to test whether hypothesized psychological processes (via their neural associates) are predictive of those outcomes. Bidirectional arrows emphasize that each construct is likely to affect the others and that the brain-as-predictor approach complements existing methods for studying the other relationships shown. Note that arrows in this figure indicate conceptual relationships between independent and dependent variables rather than causality; manipulation of brain function (e.g., using transcranial magnetic stimulation or in clinical lesion studies) is necessary in order to establish causal relationships between brain measures and behavior.

This is one example of a more general *brain-as-predictor* approach, which treats neural measures (e.g., activation, structure, connectivity) as independent variables in models that predict longitudinal outcomes as dependent variables. The adoption of the brain-as-predictor approach represents a paradigm shift for research in neuroscience, complementing traditional *brain-mapping* studies in which psychological processes are manipulated and the resulting neural activity is observed as the dependent measure (note the bidirectional relationships shown in [Fig. 1](#)). Decades of neuroscientific research aimed at establishing brain-behavior relationships and integrating results from across multiple levels of analysis are foundational to the approach described (e.g., [Cacioppo, Berntson, Sheridan, & McClintock, 2000](#); [Lieberman, 2010](#)). This approach also builds on research on the neural bases of individual differences in personality (e.g., [Canli, 2004](#); [Depue & Collins, 1999](#)) and responsiveness to clinical treatments (e.g., [Mohr & Mohr, 2001](#)). The brain-as-predictor approach differs from approaches taken in this earlier work, however, in the level of specificity of the hypothesized neural systems and targeted outcomes.

Potential for Theoretical and Applied Advances

In the brain-as-predictor framework, the brain is viewed as an additional window into psychological processes that complements other measures, such as self-reports and other biological measures; its specific role in determining behavior can be examined in the context of those other measures to advance theory and application.

Tables

Table 1. Review of item valences for popular dispositional avoidance motivation measures.

| Measure | Items with Negative Valence | | Items with Neutral Valence | | Items with Positive Valence | |
|---|-----------------------------|---|----------------------------|--|-----------------------------|---|
| | n | Example(s) | n | Example(s) | n | Example(s) |
| Chronic Prevention Focus: Regulatory Focus Questionnaire (RFQ) Higgins et al., (2001): | 5 | "Did you get on your parents' nerves often when you were growing up?" | 1 | "How often did you obey rules and regulations that were established by your parents?" | 0 | |
| Chronic Prevention Focus: Lockwood et al., (2002): | 6 | "I often think about the person I am afraid I might become in the future." | 3 | "I am more oriented toward preventing losses than I am toward achieving gains." | 1 | "I see myself as someone who is primarily striving to become the self I "ought" to be—to fulfill my duties, responsibilities, and obligations." |
| Behavioral Inhibition Sensitivity: BIS/BAS Scales, Carver & White (1994) | 7 | "If I think something unpleasant is going to happen I usually get pretty worked up." "I have very few fears compared to my friends." (R) | 0 | | 0 | |
| Sensitivity to punishment: Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) Torrubia et al., (2001) | 17 | "Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?" "Do you often refrain from doing something you like in order not to be rejected or disapproved of by others?" | 7 | "Do you think a lot before complaining in a restaurant if your meal is not well prepared." | 0 | |

Table 1 (Continued). Item valences for popular dispositional avoidance motivation measures.

| Measure | Items with Negative Valence | | Items with Neutral Valence | | Items with Positive Valence | |
|--|-----------------------------|--|----------------------------|--|-----------------------------|--|
| | n | Example(s) | n | Example(s) | n | Example(s) |
| Performance-Avoid Goal Orientation: VandeWalle (1997) | 4 | "I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others." | 1 | "Avoiding a show of low ability is more important to me than learning a new skill." | 0 | |
| Performance-Avoid Goal Orientation: Horvath et al., (2001) | 5 | "When I know my work will be compared to that of others, I get so nervous that I procrastinate." | 0 | | 0 | |
| Performance-Avoidance Goals: Elliot (1999) | 6 | "I just want to avoid doing poorly in this class." "My fear of performing poorly in this class is often what motivates me." | 0 | | 0 | |
| Worry: Motivational Trait Questionnaire-Short (MTQ-S) Heggstad & Kanfer (2000) | 9 | "I worry about the possibility of failure." "I am afraid of other people noticing my shortcomings." | 1 | "I am cautious about trying to do something that could lead to embarrassment." | 0 | |
| Emotionality: Motivational Trait Questionnaire-Short (MTQ-S) Heggstad & Kanfer (2000) | 6 | "I lose sleep because I am troubled by thoughts of failure." | 1 | "I get an uneasy feeling in my stomach when working toward something I really want to accomplish." | 2 | "I am able to remain calm and relaxed before I take a test." (R) "I am able to remain calm and relaxed in stressful situations." (R). |

Table 2. Hypothesized MTQ+V measurement model

| Scale (Regulatory Focus) | # of items |
|---|-------------------|
| Personal Mastery (Promotion Focus) | 16 |
| Desire to Learn | 8 |
| Mastery Goals | 8 |
| Competitive Excellence (Promotion Focus) | 13 |
| Other Referenced Goals | 7 |
| Competition Seeking | 6 |
| Motivation Anxiety (Prevention Focus) | 19 |
| Worry | 10 |
| Emotionality | 9 |
| Vigilance (Prevention Focus) | 22 |

Note. (Promotion Focus) = Motivational trait antecedent to behaviors and strategies that align with the promotion regulatory system.

(Prevention Focus) = Motivational trait antecedent to behaviors and strategies that align with the prevention regulatory system

Table 4. Vigilance EFA: Items deleted with communality below $\pm.30$

| Item Num. | Item Stem |
|------------------|--|
| 1 | I successfully avoid negative outcomes because I am good at forecasting threats. |
| 2 | I am often successful because I attend to details most people do not bother with. |
| 3 | I am good at successfully moving forward while reducing risk at the same time. |
| 5 | I find ways to succeed without taking unnecessary risks. |
| 6 | Even when things are going perfectly, I like to keep an eye out for ways to improve. |
| 7 | I like to wait to celebrate until I am absolutely certain that everything has been done correctly. |
| 8 | I help others make better choices because I account for threats they don't see. |
| 9 | I am often the first person to sense danger |
| 19 | I am often the first person to seek safety. |

Table 5. Vigilance EFA: Rotated two-factor solution including diligence and error detection

| Item Num. | Item Stem | Diligence | Error Detection |
|------------------|--|------------------|------------------------|
| 4 | I like to make decisions only after I have given them their due diligence. | .63 | |
| 10 | Before I act, I like to take a moment to ensure that nothing bad will happen. | .58 | |
| 12 | I feel most at ease in situations where I have taken time to consider the risks. | .59 | |
| 13 | I am good at making successful plans because I account for many different contingencies. | .55 | |
| 14 | After I make a decision, I like to wait to act until I am certain it is the right thing to do. | .63 | |
| 15 | I am often successful because I have carefully considered all the possible impacts of my decisions. | .66 | |
| 16 | I like to plan ways forward that simultaneously reduce risk and achieve objectives. | .70 | |
| 18 | I am careful to consider all the possible outcomes of my actions so that I can ensure success. | .75 | |
| 20 | I successfully avoid bad choices because I simultaneously weigh the options of many different possibilities. | .71 | |
| 21 | I am careful to give my decisions due diligence. | .74 | |
| 11 | I often correct errors that others overlook. | | .78 |
| 17 | I am good at finding errors that others usually miss | | .74 |
| 22 | I enjoy finding errors that are buried in details. | | .63 |

Note. Extraction Method = Principal Axis Factoring. Rotation Method = Oblimin with Kaiser Normalization. Rotation converged in 3 iterations.

Table 6. MTQ+V EFA: Rotated eight-factor solution

| Item | Diligence | Error Detection | Other Referenced Goals | Competition Seeking | Worry | Emotionality | Mastery Goals | Desire to Learn |
|---|-----------|-----------------|------------------------|---------------------|-------|--------------|---------------|-----------------|
| I like to make decisions only after I have given them their due diligence. | .582 | | | | | | | |
| Before I act, I like to take a moment to ensure that nothing bad will happen. | .547 | | | | | | | |
| I feel most at ease in situations where I have taken time to consider the risks. | .539 | | | | | | | |
| After I make a decision, I like to wait to act until I am certain it is the right thing to do. | .612 | | | | | | | |
| I am often successful because I have carefully considered all the possible impacts of my decisions. | .537 | | | | | | | |
| I like to plan ways forward that simultaneously reduce risk and achieve objectives. | .598 | | | | | | | |
| I am careful to consider all the possible outcomes of my actions so that I can ensure success. | .668 | | | | | | | |
| I successfully avoid bad choices because I simultaneously weigh the options of many different possibilities. | .713 | | | | | | | |
| I am careful to give my decisions due diligence. | .735 | | | | | | | |
| I often correct errors that others overlook. | | -.637 | | | | | | |
| I am good at finding errors that others usually miss | | -.623 | | | | | | |
| I enjoy finding errors that are buried in details. | | -.616 | | | | | | |
| It really upsets me when someone does something better than I do. | | | -.662 | | | | | |
| It is important for me to outperform my coworkers. Whether or not I feel good about my performance depends on how it compares to the performance of others. | | | -.586 | | | | | |
| I tend to put extra effort into tasks that involve competition with others. | | | | .482 | | | | |
| I perform best when I compete with others. | | | | .625 | | | | |
| I am not a competitive person. (RC) | | | | .731 | | | | |
| I try to avoid competitive situations. (RC) | | | | .896 | | | | |
| I would rather cooperate than compete. (RC) | | | | .546 | | | | |
| I like to turn things into a competition. | | | | .775 | | | | |

| | | |
|--|------|------|
| Even in non-competitive situations, I find ways to compete with others. | .666 | |
| I worry about the possibility of failure. | | .584 |
| I get tense when other people assess my progress. | | .563 |
| I worry about how others will view my work performance. | | .776 |
| I am cautious about trying to do something that could lead to embarrassment. | | .368 |
| I have trouble relaxing because I worry about things at work. | | .464 |
| I am unable to concentrate fully in stressful situations. | | .530 |
| I am able to remain calm and relaxed in stressful situations. (RC) | | .615 |
| I am able to remain calm and relaxed before I take a test. (RC) | | .593 |
| I set goals as a way to improve my performance. | | .484 |
| When learning something new, I focus on improving my performance. | | .629 |
| I compete with myself challenging myself to do things better than I have done before. | | .495 |
| I work hard at everything I undertake until I am satisfied with the result. | | .626 |
| Even when I have studied hard enough to get a good grade, I study more because I want to completely understand the material. | | .556 |
| I am an intellectually curious person. | | .726 |
| I prefer activities that provide me the opportunity to learn something new. | | .469 |
| I am naturally motivated to learn. | | .557 |
| I thirst for knowledge. | | .785 |

Note. Extraction Method = Principal Axis Factoring. Rotation Method = Oblimin with Kaiser Normalization. Rotation converged in 11 iterations.

Table 7. MTQ+V CFA: Motivational trait facet scale intercorrelations

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| 1 Emotionality | | | | | | | |
| 2 Worry | 0.69 | | | | | | |
| 3 Error Detection | <i>NE</i> | 0.28 | | | | | |
| 4 Diligence | <i>NE</i> | 0.46 | 0.59 | | | | |
| 5 Other Referenced Goals | 0.15 | 0.46 | 0.22 | 0.17 | | | |
| 6 Competition Seeking | -0.22 | <i>NE</i> | <i>NE</i> | <i>NE</i> | 0.73 | | |
| 7 Mastery Goals | <i>NE</i> | 0.24 | 0.53 | 0.67 | 0.12 | 0.12 | |
| 8 Desire to Learn | -0.12 | 0.13 | 0.50 | 0.53 | <i>NE</i> | <i>NE</i> | 0.73 |

N = 354. *NE* = parameter not estimated. Reported correlations are significant at the 0.05 level (2-tailed).

Table 8. Vigilance Convergent – Discriminant Analysis.

| | Approach | Avoidance |
|-------------------|-----------------|------------------|
| Vigilance | .70 | .30 |
| PM | .76 | -.01 |
| Promotion Focus | .67 | -.08 |
| Conscientiousness | .65 | -.21 |
| Extraversion | .19 | -.38 |
| MRA | .15 | .77 |
| Neuroticism | -.20 | .69 |
| Prevention Focus | .14 | .72 |

Extraction: Principal Axis Factoring. Rotation: Oblimin.
 Converged in 7 iterations.

Table 9. Study 2: Summary of response distributions for variables included in study models

| | N | Mean (SD) | Min. | Max. | Skew. (SE) | Kurt. (SE) |
|--------------------------------------|----------|------------------|-------------|-------------|-------------------|-------------------|
| Vigilance | 225 | 4.45 (0.61) | 2.83 | 6.00 | -0.01 (0.16) | -0.27 (0.32) |
| Personal Mastery | 225 | 4.65 (0.60) | 2.78 | 6.00 | -0.18 (0.16) | -0.16 (0.32) |
| Motivation Related to Anxiety | 225 | 3.94 (0.78) | 1.25 | 6.00 | -0.03 (0.16) | 0.41 (0.32) |
| Promotion-task self-Efficacy | 225 | 3.37 (0.60) | 1.50 | 4.70 | -0.57 (0.16) | -0.10 (0.32) |
| Prevention-task self-Efficacy | 225 | 3.73 (0.50) | 1.60 | 4.90 | -0.80 (0.16) | 2.22 (0.32) |
| Promotion Task Performance | 225 | 8.13 (3.53) | 0.00 | 22.00 | 0.84 (0.16) | 1.14 (0.32) |
| Prevention Task Performance | 225 | 6.67 (2.57) | 1.00 | 14.00 | 0.11 (0.16) | -0.36 (0.32) |

Table 10. Study 2: Scale intercorrelations, reliability estimates, and descriptive statistics

| | n | Mean (SD) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|----------|------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------|----------|
| 1 vigilance | 225 | 4.45 (0.61) | $\alpha=.88$ | | | | | | |
| 2 Personal Mastery | 225 | 4.83 (0.58) | .55* | $\alpha=.84$ | | | | | |
| 3 Motivation Related to Anxiety | 225 | 3.97 (0.78) | .29* | .08 | $\alpha=.81$ | | | | |
| 4 Promotion-task self-Efficacy | 225 | 3.37 (0.60) | -.02 | .15* | -.25* | $\alpha=.85$ | | | |
| 5 Prevention-task self-Efficacy | 225 | 3.73 (0.50) | .06 | .20* | -.19* | .27* | $\alpha=.87$ | | |
| 6 Promotion Task Performance | 225 | 8.13 (3.53) | .06 | .11 | -.00 | .26* | .02 | - | |
| 7 Prevention Task Performance | 225 | 6.67 (2.57) | .06 | -.03 | .07 | -.08 | .13* | .17* | - |

Note. * = significant at the 0.05 level (2-tailed).

Table 11. Study 2: Testing for order effects using multiple-group analysis

| Model | Path | β_1^\dagger | β_2^\ddagger | χ^2 (df) | χ^2_{diff} (df) |
|-------------------------|-------------------------|-------------------------------------|--------------------------------------|---------------------------------|---|
| Unconstrained | | | | 37.12 (24) | |
| PM1 | PM – Prom. TSE | 0.11 | 0.19 | 37.69 (25) | 0.58 (1) |
| MRA1 | MRA – Prom. TSE | -0.26 | -0.27 | 37.13 (25) | 0.01 (1) |
| MRA2 | MRA – Prev. TSE | -0.25 | -0.23 | 37.44 (25) | 0.32 (1) |
| VIG1 | Vig – Prev. TSE | -0.01 | 0.29 | 41.50 (25) | 4.39 (1)* |
| Prom. TSE1 | Prom. TSE – Prom. Perf. | 0.31 | 0.20 | 38.43 (25) | 1.32 (1) |
| Prev. TSE1 | Prev. TSE – Prev. Perf. | 0.19 | 0.09 | 37.35 (25) | 0.24 (1) |
| Corr. Efficacies | Prom. TSE – Prev. TSE | 0.31 | 0.17 | 38.18 (25) | 1.06 (1) |

Note. * = $p < .05$. \dagger = Condition 1, promotion task protocol first. \ddagger = Condition 2, prevention task protocol first.

Table 12. Study 2: Comparing hypothesized and alternate structural models using global model fit

| Model | χ^2 (df) | <i>P</i> | SRMR | CFI | RMSEA | AIC | Model | |
|------------------------------|---------------|----------|------|------|-------|--------|------------|------------------------|
| | | | | | | | Comparison | χ^2_{diff} (df) |
| 1 (Full Mediation) | 37.12 (24) | 0.04 | 0.07 | 0.93 | 0.05 | 101.12 | | |
| 2 (MRA Moderator) | 55.14 (40) | 0.06 | 0.07 | 0.94 | 0.04 | 155.14 | - | - |
| 3 (Partial Mediation) | 31.02 (16) | 0.01 | 0.05 | 0.92 | 0.07 | 111.02 | 1--3 | 6.10 (8) ^{NS} |
| 4 (PM-VIG cross TSE) | 28.42 (20) | 0.10 | 0.06 | 0.95 | 0.04 | 100.43 | 1--4 | 8.69 (4) ^{NS} |

Note. * = $p < .05$. ^{NS} = not significant at the .05 level.

Table 13. Study 2: Summary of path coefficients between motivational traits, task self-efficacies, and task performance

| Path (Hypothesis) | Condition 1 | | | | Condition 2 | | | |
|---------------------------------|-------------|------|---------|----------|-------------|------|---------|----------|
| | <i>b</i> | SE | β | <i>p</i> | <i>b</i> | SE | β | <i>p</i> |
| Prom. TSE—Prom. Task Perf. (1a) | 2.04 | 0.57 | 0.31 | 0.000* | 1.14 | 0.53 | 0.20 | 0.031* |
| Prev. TSE—Prev. Task Perf. (1b) | 0.88 | 0.42 | 0.19 | 0.035* | 0.54 | 0.56 | 0.09 | 0.335 |
| PM—Prom. TSE (2) | 0.11 | 0.08 | 0.11 | 0.188 | 0.20 | 0.09 | 0.19 | 0.033* |
| MRA—Prom. TSE (3) | -0.19 | 0.07 | -0.26 | 0.004* | -0.20 | 0.07 | -0.27 | 0.003* |
| vigilance—Prev. TSE (4) | -0.01 | 0.08 | -0.01 | 0.919 | 0.22 | 0.07 | 0.29 | 0.003* |
| MRA—Prev. TSE (5) | -0.18 | 0.07 | -0.25 | 0.006* | -0.13 | 0.06 | -0.23 | 0.018* |
| Prom. TSE—Prev. TSE | 0.08 | 0.26 | 0.31 | 0.002* | 0.04 | 0.03 | 0.17 | 0.084* |

Note. * = $p < .10$.

Figure Captions

Figure 1. Scree plot of vigilance EFA illustrating a two-factor solution. Eigenvalues represented on the Y-axis and the number of factors represented on the X-axis. Factor 1 accounted for 42.30% (Eigenvalue = 5.50) of the common variance in items. Factor 2 accounted for an additional 11.96% (Eigenvalue = 1.56).

Figure 2. CFA estimation of the vigilance factor structure with error detection and diligence facets. CFA confirmed the two-factor vigilance model with optimal indices of fit [χ^2 (53) = 90.85, $p < .01$; SRMR = .04; RMSEA = .05; CFI = .98; AIC = 140.85].

Figure 3. CFA estimation of the MTQ+V measurement model with eight sub-factors. CFA confirmed the eight-factor with adequate fit [χ^2 (680) = 1483.29, $p < .01$; SRMR = .07, RMSEA = .06, CFI = .87, AIC = 1683.29].

Figure 4. Rotated factor plot for convergent and discriminant analysis including vigilance and existing motivational constructs. The shared variance in vigilance is captured by an avoidance factor yet a large share of its variance is also captured by the approach factor.

Figure 5. Model 1: Hypothesized structural model with fully mediated relationships between motivational traits and task performance through task-specific self-efficacy.

Figure 6. Model 2: Alternative structural model with MRA as a moderator of relationships between motivational traits and task-specific self-efficacy.

Figure 7. Model 3: Alternative structural model specifying partially mediated relationships between motivational traits and task performance through task-specific self-efficacy.

Figure 8. Model 4: Alternative structural model specifying relationships between motivational traits and task-specific self-efficacies across promotion and prevention task types.

Figure 9. Histogram of prevention-task self-efficacy responses illustrating an approximately normal distribution. Response frequency on Y-axis. Self-efficacy composite scale score on X-axis. Composite calculated as the average across the 10-item scale ($\alpha = .87$).

Figure 10. Histogram of promotion task performance illustrating an approximately normal distribution. Response frequency on Y-axis. Number of ideas generated on X-axis.

Figure 11. Estimated structural model for subjects in Condition 1. Personal Mastery = 9 items ($\alpha = .84$). Motivation Related to Anxiety = 8 items ($\alpha = .80$). Vigilance = 12 items ($\alpha = .88$). Promotion-task self-Efficacy = 10 items ($\alpha = .85$). Prevention-task self-Efficacy = 10 items ($\alpha = .87$). Promotion Task Performance = number of unique ideas generated in 5 minutes. Prevention Task Performance = number of errors correctly identified in 5 minutes. * = $p < .10$. Overall model fit = [χ^2 (24) = 37.12, $p = .04$; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12].

Figure 12. Estimated structural model for subjects in Condition 2. Personal Mastery = 9 items ($\alpha = .84$). Motivation Related to Anxiety = 8 items ($\alpha = .80$). Vigilance = 12 items ($\alpha = .88$). Promotion-task self-Efficacy = 10 items ($\alpha = .85$). Prevention-task self-Efficacy = 10 items ($\alpha = .87$). Promotion Task Performance = number of unique ideas generated in 5 minutes. Prevention Task Performance = number of errors correctly identified in 5 minutes. * = $p < .10$. Overall model fit = [χ^2 (24) = 37.12, $p = .04$; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12].

Figures

Figure 1.

Scree plot of vigilance EFA illustrating a two-factor solution

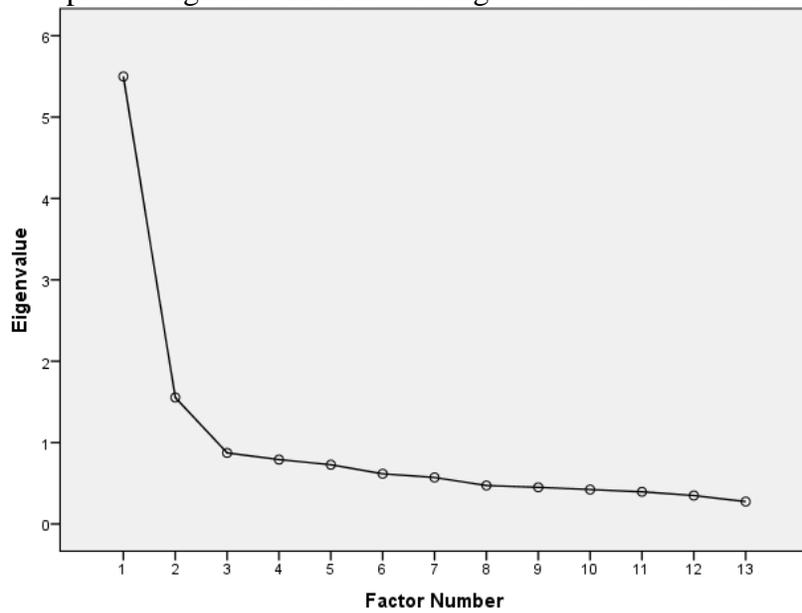


Figure 2.

CFA estimation of the vigilance factor structure with error detection and diligence facets.

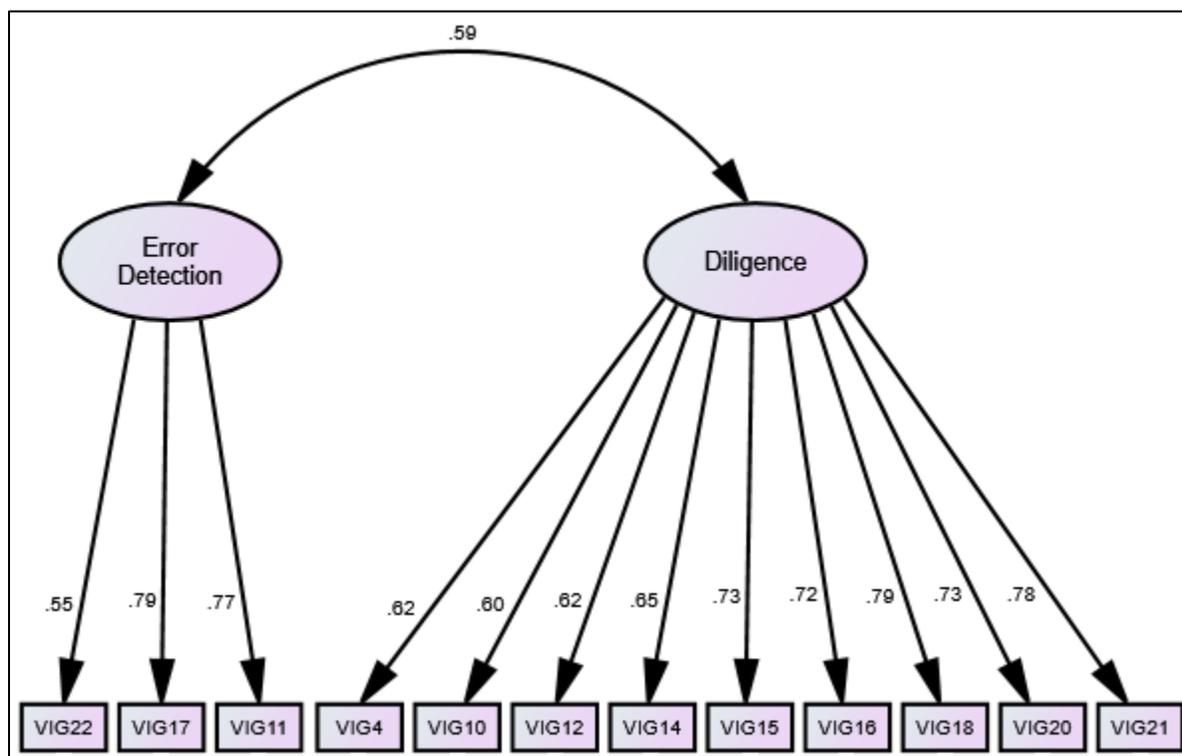


Figure 3.

CFA estimation of the MTQ+V measurement model with eight sub-factors.

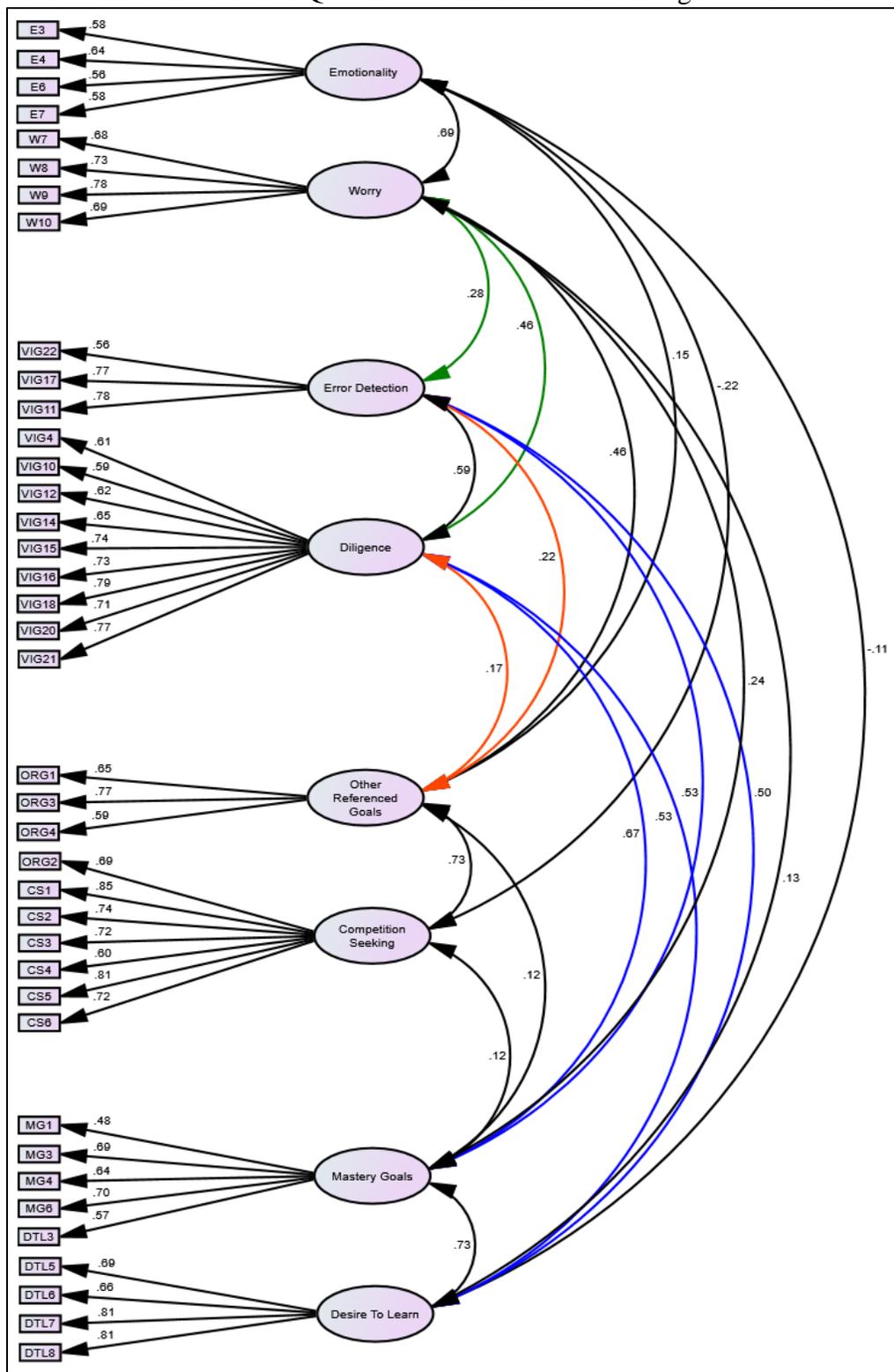


Figure 4.

Rotated factor plot for convergent and discriminant analysis including vigilance and existing motivational constructs.

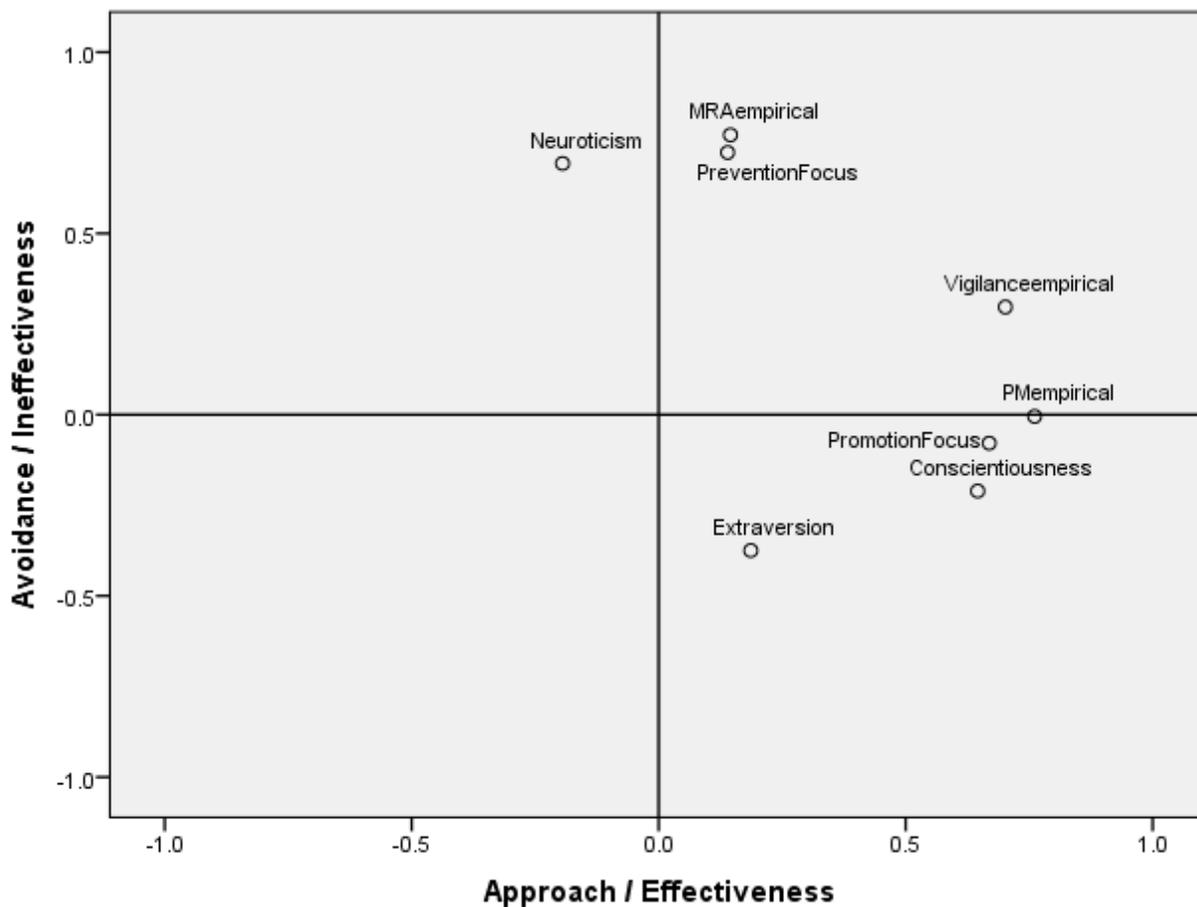


Figure 5.

Model 1: Hypothesized structural model with fully mediated relationships between motivational traits and task performance through task-specific self-efficacy.

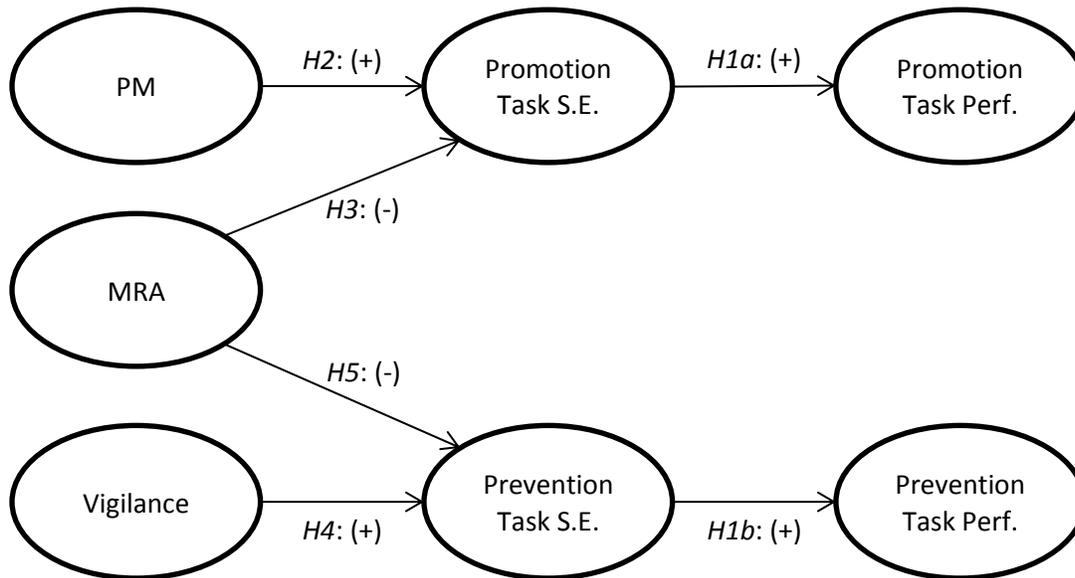


Figure 6.

Model 2: Alternative structural model with MRA as a moderator of relationships between motivational traits and task-specific self-efficacy.

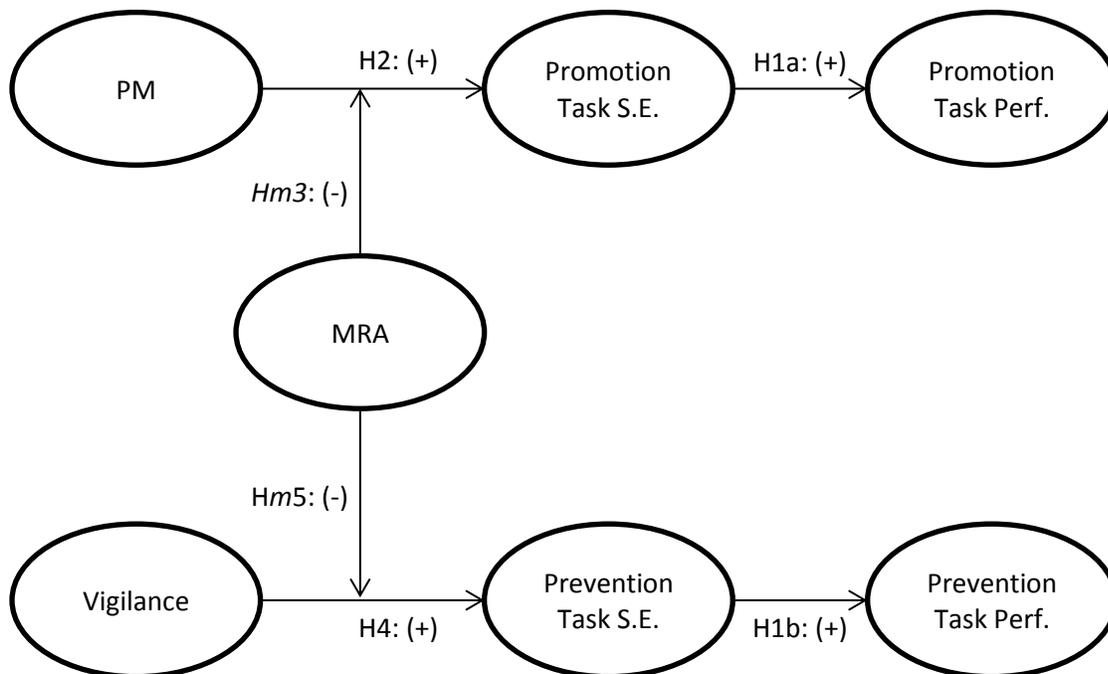


Figure 7.

Model 3: Alternative structural model specifying partially mediated relationships between motivational traits and task performance through task-specific self-efficacy.

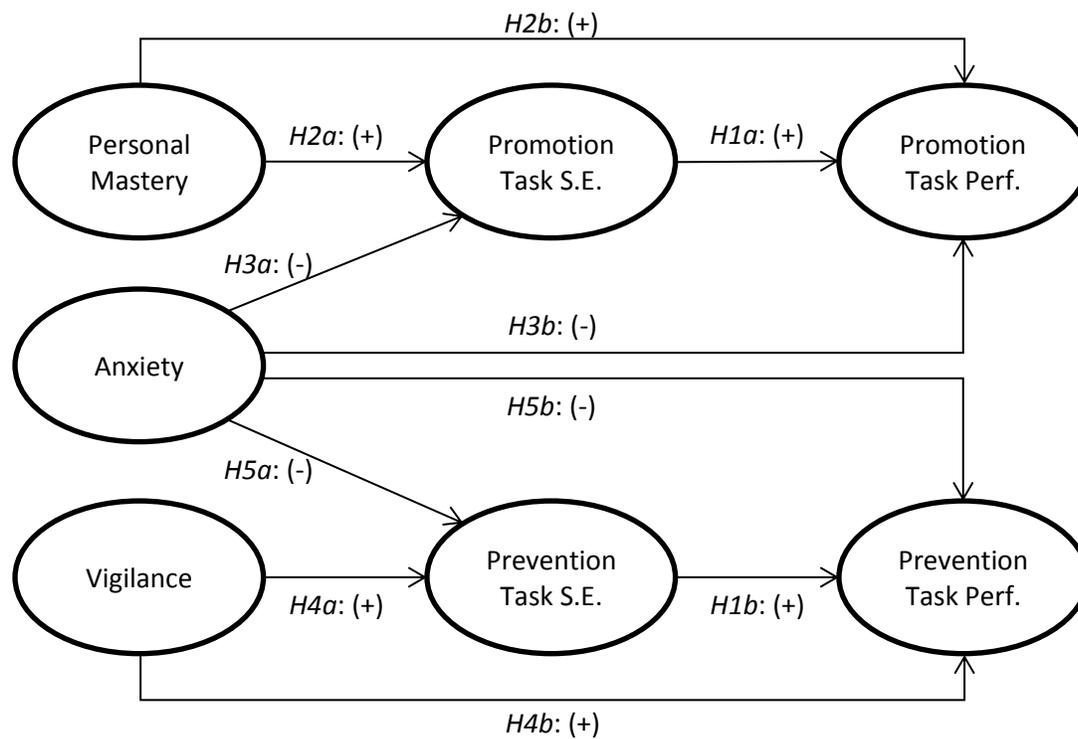


Figure 8.

Model 4: Alternative structural model specifying relationships between motivational traits and task-specific self-efficacies across promotion and prevention task types.

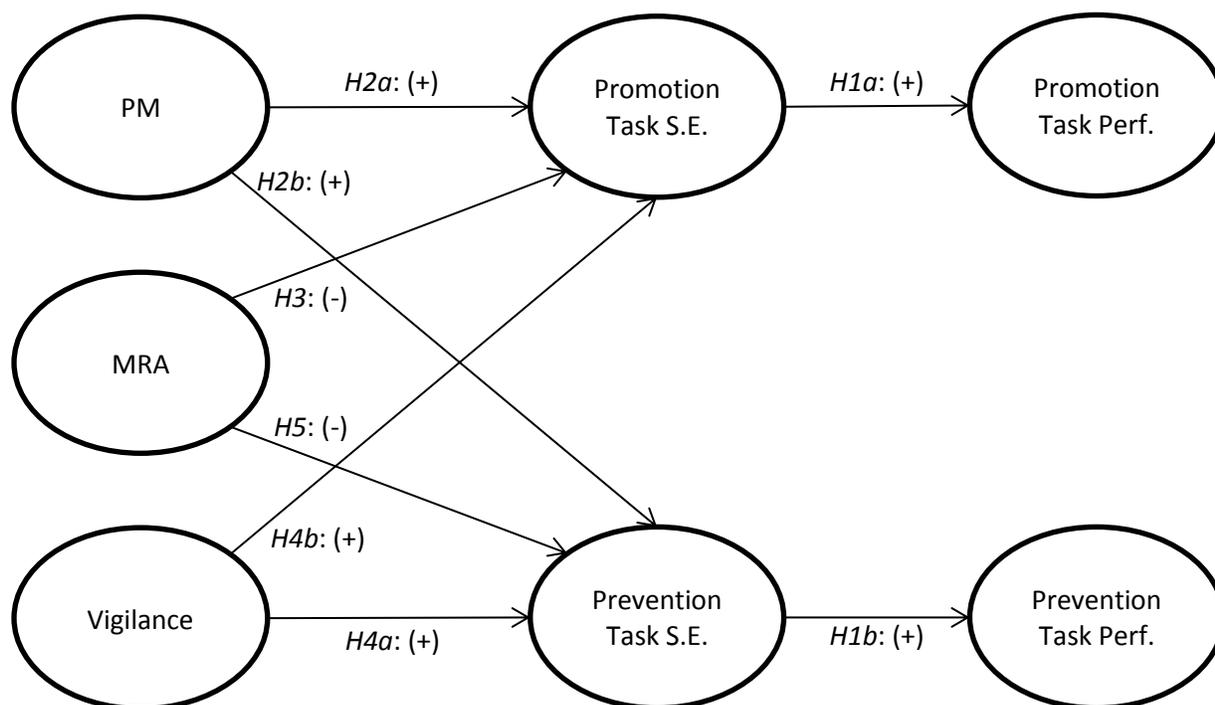


Figure 9.

Histogram of prevention-task self-efficacy responses illustrating an approximately normal distribution.

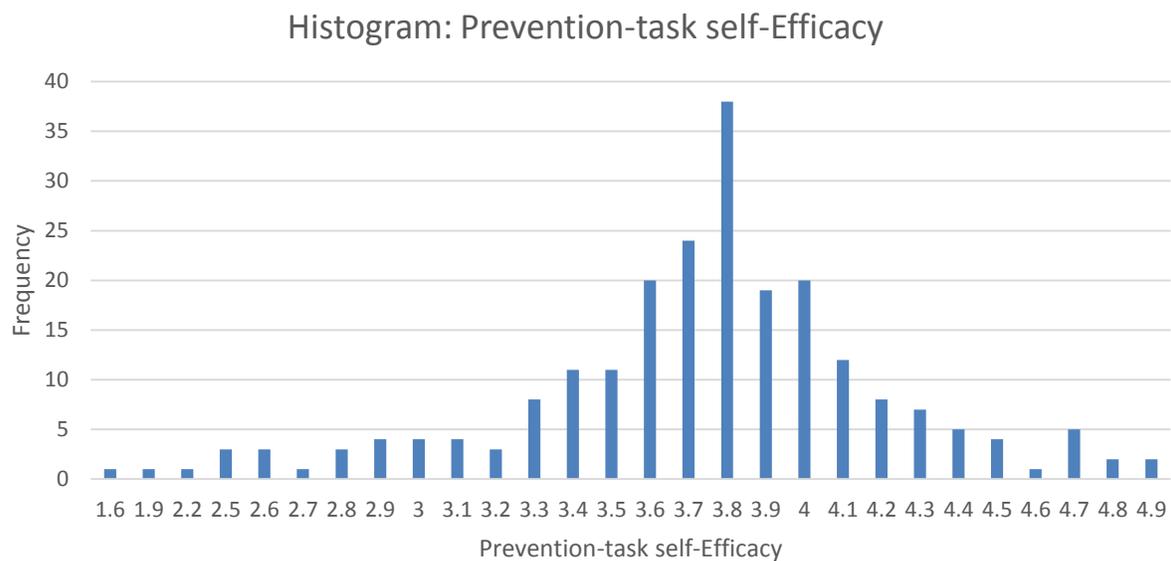


Figure 10.

Histogram of promotion task performance illustrating an approximately normal distribution.

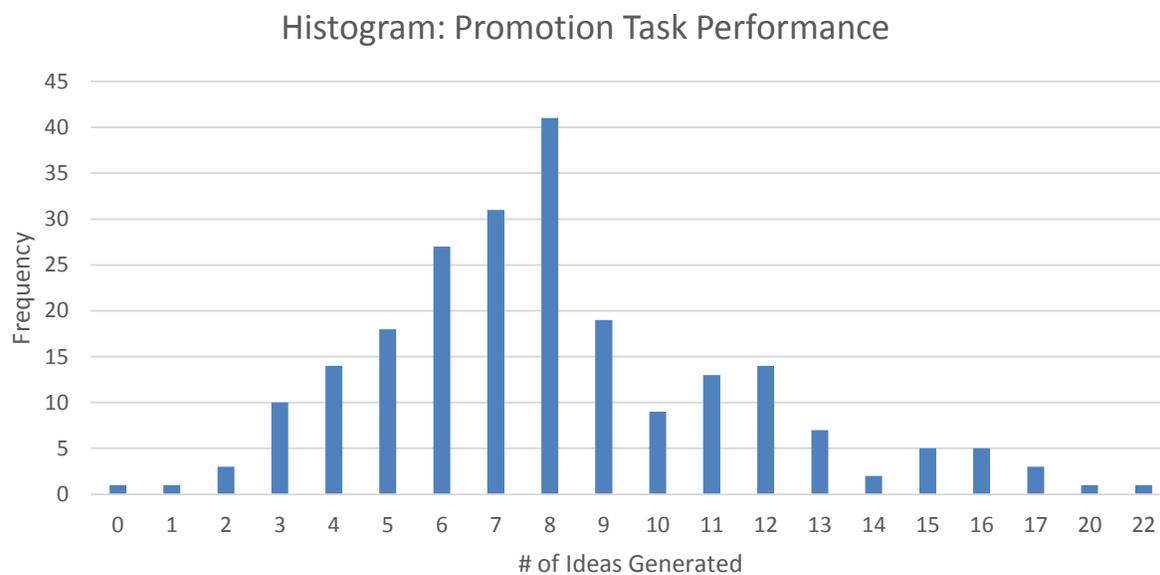
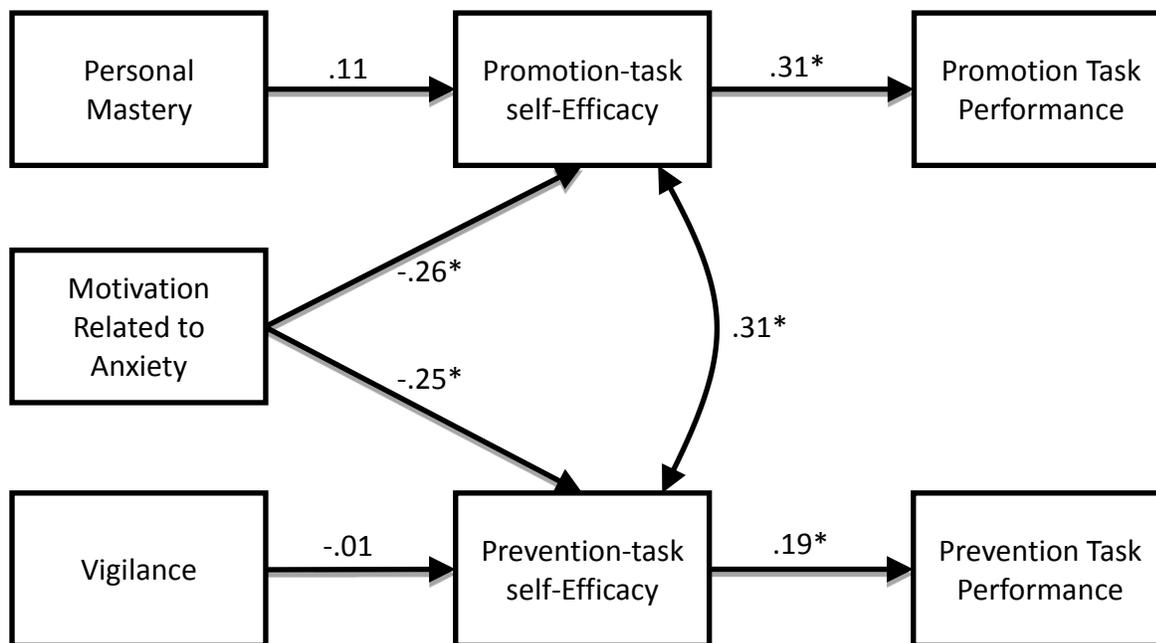


Figure 11.

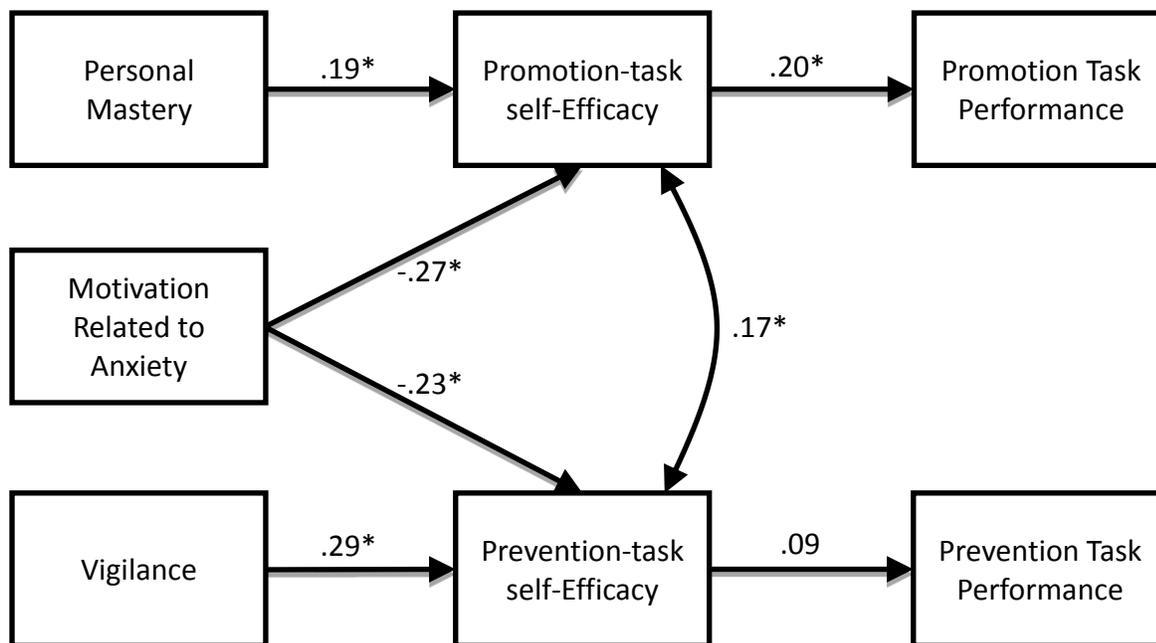
Estimated structural model for subjects in Condition 1.



Note. $\chi^2(24) = 37.12, p = .04$; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12

Figure 12.

Estimated structural model for subjects in Condition 2.



Note. $\chi^2(24) = 37.12, p = .04$; SRMR = .07; CFI = .93; RMSEA = .05; AIC = 101.12