

Development of the Mental Toughness Situational Judgment Test:
A Novel Approach to Assessing Mental Toughness

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ACADEMIC ABSTRACT

Mental toughness (MT) has been shown to predict outcomes across a variety of high-stress contexts such as athletics, the military, and the workplace. Despite this, researchers have struggled to reach consensus regarding how best to conceptualize and measure MT. Specifically, MT assessments have focused on measuring general MT rather than domain-specific MT. The current study proposes a measurement model of MT grounded in social-cognitive theory, and introduced an assessment of MT within a situational judgment test framework to assess MT in the workplace. Participants completed a battery consisting of the new measure as well as measures intended to establish construct validity. Factor analyses suggested a three-factor solution fit the data best. Furthermore, cross-structure analyses indicated that the new assessment avoided common-method bias in responding, as evident by weak correlations with measures of other constructs.

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GENERAL AUDIENCE ABSTRACT

Mental toughness (MT) has been shown to be a resource that buffers against the negative effects of distress and predicts outcomes across a variety of settings, including the workplace. However, widely used self-report MT questionnaires have numerous issues, such as a lack of context. The current study addressed a number of these issues by creating a measure of MT wherein respondents were given a workplace situation and asked the likelihood that they would respond in a variety of manners, thereby assessing MT as relevant to the workplace context. Three factors of MT were most prominent – task persistence, emotional control, and utilization of feedback. The measure introduced in the current study had small associations with existing self-report measures of MT, personality, and distress, suggesting that the new method of measuring MT avoided some issues inherent to self-report responding. This research laid promising groundwork for the future assessment of MT in the workplace.

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Chapter 1

Introduction

Mental Toughness (MT) is a popular psychological construct that has been applied in athletics, the military, and the workplace. Traditionally, MT has been conceptualized as a psychological disposition that facilitates the ability to overcome adversity and maintain high levels of performance, even during intense stress. Although numerous diverse definitions of MT have been proposed (e.g., Clough, Earle, & Sewell, 2002; Gucciardi, Gordon, & Dimmock, 2008, Jones, Hanton, & Connaughton, 2002), Gucciardi, Hanton, Gordon, Mallett, and Temby (2015) summarize prior MT research by defining it as the “personal capacity to produce consistently high levels of subjective (e.g., personal goals or striving) or objective performance (e.g., sales, race time, GPA) despite everyday challenges and stressors as well as significant adversities” (p. 28). MT research has recently spread to the workforce, and thus it is necessary to examine the conceptualization and assessment of the construct as it pertains to the workplace in an employed sample.

Applications of Mental Toughness

Initially, MT researchers focused on athletes, with the general finding that athletes at higher levels of competition (e.g., professionals) display higher levels of MT than amateurs (Chen & Cheesman, 2013; Golby & Sheard, 2004). MT is presumed to improve athletes' coping strategies (Nicholls, Levy, Polman, & Crust, 2011), including the ability to perform under pressure (Bell, Hardy, & Beattie, 2013), and to recover after injury (Petrie, Dieters, & Harmison, 2014). The research on MT among athletes has grown dramatically in recent years, showing MT to be a prevalent cognitive process that facilitates athletic performance.

Recently, MT has been studied in high-stress, non-athletic situations. For example, research of military training has shown MT scores to predict training outcomes (Arthur, Fitzwater, Hardy, Beattie, & Bell, 2015; Godlewski & Kline, 2012; Gucciardi, et al., 2015). Researchers have also investigated relationships between MT and workplace outcomes (Gucciardi et al., 2015; Lin, Clough, Welch, & Papageorgiou, 2017; Marchant et al., 2009). Specifically, Gucciardi et al. (2015) found that employees at higher levels of MT experienced lower levels of perceived work-related distress and were perceived to be more competent employees, based on supervisor ratings.

Studying managers at various levels of organizational hierarchies, Marchant et al. (2009) found that senior-level managers displayed higher levels of MT than middle-level and junior managers. Additionally, MT has been found to correlate positively with financial income (Lin et al., 2017). Despite these recent advances in applying MT to work issues (Gucciardi & Gordon, 2011), general research pertaining to MT in the workplace is scant, and more research is needed to investigate the manifestations of MT in the workplace.

Conceptualizing Mental Toughness

As investigations of MT in the workplace continue, it is necessary to examine the construct validity of MT measurement tools. Unfortunately, definitions of MT have lacked clarity and cohesiveness (Andersen, 2011). Definitions of MT have been generated from qualitative studies (e.g., Jones et al., 2002) and from applying theories borrowed from health and positive psychology (e.g., Clough et al., 2002; Sheard, Golby, & van Wersch, 2009). The diverse interests in MT speak to the importance of the construct, but such diversity also leads to conceptual confusion about MT.

Although MT definitions share common themes (e.g., confidence, self-motivation, overcoming adversity, and managing goals effectively), many differences are evident in the specification of the MT construct. For example, Jones et al. (2002) define MT in relation to others – individuals at a high level of MT must be more persistent than their competitors. However, this relative approach is not apparent in other definitions. Clough et al. (2002) argue that interpreting potential threats as positive opportunities is a defining characteristic of MT, but this component is not included in the MT definitions of other researchers (e.g., Sheard et al., 2009).

In a critique of the MT construct, Andersen (2011) noted that the language used in the definitions of MT border on fantasy, with words such as “unshakeable,” “insatiable,” and “always.” He further argues that it is fallacious to believe that an individual with high levels of MT has “unshakeable” confidence in all situations, or “always” works harder than competitors despite significant adversities. Indeed, the absolute terms used to depict MT are more reflective of a superhuman ability than a realistic construct.

In an attempt to synthesize the myriad of MT definitions, Gucciardi et al. (2015) proposed a seven-factor model of MT, conceptualizing it as a combination of self-belief, attention regulation, emotion regulation, success mindset, situational knowledge, buoyancy, and optimism. Broadly speaking, these factors reflect diverse cognitive processes individuals possess that allow them to cope with the demands of competitive and stressful environments, thereby lowering distress levels and improving performance.

However, Gucciardi et al. (2015) provided mixed empirical support for the seven-factor model, examining both a hierarchical and lower-order model of the dimensionality of MT. Whereas the models had acceptable fit indices, internal reliability, and consistent factor loadings, a strong positive manifold among the factors was found. The researchers tested both the lower-order and higher-order seven-factor models on a sample of athletes, students, and employees ($N = 1,492$), but they found a nonpositive definite matrix in both samples, leading them to conclude that the model was misspecified. As a result, the authors called for more research into the dimensionality of MT, suggesting it is possible the construct could be unidimensional, contrary to research conceptualizing MT as multidimensional. The purpose of the current study is to introduce a revised measurement model of MT that is grounded in social-cognitive and self-regulation theory, while retaining aspects of Gucciardi et al.'s MT definition. See Figure 1 for a representation of the model.

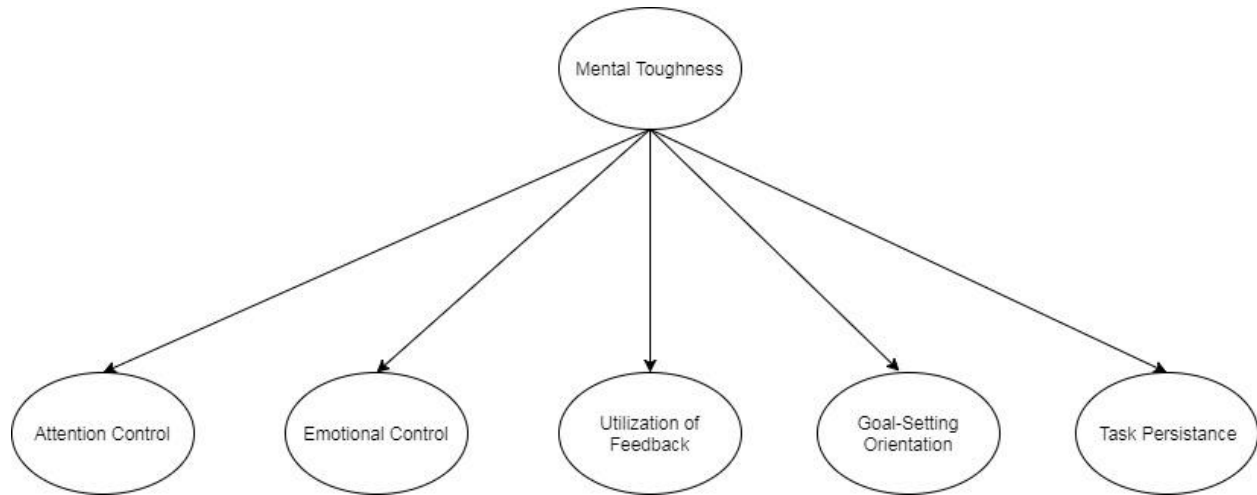


Figure 1. Proposed measurement model.

Social-cognitive theorists argue that behavior is the result of dynamic interactions between individuals' cognitions and their environment (Mischel & Shoda, 1995). Relatedly, self-regulation theory posits that individuals regulate their behaviors and emotions by continuously monitoring their behaviors and comparing them to personal standards (Bandura, 1991). These theories provide a strong theoretical basis to describe the nature of MT as a situation-bound chronic preference. Within this framework, MT can be conceptualized as a combination of cognitive units that interact in dynamic fashion with the environment and each other to facilitate the achievement of goals, relative to one's personal standard. These units include emotional control, attention regulation, task persistence, approach goal-orientation, and appropriate utilization of feedback. See Table 1 for a description of each unit.

Table 1

The Five Subcomponents of Mental Toughness

Dimension	Definition
Attention regulation	The ability to focus on relevant stimuli while minimizing the intrusion of irrelevant stimuli
Emotion regulation	The awareness and ability to use emotionally relevant processes to facilitate optimal performance and goal attainment.
Utilization of feedback	The ability to utilize both positive and negative feedback from a variety of sources, including both objective standards and social responses, to direct behavior towards a goal.
Task persistence	The ability to remain committed to a specific task despite challenges. This involves adjusting one's goals if they are met too easily, and exerting more effort to achieve challenging goals.
Approach goal-orientation	One's likelihood to set goals to achieve a favorable outcome rather than avoid an unfavorable outcome.

A primary goal of this revised MT conceptualization is to reduce the positive manifold so as to capture MT dimensions as distinct but related constructs. The secondary goal is to develop a measure where the operationalization of MT is bounded by the situation. For example, a student-athlete may be mentally tough in overcoming challenges related to athletic competition, but less mentally tough when facing academic challenges. From this perspective, creating a global MT measure requires sampling across a wide array of life situations, whereas, much like self-efficacy, MT can also be measured in a specific life domain (e.g., work, school, and athletic competitions).

Measuring Mental Toughness

Given the lack of agreement about the conceptualization of the MT construct, it is not surprising that many self-report measures of MT have been created. Two common measures of

MT include the Mental Toughness Questionnaire 48 (MTQ48) and the Sports Mental Toughness Questionnaire (SMTQ). A multitude of issues have been raised about the measurement properties of both scales (Gucciardi, Mallett, Hanrahan, & Gordon, 2011). As such, there is no commonly accepted “best” scale for measuring MT.

The MTQ48 (Clough et al., 2002) is the most frequently used measure of MT among athletes and workplace employees. This tool measures MT as a combination of four factors: confidence, emotional control, commitment to goals, and the ability to interpret potential threats as positive challenges. Although researchers have supported the four-factor model (Horsburgh, Schermer, Veselka, & Vernon, 2009; Perry, Clough, Crust, Earle, & Nicholls, 2012), other researchers have failed to recover four factors (Birch, Crampton, Greenlees, Lowry, & Coffee, 2017; Gucciardi, Hanton, & Mallett, 2012).

The SMTQ is designed to measure 3 MT dimensions: emotional control, constancy (maintaining determination to accomplish goals), and confidence (Sheard et al., 2009). However, critiques of the SMTQ include construct deficiency and failing to follow item development best practices due to the inclusion of double-barreled questions, such as “I get angry and frustrated when things do not go my way” (Gucciardi et al., 2011).

Crust and Swann (2011) compared the MTQ48 with the SMTQ and found the two measures shared 56 % common variance, and correlations between similar subscales on different measures (e.g., MTQ48’s “confidence in abilities” and SMTQ’s “confidence”; MTQ48’s “emotional control” and SMTQ’s “control”) were lower than expected ($r = .49-.62$). Crust and Swann concluded that these two measures capture different dimensions of MT.

Situational Measurement of MT

Researchers have suggested that measuring MT in a specific situation would improve the assessment of MT (Gucciardi et al., 2011; Gucciardi & Gordon, 2009; Gucciardi, Gordon, & Dimmock, 2009a). For example, a case study by Fawcett (2011) attempted to understand the construct of MT from a phenomenological perspective by interviewing two individuals in diverse fields - an elite adventurer and field hockey coach. Each believed MT to be important for their personal success but each individual exhibited a great degree of variation when asked to conceptualize MT as a function of the situation.

In addition, the situation is important because MT has both trait and state qualities (Gucciardi et al., 2015; Hardy, Imose, & Day, 2014; Horsburgh, 2009; Veselka, Schermer, Petrides, & Vernon, 2009). Gucciardi et al. tested whether MT is best conceptualized as a trait or a state in a sample of students over time and found more within-person variability (56%) than between-person variability (44%) among MT scores. This led the authors to conclude that MT may be best thought of as a “contextualized expression of dispositional traits that are activated or shaped by contextual or social factors” (p. 41). In sum, this research indicates that MT is a construct inherently tied to the specific situation in which it functions, and therefore situational factors must be reflected in the measurement of the construct.

Although this critique of MT measurement has been applied to the most frequently-used measures of MT, sport-specific MT scales have been developed, namely the Australian football MT Inventory (Gucciardi et al., 2009a) and the Cricket MT Inventory (Gucciardi & Gordon, 2009). These tools have been used to differentiate players of different skill levels and experience. Furthermore, they correlated moderately with measures of resilience, flow, and hardiness, and also predicted athlete burnout. These scales include sport specific items that give the respondent

a specific situation for framing the items. Example items include, “I have an unshakeable self-belief in my cricket abilities” and “I remain focused despite cricket-related distractions.” Despite the inclusion of such items, some items on these scales still lack specification of a situation, such as “I remain focused during adversity” and “I never experience doubts about my ability”. However, the preliminary research with sport-specific scales provided promising findings that the measurement of MT can be improved when incorporating a specific situation.

More recently, Arthur et al. (2015) developed a behavior-based measure of MT that focused on superordinates’ behavioral ratings of subordinates in a military training program. While this measure demonstrated incremental validity over the often-used SMTQ, this measure is limited in the ease and practicality with which it can be applied because it relies on superordinates, thus demanding a second party to observe and assess the construct. Behavior-based approaches to the measurement of MT have been recommended (Andersen, 2011), yet few attempts to develop such measures have been conducted.

A Novel Approach to Measuring Mental Toughness

Gucciardi et al. (2011) argue that scenario-based measures of MT should be investigated. One manner of incorporating the situation into the measurement of MT is by crafting a tool within the framework of a Situational Judgment Test (SJT). SJTs are frequently used by organizations as assessment tools in which candidates are presented with a series of scenarios, and asked to select an appropriate response from a list of possible responses. SJTs can be beneficial to the measurement of MT because the respondent is directed to identify motivations or behavioral intentions related to MT within a particular situation. Moreover, such measures retain the ease-of-administration benefit of self-report measures, and are less susceptible to social desirability biases and faking (Motowidlo, Hooper, & Jackson, 2006)

The current study adopted this SJT approach by creating an MT measurement tool applicable for the workplace. As indicated by recent research (Gucciardi et al., 2015; Lin et al, 2017; Marchant et al., 2009), MT is a construct relevant to the workplace, and organizations have become interested in MT in recent years. In conjunction with the measurement model proposed above, it is argued that MT is best conceptualized as a chronic preference that is bound by the situation, and the measurement tool should reflect this conceptualization. As a result, the current study explored the scenario-based framework to assess MT directly within the context of the workplace, thereby fulfilling the need for a practical workplace measure of MT.

The Current Study

The current study introduced a new measurement model of MT (i.e., the Social Cognitive Mental Toughness Model) and an associated measure labeled the “Mental Toughness Situational Judgment Test” (MTSJT) designed to measure MT in work situations. This initial empirical effort was designed to validate the MTSJT as a manifest indication of MT that corresponds with the proposed MT construct domain. Thus, the aim of the current study was to conduct both exploratory and confirmatory factor analyses to establish the internal structure of the MTSJT, and to evaluate the cross-structure of the MTSJT. For the cross-structure analysis, an existing measure of MT and a perceived distress measure were included to assess convergent validity; the Big Five personality traits were assessed to demonstrate divergent validity.

Chapter 2

Literature Review

Researchers have long been interested in identifying mechanisms that allow individuals to overcome adversity in a variety of situations. The construct of mental toughness (MT) has become popular in research on athletics, the military, and the workplace. MT is the “personal capacity to produce consistently high levels of subjective (e.g., personal goals or striving) or objective performance (e.g., sales, race time, GPA) despite everyday challenges and stressors as well as significant adversities” (Gucciardi et al., 2015, p. 28). MT has been shown to facilitate an individual’s ability to manage perceived distress and maintain performance despite the presence of stressors and challenges (e.g., Arthur et al., 2015; Gucciardi et al., 2015; Nicholls, Polman, Levy, & Backhouse, 2008). Research has also demonstrated the practical utility of the MT construct (Lin, Mutz, Clough, & Papageorgiou, 2017). Although there is a general understanding of what MT represents, researchers have not come to a consensus in the specification of the

underlying measurement model of MT, raising issues about both the conceptualization and measurement of MT.

MT Research

Over the last few decades, MT research has spread to a variety of domains where it is proposed to facilitate the ability to handle stressors effectively. Originally, researchers investigated the role of MT among athletes, before branching into other high-stress environments such as the military and the workplace. Taken in sum, the literature reviewed here demonstrates that individuals operating at higher levels of MT tend to handle stressors more effectively and therefore are more likely to maintain high levels of performance.

Athletics. Sports psychologists' are interested in athletes' abilities to overcome the pressures of performance and remain committed to their goals, despite significant setbacks. Researchers have demonstrated that coaches believe MT is among the most important "psychological skills" their athletes could develop (Gould, Hodge, Peterson, & Petlichkoff, 1987); Major League Baseball players believe MT to be one of the most important contributors to success (Wagner, 2011); and college basketball players with higher levels of MT were perceived to be more talented by their coaches. (Madrigal, Hamill, & Gill, 2013).

Research in athletics supports the notion that MT provides unique advantages to athletes that helps them perform (Crust, 2008; Gucciardi & Gordon, 2011; Sheard, 2012). For example, research with elite tennis players has demonstrated positive connections between MT and the ability to monitor and control negative reactions (Cowden, Anshel, & Fuller, 2014) as well as a claimed reciprocal relationship between MT and flow - a state where an athlete is fully immersed and focused (Crust & Swann, 2013). Furthermore, Chen and Cheesman (2013) demonstrated that professional mixed martial artists exhibited higher levels of MT than amateurs, whereas Golby

and Sheard (2004) noted small yet significant differences between rugby players engaging in different levels of competition, such that players at the highest level of competition displayed higher levels of MT than players competing at lower levels. Such research suggests that athletes in a state of high MT can also physically perform at a higher level.

Moreover, positive associations have been demonstrated between MT scores and physical endurance (Crust & Clough, 2005), use of adaptive coping styles (Kaiseler, Polman, & Nicholls, 2009; Nicholls et al., 2008), and injury recovery (Petrie et al., 2014). Overall empirical research has shown robust effects indicating that athletes at higher levels of MT compete at more advanced levels or are perceived to perform at higher levels.

Military. Research applying MT to the military has grown dramatically in recent years. In particular, research has focused on military training programs. Such situations are pertinent to MT because of the presence of numerous stressors, including physical, mental, and emotional challenges. Gucciardi et al. (2015) demonstrated the importance for MT to help individuals overcome sustained exposure to stress by studying training outcomes in the Australian Defense Force.

The findings of Gucciardi et al. (2015) showed that MT was a significant predictor of passing a military training program while similar constructs such as hardiness and self-efficacy did not predict training success. Additionally, Godlewski and Kline (2012) found MT predicts voluntary turnover in the Canadian Armed forces, and this relationship was mediated by normative and affective commitment to the organization. Godlewski and Kline's retention results indicate that individuals at higher levels of MT wanted to stay with the military because they enjoyed the experience and they felt obligated to stay.

Finally, Arthur et al. (2015) found that a behavioral measure of MT (one in which superordinates rated the frequency that subordinates engaged in behavioral perseverance in response to challenges) predicted ratings of training performance among the infantry personnel. In sum, recent research focused on applying MT to the military has demonstrated the utility of the construct in such high-stress situations.

Learning. Academic achievement and learning is another domain in which the application of MT has become increasingly popular. Research in this domain has shown positive associations between individuals at a high level of MT and the ability to minimize the intrusion of irrelevant information (Dewhurst, Anderson, Cotter, Crust, & Clough, 2012); video game learning (Hardy et al., 2014); academic progress over time (Gucciardi et al., 2015); quality of adjustment to higher education and classroom behavior (St. Clair-Thompson et al., 2017); and academic performance (Crust et al., 2014). Thus, empirical research has demonstrated that MT predicts a variety of outcomes in the academics and learning.

Workplace. A final domain in which researchers have investigated the applicability of MT is the workplace. Speaking on the closely related concept of resilience, Shoenfelt (2016) stated “I strongly encourage I-O psychologists studying resilience to review, borrow, and build on the sport psychology research in this area” (p. 443). Despite several such suggestions by researchers (e.g., Gucciardi et al., 2011) not much workplace-related research has been conducted. Exceptions include Gucciardi et al. (2015) showing that MT predicted supervisor’s ratings of job performance; Marchant et al. (2009) showing that managers at more senior levels of organizations display higher levels of MT than junior managers; and Lin et al. (2017) showing that MT predicts career success as predicted by earnings.

Work is a large part of an individual's identity (Gini, 1998) and is a leading factor for life satisfaction (Judge & Watanabe, 1993). Thus, investigations into constructs that relate to workplace stress and distress are of utmost importance to industrial/organizational psychologists. As research implementing MT in the workplace continues to grow, it is necessary to examine the construct validity and measurement of MT to ensure MT is being assessed properly in the workplace context.

Issues with the Current Conceptualizations of MT

The aforementioned research demonstrated that MT has been widely studied and applied in a variety of different situations, with the general conclusion that MT decreases perceived distress and increases the likelihood of optimal performance and the achievement of desirable outcomes. Despite such findings, MT research has failed to reach consensus on the definition of MT.

Furthermore, researchers have struggled to create a common conceptualization and measurement model. As a result, many of the studies mentioned above differ in the conceptualization of MT as well as their measurement of MT. This has made it difficult to properly integrate findings.

Early conceptualizations of MT defined the construct as the ability to cope with stress, pressure, and adversity (Goldberg, 1998), the possession of superior mental skills (Bull, Albinson, & Shambrook, 1998), and the ability to overcome and rebound from failure (Dennis, 1981). Unfortunately, these definitions lack empirical testing, are too vague, and do not distinguish between MT and related constructs such as grit and hardiness.

Loehr (1986) popularized MT in a self-help book about using MT to achieve athletic goals. However, most of the progress in conceptualizing and defining MT has taken place in the

last two decades. Jones et al. (2002) addressed the question “What is this thing called Mental Toughness?” by conducting qualitative research on elite Olympic athletes. Based on the interviews, Jones et al. defined MT as “having the natural or developed psychological edge that enables you to: generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.” (p. 209).

Furthermore, the researchers identified 12 key attributes of mentally tough performers, with examples including “having an unshakeable belief in your ability to achieve your competition goals,” “having an insatiable desire and internalized motives to succeed,” and “remaining fully focused on the task at hand in the face of competition-specific distractions.”

Andersen (2011) was highly critical of this conclusion from Jones et al. (2002). First, the MT conceptualization is grounded in interviews with ten elite athletic performers, limiting the ability to gain an understanding of how MT operates in the general population. Jones et al. also defined MT as an other-dependent construct by indicating that one must outperform opponents. This suggest that an individual who possesses attributes of MT, but loses a competition to an individual who possess superior relevant attributes, is not exhibiting MT.

Additionally, Andersen (2011) indicated that the MT conceptualization is plagued with fantasies and absolute language such as “unshakable belief,” “insatiable desire,” and “fully focused.” The use of adjectives such as these to describe behaviors, cognitions, and affects associated with MT misconstrues the manifestation of the construct. Taken in sum, the work of Jones et al. (2002) provided an overview of how MT is perceived by elite athletes and brought to

light some of the core components of the construct yet is still plagued by many conceptual issues.

Quantitative research has built upon the findings of Jones et al. (2002) to further understand the construct of MT. For example, Clough et al. (2002) borrowed heavily from the construct of hardiness and proposed a four-factor model of MT. Three factors of the model were a direct adoption of hardiness theory. Hardiness, as defined by Kobasa (1979), consists of the factors of emotional control, commitment to goals, and the ability to perceive potential threats as positive challenges. In their seminal research on hardiness, Kobasa demonstrated that hardy individuals are better equipped at handling adversity and less likely to fall physically ill despite facing stressors. Clough et al. added a fourth component to this definition – confidence – to craft their conceptualization of MT.

Clough et al.'s (2002) work has largely been criticized as a rebranding and reapplication of hardiness, considering that 75 percent of the conceptualization is directly adopted from hardiness theory (Gucciardi et al., 2011). To further complicate this issue, research has shown a positive relationship between hardiness and confidence (Gucciardi et al., 2011), suggesting that confidence may already be a factor encapsulated by hardiness.

Sheard et al. (2009) also conducted empirical research designed to provide a conceptualization of MT. Sheard et al. derived their conceptualization from the field of positive psychology and defined MT as a combination of emotional control, constancy in striving to achieve goals, and confidence in one's abilities. Gucciardi et al. (2011) criticized this conceptualization for being too parsimonious as a model of MT. That is, the three dimensions of MT captured in Sheard et al.'s conceptualization fail to account for other important aspects of

MT that have been identified by qualitative research, including attention control, success mindset, and contextual intelligence, among others.

Recently, Gucciardi and colleagues (2008; 2015) advanced both the conceptual understanding and measurement of MT by providing the most comprehensive definition of MT to date (i.e., the personal capacity to produce consistently high levels of subjective (e.g., personal goals or striving) or objective performance (e.g., sales, race time, GPA) despite everyday challenges and stressors as well as significant adversities). This definition succinctly summarizes the major components of MT that have been consistently identified in empirical research, as it was grounded in an extensive review of both the theoretical and empirical literature addressing MT. According to Gucciardi et al., MT is best conceptualized as the ability to survive times of adversity, strive to achieve goals, and thrive during times of prosperity.

Furthermore, Gucciardi et al. (2015) proposed a seven-factor measurement model of MT, consisting of: generalized self-efficacy, buoyancy, success mindset, optimistic style, context knowledge, emotion regulation, and attention regulation. They created a new measure of MT, the Mental Toughness Index (MTI), but failed to find support for this elaborate measurement model. Finding a strong positive manifold among the factors, the authors concluded that MT may best be conceptualized as unidimensional, rather than a multidimensional trait.

Similarities and Differences with Other Constructs. In addition to the numerous definitions of MT proposed above, conceptual inconsistencies exist among other domains regarding MT. Namely, researchers have struggled to differentiate MT from constructs such as grit, hardiness, and resilience. Grit is defined as passion and perseverance for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). Hardiness, referred to previously, is conceptualized as a combination of emotional control, commitment towards one's goals, and the

ability to interpret potential threats as challenges, and allows an individual to remain physical healthy in the face of adversity (Kobasa, 1979). Furthermore, resilience is defined as the capacity of a dynamic system to adapt successfully to disturbances that threaten its function, viability, or development (Masten, 2014). Each of these constructs is associated with the ability to overcome adversity or facilitate the achievement of goals.

Broadly speaking, this general field of research regarding attempts to differentiate superior performers based on motivationally-oriented individual differences appears to suffer from the jangle fallacy – the tendency for researchers to “discover” new constructs even though very similar constructs already exist (Fogarty & Perara, 2016). This problem has been exacerbated in psychology by the division of research into subdisciplines. For instance, hardiness has been widely study in industrial/organizational psychology, while MT has been largely studied by sports psychologists. As such, scholars have taken theoretical and empirical approaches to distinguishing between the constructs. Considering the distinctiveness of MT from related constructs, Arthur et al. (2015) stated that hardiness, grit, and resilience are defined as a constellation of personality traits and as such have been measured as abstract traits (e.g., I am a hard worker), while MT as a construct is inherently tied to behavior and should be measured and conceptualized in terms of specific behaviors.

Furthermore, Gucciardi (2017) posited that MT is distinct from hardiness by the direct inclusion of confidence; although as previously discussed, this distinction has been questioned in recent research. Furthermore, the main distinguishing factor between MT and resilience is that resilience is defined as a reactive construct, but MT can be both reactive and proactive. That is, individuals can rely on resilience to overcome adversity, but cannot utilize resilience to thrive during times of prosperity.

In addition, the construct of self-motivation has been compared to MT. According to Bandura (1977) self-motivation involves comparing behavior against the individual's own standard to evaluate performance. By creating self-induced consequences relating to the individual's behavior, individuals can detect discrepancies between current behavior and their goals. Generally speaking, scholars have viewed self-motivation as a process encapsulated by the construct of MT (Crust & Azadi, 2010; Gucciardi et al., 2009d; Gucciardi, 2010).

Finally, MT is distinguished from grit in two manners. While both constructs are tied to goal achievement, the focus of the goal differs between the constructs. Grit describes the ability to reach a singular objective goal whereas MT involves handling different stressors and competing goals to maximize overall performance, even at a cost to performance for one certain goal (Gucciardi, 2017). More importantly, grit is defined explicitly as a personality trait (Duckworth et al., 2007), while MT is influenced by both dispositional and situational factors (Gucciardi et al., 2015).

In addition to these theoretical distinctions, scholars have demonstrated that MT predicts differentially in comparison to such constructs. For example, when predicting military training outcomes, Gucciardi et al. (2015) demonstrated that MT was a significant predictor of superordinate's ratings, while the three subscales of hardiness (control, challenge, commitment) were not. In a similar setting, Arthur et al. (2015) showed that MT provided incremental validity in the prediction of military training performance above contributions made by resilience and general self-confidence. Furthermore, Sheard et al. (2009) reported weak correlations between MT and the hardiness subscales ($r = .13-.33$). In sum, empirical evidence suggests that there are differences between constructs similar to MT.

Dispositional and situational factors affecting MT. The distinction between grit and MT raises an important point concerning the conceptualization of MT. Namely, whether MT is best conceptualized as a personality trait or a transient, situationally-bound state. Traditional MT researchers have conceptualized it as a dispositional trait (e.g., Clough et al., 2002). More recently, scholars have argued that MT is best conceptualized as a state, and is expressed differentially across situations. For example, a ten-week longitudinal study by Gucciardi et al. (2015) provided evidence for a state perspective of MT because their findings revealed more within person variability (56%) in MT scores than between person variability (44%) over time.

Evidence in support of the conceptualization of MT behavior as a situational expression comes from research investigating the differences between general and domain-specific MT. Hardy et al. (2014) examined both trait and domain-specific MT as predictors of learning in a computer task. Hardy used a general measure of MT and created a domain specific measure that included items such as, “When it comes to video and computer games, I accept game-related pressure as a challenge” and “When it comes to video and computer games, I am able to ignore distractions while playing.”

Hardy et al. (2014) also measured general mental ability, core self-evaluations, goal orientation, and task self-efficacy as potential predictors of task learning. Using post-practice self-efficacy, task enjoyment, task knowledge, and task performance as outcomes, non-significant correlations were found with trait MT, but domain MT correlated with each of the four criteria. Furthermore, hierarchical regression analyses demonstrated that domain MT accounted for significant variance in post-practice self-efficacy and performance when controlling for all other predictor variables. Trait MT did not provide any incremental validity in predicting outcomes.

Finally, researchers have also demonstrated that MT training programs increase MT and physical performance, suggesting that individuals can be trained to express more MT behaviors and cognitions over time (Gucciardi, Gordon, & Dimmock, 2009b; Gucciardi, Gordon, & Dimmock, 2009c; Sheard & Golby, 2006).

While researches have typically taken an either-or approach to the conceptualization of MT as a dispositional trait or a situational expression, research in genetics suggests that it is likely a mixture of both (Lin et al., 2017). For instance, studies of nonshared environmental factors between twins has shed light on this notion. Specifically, Horsburgh et al. (2009) found that variability in MT scores can be attributed to both genetic (52%) and nonshared environmental factors (48%). Plus, they noted that the subscales of commitment and emotional control may be more malleable due to their higher percentage of variance accounted for by environmental factors.

Similar results were obtained by Veselka et al. (2009), who integrated MT into a model of personality. Again studying twin pairs, Veselka et al. found that nonshared environmental factors explained 47% of variance in this personality model obtained from a combination of the Big Five personality traits and MT scores, obtaining similar findings as Horsburgh et al. (2009). These results suggest that both dispositional and situational factors affect the expression of MT.

In congruence with this line of research, research has found that personality traits have as much within-person variability as between-person variability (Fleeson, 2001; Gucciardi et al., 2015). As such, MT may best be conceptualized as a chronic preference, wherein people have a dispositional preference to be mentally tough or not be mentally tough, but the situation can influence the behavioral expression of this characteristic.

Despite evidence continually accruing in support of this conceptualization, the construct is largely measured by assessments that conceptualize MT as a trait. As such, it is necessary to critically examine the conceptual and psychometric properties of MT measures as the field of MT research continues to grow.

Measurement of MT

MT has been measured almost exclusively using a self-report Likert-style method. Popular measures of MT include the Psychological Performance Inventory (PPI), the Mental Toughness Questionnaire 48 (MTQ48), the Sports Mental Toughness Questionnaire (SMTQ), the Mental Toughness Index (MTI), among others. These measurement tools have been widely used in a multitude of different situations, and have been thoroughly evaluated for their psychometric properties.

The PPI (Appendix A) was originally developed by Loehr (1986) to assess MT among athletes. The PPI is a 42-item measure that asks respondents to indicate the extent to which (1 – almost always to 5 – almost never) they believe certain statements are descriptive of themselves. Example items from the measure include, “I see myself as more of a loser than a winner in competition” and, “I get angry and frustrated in competition.” The PPI was designed to assess MT as a combination of seven key dimensions, including self-confidence, negative energy, attention control, visual and imagery control, motivation, positive energy, and attitude control.

While the PPI remains popular within sports psychology, researchers have criticized the factor structure and internal reliability of this measure (Mack & Ragan, 2008). Studying a sample of Australian high-school students, Middleton et al. (2004) examined the factorial and construct validity of the measure. The seven-factor model fit the data poorly. They also conducted an EFA and found that a five-factor model fit the data well, but did not correlate with

constructs intended to establish construct validity, including physical self-perception, perception of success, athletic self-concept, and flow. Subsequent researchers have conducted independent CFA analyses using this measure, and failed to find satisfactory model-fit indices and internal reliability (Golby, Sheard, & van Wersch, 2007; Gucciardi, 2012)

Perhaps the most widely used self-report measure of MT is Clough et al.'s (2002) MTQ48¹. This measurement device conceptualizes MT as a combination of emotional control, commitment to goals, the ability to interpret potential threats as challenges, and confidence in one's abilities. The MTQ48 has been used as the standard measurement of MT (Lin et al., 2017).

Despite this, evidence for the hypothesized measurement structure is lacking. For example, Gucciardi et al. (2012) conducted a CFA and an exploratory structural equation modeling (ESEM) analysis on both a sample of athletes and a sample of employees. CFA results for both athletes and employees indicated a poor model-fit. Comparable results were obtained using the ESEM techniques, indicating that both statistical approaches suggest the measurement model fits the data poorly.

Additionally, Birch et al. (2017) conducted CFAs on two large independent samples of student athletes and again failed to support the four-factor structure of the MTQ48. Across both samples, Birch et al. reported inadequate model-fit indices, in addition to finding that the model parameter estimates were considered poor for about 50% of the items.

Vaughan, Hanna, and Breslin (2017) conducted CFA analyses on a sample consisting of professional athletes, amateur athletes, and non-athletes. Again, inadequate model-fit indices were reported, and the findings indicated that constraining factor loadings across groups resulted

¹ The MTQ48 is not appended due to copyright laws

in a poor model-fit. This ultimately suggested that the measurement structure was not consistent among professional athletes, amateur athletes, and non-athletes.

Other researchers have argued support for the four-factor solution for the MTQ48, but closer examination of their empirical results are less convincing (Horsburgh et al., 2009; Gerber et al., 2013; Perry et al., 2013). For instance, Perry et al. conducted a CFA on a diverse sample and concluded that their results support the factorial validity of the measure, despite having reported a large χ^2 , CFI below .95, and factor loadings below .7, suggesting the model does not fit as well as the authors conclude. In addition, Horsburgh et al. (2009) reached a similar conclusion in support of the factor structure, but failed to report their empirical data in support of such conclusions. Given the apparent lack of support for the proposed four-factor model, researchers have questioned the findings of studies using the MTQ48 (Birch et al., 2017; Gucciardi et al., 2011; Gucciardi et al., 2012).

In response to the MT measurement challenge, Sheard et al. (2009) developed the SMTQ (Appendix B), a 14-item measure that conceptualizes MT as a combination of emotional control, constancy towards goals, and confidence. Example items from this measure include, “I have an unshakeable confidence in my abilities” and, “I get angry and frustrated when things do not go my way”. Sheard et al. proposed a higher-order model where the abovementioned factors combined into one general factor of MT. The authors demonstrated adequate model fit and internal consistency for this measure, as well as divergent validity from hardiness, optimism, and positive affect.

Despite preliminary evidence in support of the psychometric properties of this scale, researchers have critiqued the scale for a number of reasons. First, the language of the items has been criticized for containing hyperbolic adjectives that lead to a fallacious understanding of

how MT should be assessed. For instance, words like “unshakeable” misrepresent the construct, portraying MT more as an unattainable standard rather than a realistic construct (Andersen, 2011). In addition, the SMTQ contains double barreled questions as shown above, which can lead to interpretation difficulties for respondents. Finally, from a theoretical perspective, the SMTQ has been challenged for being too parsimonious to capture all facets of MT (Gucciardi et al., 2011).

Crust and Swann (2011) compared the SMTQ and the MTQ48 by administering both to a sample of young adult athletes participating in both collegiate and local club sports. The results indicated that the correlation between higher-order MT factors was high ($r = .75$) but the correlations between lower-order factors were lower than expected, given the theoretical overlap between the factors. For example, the correlation between the SMTQ’s subcomponent ‘control’ and the MTQ48’s ‘emotional control’ was .49; the correlation between ‘constancy’ and ‘commitment’ was .61. In sum, the researchers suggested these scales may be capturing different constructs even though they are both designed to assess MT.

Finally, Gucciardi et al. (2015) conducted exploratory research to create a sound measure of MT while also examining the dimensionality of MT. Gucciardi and colleagues’ 21-item MTI exhibited excellent model fit as both a higher order and lower order model across samples of athletes, students, and employees. The researchers also reported high factor loadings and good internal reliability estimates, providing some support for the model. However, they reported a nonpositive definite matrix because of model misspecification, and concluded that an eight-item unidimensional measurement model fit the data best (Appendix C).

While the MTI demonstrates excellent psychometric properties, several critiques of the measure remain. First, the measure is relatively new, and therefore additional examinations of

the psychometric properties should be conducted to confirm the measurement structure. Second, the measurement model supports a unidimensional conceptualization, even though a dearth of research in the field of MT from both qualitative (e.g., Jones et al., 2002) and quantitative (Clough et al., 2002; Lin et al., 2017) studies supports the multidimensional conceptualization of MT.

Key Issues with MT Measurement

The abovementioned critiques are focused on the most popular assessment tools used in the field of MT research. However, a multitude of other, lesser-used self-report scales have been created to assess the construct (e.g., Mental Toughness Inventory, Mental Toughness Scale, Mental, Emotional, and Bodily Toughness Inventory). These scales have not been rigorously tested nor used frequently, and therefore not reviewed here.

In the previous section, several specific critiques of individual assessment tools were presented. However, the field of MT measurement remains in a methodological rut, and there are several important critiques that apply generally to the measures used. Three major critiques are discussed here. First, MT has been measured almost exclusively from a self-report Likert-style questionnaire perspective. Given the nature of the construct, this makes such measures very susceptible to social desirability bias, while also making it difficult to separate construct variance from method variance.

A second major critique is that the abovementioned measures lack situational information. As previous research indicates (e.g., Gucciardi et al., 2015; Lin et al., 2017) MT may be best conceptualized as chronic preference influenced by situational factors. Thus, if it is expected that MT will differ across situations, it should be measured in a specific setting. Items

that ask a participant to rate the extent to which they are confident in general abilities are missing situational information and potentially misrepresenting the construct.

Researchers have shown that including situational factors in the measurement of MT is beneficial; MT inventories have been created specifically for cricket (Gucciardi & Gordon, 2009) and Australian football (Gucciardi et al., 2009a). These scales amended typically-used items (e.g., “I have confidence in my abilities”) by placing the items directly in a sport-specific situation (e.g., “I have confidence in my cricket abilities”). These scales demonstrated adequate internal reliability, positive correlations with flow and hardiness, as well as minimal correlations with social desirability. Furthermore, they were able to distinguish players of different caliber and predict athlete burnout.

Finally, traditional MT measures lack an emphasis on behavioral expression. As Arthur et al. (2015) indicated, there is a lack of behaviorally-focused measures in MT research. For example, MT measures ask respondents to rate their ability to overcome adversity, but do not actually assess occurrences of perseverant behavior. While relationships between MT and behavior are evident (e.g., Arthur et al., 2015; Gucciardi, Peeling, Ducker, & Dawson, 2016), current measures of MT focus more on measuring abstract traits instead of behavioral expressions. Taken in sum, both the specific and general critiques of MT measurement suggest that current measures are not accurately capturing the construct. As such, Gucciardi et al. (2011) indicated that future researchers should investigate behavior and scenario-based methods of MT assessment.

An Integrated Conceptualization of MT

The empirical and theoretical work presented above suggests that the field of MT research lacks conceptual clarity and as a result, has been measured inconsistently. Given the

critiques of the measurement models frequently used, a revised conceptualization and measurement model of MT is introduced here – the Social Cognitive Mental Toughness model (SCMT). The conceptualization of MT proposed here emphasizes the interaction between situation and disposition, arguing that MT is situational expressions of motivation and behavior, rather than a personality trait. The conceptualization is grounded in theory from social-cognitive and self-regulatory theories and conceptualizes MT as a chronic preference that is influenced by situational factors.

Gucciardi et al.'s (2015) overarching definition of MT was retained because it represents the most comprehensive definition of MT to date and encompasses the core aspects of the construct. However, the seven-factor measurement model that Gucciardi et al. proposed in conjunction with their definition did not fit the data well due in part to strong correlations among the factors. Given the evidence in support of MT as a multidimensional construct (e.g., Clough et al., 2002; Jones et al., 2002; Harmison, 2011), a revised measurement model to fit Gucciardi et al.'s definition is needed.

The aim of this revised measurement model is to capture distinct components of MT. For the SCMT, it is posited that MT is constituted of five unique factors: attention control, emotional control, utilization feedback, task persistence, and an approach goal-orientation (see Table 1 for descriptions of each factor). Here, the theoretical underpinnings of the model are discussed in detail.

Cognitive Affective Processing Model. Theories from social-cognitive research help explain the situational sensitivity of MT. In general, social-cognitive theories state that behavior results from the interaction between an individual's cognitive processes and environmental

factors (Mischel & Shoda, 1995). More specifically, scholars have integrated MT into the Cognitive Affective Processing Model (CAPS; Mischel & Schoda, 1995).

The CAPS model explains how personal variables (referred to as cognitive-affective processing units) interact with one's environment to generate specific behaviors. This model is grounded in two core assumptions: 1) Individual differences in personality exist in the ease with which a person can activate various cognitive-affective representations available to them, and 2) Individual differences exist in the stable organization of the relationships between a person's cognitions and affects that are part of his/her personality.

With reference to Assumption 1, Mischel and Shoda (1995) further defined cognitive-affective units as encodings (identifying and interpreting the situation around an individual), expectancies and beliefs, affects, goals, and values, and self-regulation skills. According to the CAPS model, these units interact with one another in dynamic fashion to generate personality and ultimately behavior. The five-factor model of MT proposed above fits the CAPS model, as each of the five-factors constitutes a different unit within this system.

Integrating MT within the CAPS model, Harmison (2011) stated, "a key to understanding and developing MT in sport is to view athletes' level of MT as a function of their dynamic personality systems that are comprised of organized networks of interconnected and interacting cognitive processing units" (p. 58). Furthermore, Mischel and Shoda (1995) emphasized how individual differences exist within these units. As such, certain individuals can be perceived as more mentally tough than others, although this is situation dependent.

Assumption 2 emphasizes the role of the environment, indicating that individuals perceive features of a situation that activate cognitive-affective processing units. As such units are repeatedly activated over time in the same situation, they become a strengthened cognitive

pattern that leads to a consistent behavioral expression. However, different units can be activated differentially across situations, creating intraindividual differences across situations in behavioral expressions.

Weinberg, Butt, Mellano, and Harmison (2017) conducted interviews with 12 elite junior tennis players (ages 14 to 20) to examine MT within the context of the CAPS model. Analyzing interview transcripts, the researchers found that the players identified a competitive environment and a training environment as situations that required MT in order to be successful. Furthermore, the players consistently referred to the fact that MT varies from situation to situation, describing MT as a “roller coaster” (p. 13).

The interviews emphasized the extent to which MT is necessary varies from moment to moment, in addition to the observation that an individual may be mentally tough in one situation (e.g., competition) but not in another (e.g., training). In addition, the interviews reported certain cognitions, affects, and behaviors that mentally tough athletes identified. Cognitions included thought control, task focus, and self-belief. Affects included feeling energized and relaxed, and behaviors included displaying confidence and engaging in assertive play. Weinberg et al.’s exploratory qualitative research applying MT to the CAPS model has laid future groundwork for extending the social-cognitive approach to studying MT.

In sum, social-cognitive theories integrate conceptual aspects of MT into a comprehensive model. This approach postulates that MT serves as a collection of cognitive-affective processing units that interact with the environment to influence motivation and behavior. Such units carry out the functions of monitoring behavior, comparing it to a personal standard, and providing an affective evaluative component.

MT within Self-regulatory Theory. While the CAPS model is useful for explaining how MT cognitions and affects interact in dynamic fashion with the environment to produce behavioral patterns, self-regulatory theory helps explain how an individual's goals are selected and how MT facilitates the ability to guide behavior toward achieving those goals. Broadly speaking, self-regulatory theory postulates that behavior is largely guided and regulated by self-influence (Bandura, 1991).

This self-influence has three major subfunctions: monitoring behavior and its determinants; judging behavior in relation to personal standards, and utilizing affective self-reaction. Each of these subfunctions provides mechanisms for influencing an individual's motivation and behavior and can be used to explain how each dimension of MT functions. Self-regulatory theory is heavily grounded in goal attainment, which matches the conceptualization of MT as a resource that facilitates the achievement of subjective and objective goals despite both significant challenges and every day hassles. As a result, the five dimensions provide different processes that assist in goal attainment.

Attention control. Attention control as it pertains to MT is defined as the ability to focus on that which is relevant while minimizing the intrusion of irrelevant information from the environment (Gucciardi et al., 2015). According to self-regulatory theory, monitoring the self is heavily influenced by cognitive processes that influence those aspects of functioning given cognitive attention. Bandura (1991) emphasized the importance of being able to increase goal performance by channeling attention despite distraction from serious obstacles.

As such, individuals in a state of high MT focus on information that is relevant to the task at hand while excluding irrelevant information. For example, an athlete in a state of high MT should be able to block out irrelevant stimuli (e.g., crowd noise) while focusing on relevant

stimuli (e.g., the ball) during competition. Likewise, an employee in a state of high MT can exclude irrelevant stimuli while giving a presentation under pressure.

Emotional control. Emotional control entails the ability to effectively manage emotions to maintain motivation and guide behavior. Emotional control is evident in the affective self-reaction component of self-regulation. Bandura (1991) states that individuals capable of managing emotions are likely to have higher self-perceptions and more confidence, which positively influences motivation and behavior to achieve a goal. In addition, both achieving and failing to attain personal goals can serve as motivators for individuals capable of managing emotions. As Gucciardi et al. (2015) indicated, two elements of MT are striving and thriving.

When individuals have failed to reach a goal, proper emotional control allows them to keep striving rather than feeling dejected and allowing such feelings to guide behavior. Likewise, when thriving (attaining personal goals), proper emotional control allows individuals to avoid feeling complacent and to keep working hard. As an example, an employee at a high level of MT will effectively manage positive emotions after receiving a performance appraisal to maintain motivation and keep performing well. Likewise, if a worker failed to achieve an objective goal (e.g., sales numbers) he/she can effectively manage the negative emotions to avoid feeling discouraged and continue working towards goal attainment.

Utilization of feedback. This component of MT describes the ability to process and evaluate feedback from both objective (e.g., the outcome of a competition) or subjective (e.g., feedback from a supervisor) sources to direct behavior. MT incorporates the ability to analyze situational feedback and effectively use the information to improve motivation and behaviors.

According to Bandura (1991), individuals must self-observe their motivation and behavior in conjunction with information from the environment to enhance their performance.

Furthermore, Bandura posits that motivations and behavior are compared against personal standards. Incorporating feedback influences both the development of personal standards and the ability to judge behaviors and performance. Awareness of discrepancies between personal standards and behaviors/performance influence future behavior (Higgins, 1989).

Task persistence. Task persistence refers to the ability to remain dedicated to completing tasks and achieving goals even in the face of adversity. Specifically, task persistence focuses on the effort component of self-regulation theory. When individuals identify a discrepancy between their behavior and their personal standard, they must exert some degree of effort to improve their behavior. When a positive discrepancy is detected, individuals high on task persistence will raise their goal (i.e., challenge themselves with a higher standard). But, when a negative discrepancy is detected, individuals high on task persistence will not lower their goal (i.e., increase effort to reach the goal).

The amount of effort an individual is willing to expend on completing a task is contingent upon the value the individual places on the task. This is evident in the situational expression of MT. A student-athlete who values his/her contribution to the team is likely to expend great deals of effort to achieve related goals; if the student does not value his/her academic performance, they will not spend the same amount of effort to achieve it.

Bandura (1991) also emphasizes the role of self-belief in task persistence, such that individuals who believe in their abilities “intensify their efforts when they fail to achieve what they seek and they persist until they succeed” (p. 258). As a result, MT constitutes not only a value on the outcome of achieving a goal, but also the belief in the ability to accomplish the goal. These elements influence the effort expenditure an individual is willing to put forth, affecting his/her task persistence.

Approach goal-orientation. While the four factors mentioned above describe dimensions of MT that facilitate the process of goal achievement, the final factor – approach goal-orientation – describes the individual’s goal selection process (Payne, Youngcourt, & Beaubien, 2007). Approach-avoidance theorists argue that the overarching motivation affecting all behavior is the desire to either acquire positive consequences or to avoid negative consequences, and such goals are an essential part of the self-regulation process (Elliot & Thrash, 2002). Research suggests that individuals in a state of high MT tend to use approach coping styles to address issues (Kaiseler et al., 2008; Nicholls et al., 2008). Thus, it is postulated that the same styles will be evident in goal-setting behavior, such that approach-orientation is a major contributing factor to MT.

Situational Judgment Testing

The new conceptualization of MT proposed above emphasizes that behavioral expressions are the result of an interaction between person and environment. In conjunction with the new measurement model, a novel approach to measuring MT is proposed - one that emphasizes the role of situation-specific motivation and behavior. Harmison (2011) integrated MT within the CAPS model and highlighted the need for improved measurement of the MT construct. Specifically, Harmison stated “A need exists, however, to develop valid and reliable ways to assess the display of mentally tough behaviors. One possible avenue is the development of sport and competition-specific measures of mentally tough behaviors...” (p. 64).

Furthermore, in a review of current MT measures, Gucciardi et al. (2011) highlighted the need for a scenario-based approach to measuring MT. Gucciardi et al. discouraged the use of Likert-style scales which tend to hold lower construct and cross-cultural validity (Peng, Nisbett, & Wong., 1997). Furthermore, Gucciardi et al. focused on the importance of situations,

indicating that the likelihood a person would behave in a certain way depends on his/her perception of a situation. To date, no known scenario-based measure of MT exists.

Situational Judgment Tests (SJT) are a scenario-based form of measurement that has been traditionally used in the workplace by psychologists to predict job performance. SJTs present prospective employees with a series of scenarios and a list of response options, typically asking the respondent to select the most appropriate response or to rate the appropriateness of each response. SJTs have been shown to significantly predict job performance and provide incremental validity over more commonly-used predictors such as intelligence and personality (Lievens, Peeters, & Schollaert, 2008).

Most of the research on SJT investigates criterion-related validity because SJTs are mostly designed to predict job performance regardless of their construct validity. However, other researchers have focused on designing SJTs to measure specific constructs. Advantages of using SJTs to measure constructs include: such tests explain why the assessment predicts outcomes, allows for more precise comparisons between measures, and reduces the contamination by non-relevant constructs (Christian, Edwards, & Bradley, 2010).

While many job-related constructs have been identified by researchers intending to use SJTs to measure constructs (e.g., teamwork skills, supervision, etc.), less research has focused on broader constructs. Lievens and Motowidlo (2016) suggested that SJT research should shift to a construct-driven approach. Here, relevant literature on the reliability and validity of SJT assessments designed explicitly to measure constructs is reviewed, and an SJT designed to assess MT - the Mental Toughness Situational Judgment Test (MTSJT) is introduced.

Big Five traits. Research has indicated SJTs are effective ways of measuring aspects of personality (Whetzel & McDaniel, 2009). Specifically, researchers have focused on using SJTs

as an alternative method of measuring agreeableness, conscientiousness, and extraversion. In a series of studies investigating the utility of such tests, Motowidlo et al. (2006) crafted SJTs designed to measure these traits and found that they correlated only moderately with traditional explicit measures of personality. Despite this, their results indicated that the SJT measures of personality traits were significant predictors of behavioral representations of each respective trait, thereby demonstrating the utility of the tests and suggesting that implicit and explicit measures of personality may be capturing different dimensions of the same construct.

Emotional intelligence. Sharma, Gangopadhyay, Austin, and Mandal (2013) designed an SJT to measure the construct of emotional intelligence and found encouraging results for the reliability and validity of their measure. A series of factor analyses revealed that a three-factor solution fit the data well, and divergent validity was demonstrated via weak correlations with measures of personality and intelligence. In addition, test-retest and internal reliability was demonstrated. Predictive validity was also demonstrated with positive associations between the measure and academic achievement and life satisfaction. In sum, the researchers concluded that the SJT approach was an effective way to measure emotional intelligence.

Prosocial implicit trait theory. Motowidlo, Ghosh, Mendoza, Buchanan, and Lerma (2016) used an SJT framework to measure prosocial implicit traits in a variety of occupations. The results supported their proposed one-factor model, and they demonstrated adequate levels of internal reliability. In addition, convergent validity was demonstrated with high correlations between agreeableness, benevolent values, and emotional intelligence, among others. In addition, Motowidlo et al. demonstrated the criterion-related validity of the measure by using it to predict prosocial behavior in a simulation that involved others needing help.

Resilience. Patterson, Baron, Carr, Plint, and Lane (2009) designed an SJT to measure empathy, integrity, and resilience as a form of selecting doctors for specialty training. The limited psychometric evidence reported suggested high levels of internal reliability. Furthermore, this measure significantly predicted the applicant's score on assessment-center tasks, suggesting it is a valid and reliable tool for assessing medical trainees. While this tool was designed specifically for the medical profession and lacks a robust psychometric evaluation, it provides initial empirical evidence that constructs similar to MT can be evaluated using the SJT methodology.

In sum, these results provide support for the proposition that constructs such as MT can be effectively measured via SJTs, and that scores from such tests predict behavioral expressions of the construct. Building upon such research, and the claims of MT researchers that scenario-based measures should be evaluated, the proposed study will introduce an SJT approach to measuring the construct that reflects the SCMT model described above.

The Current Study

The current study seeks to make two contributions to MT research. First has been the introduction of an alternative perspective of MT that is grounded in social-cognitive models of self-regulation. The objective of using a social-cognitive approach is to move the conceptualization of MT away from a traditional individual difference perspective that is imbued with trait-based arguments. In place of this perspective, a conceptualization of MT based on proximal self-regulatory principles that reflect interactions between the person and the environment has been introduced.

The second objective is to develop a measure consistent with the social-cognitive conceptualization. To this end, an SJT approach to assessing the construct was used, where

respondents were presented with scenarios and asked to rate the likelihood of engaging in each response option. For each scenario, each of the three response options was designed to reflect a dimension of MT. In addition to contextualizing MT, the SJT approach has the added potential benefit of reducing social desirability biases that are common with traditional self-report MT measures. To validate the measure, 40 scenarios with 3 response options each were presented to a sample of 583 college undergraduates. Factor analysis techniques were used to examine the internal reliability of the measure, while a series of correlation analyses examined the cross-structure of the measure.

Hypotheses

Hypothesis 1: Evaluation of the internal structure of the MTSJT will correspond to the SCMT model

Hypothesis 2: Evaluation of the cross-structure of the MTSJT will find convergent validity with another measure of MT as well as a perceived distress measure; the divergent validity of the measure will be demonstrated via weak correlations with measures of personality.

Chapter 3

Method

Participants

A total of 583 participants from a large Southeastern university were recruited.

Participants ranged in age from 18 to 22 years. All participants indicated that they had been employed at least part time (20 hours per week) in the last six months in order for their data to be used. Participants were compensated with course credit for their time.

Procedure

Informed consent, demographic information, and all surveys were collected via Qualtrics Online Survey Software. Participants were told they were participating in a study aimed at better understanding the nature of certain workplace behaviors. Participants were free to complete the survey at a time and location of their choosing. Most participants were able to complete the survey in less than an hour. Situations were presented one at a time. In addition to the measures listed below, three attention checks (e.g., Please select “agree”) were included to reduce careless

responding. Upon completion of the survey participants were debriefed and compensated with course credit.

Scale development

A total of 40 situations were generated by subject-matter experts (i.e., industrial-organizational psychology PhD's and graduate students). Situations consisted of a brief scenario that describes a challenging workplace issue that requires an individual to exhibit MT in order to resolve effectively, and three response options. Appendix D includes all of the situations and response options. Due to their length, SJTs can be cumbersome for respondents. Thus, although 40 situations were included in the focal study, the aim was to reduce the number of situations significantly based on model-fit indices and factor loadings in order to create a final version of the MTSJT with ten to fifteen situations.

Situations were broadly written so they apply to various white-collar, managerial professions. All situations were written from the perspective of the SJT respondent reacting to an issue in the workplace. Each response option represents a specific dimension of the SCMT model as listed in Table 1.

Using a Likert-scale, respondents were asked to rate the likelihood they would engage in each response option, with possible scores ranging from 1 (not likely) to 7 (very likely). Research supports the use of seven-option response formats, indicating improved reliability and validity over response options with fewer or more options (Preston & Colman, 2000). Not every dimension of MT is relevant to each situation (i.e., attention control is not relevant when deciding whether or not to apply for a promotion), and thus only three response options were included with each situation. Using this seven-point scale, participants provided a rating of each of the three response options (representing different dimensions of MT). The instrument was

designed to measure each dimension of the SCMT (i.e., attention control, emotion control, task persistence, utilization of feedback, and goal-orientation) as well as provide an overall assessment of MT.

To generate the situations and response options, subject-matter experts relied on knowledge of the construct, personal experience, as well as consultations with colleagues to determine critical incidents that individuals might experience in the workplace. A guiding framework was created to generate situations (See Table 2 and Figure 2 for a description of the taxonomy). All situations were classified as either acute or long-term situations. Acute situations require immediate action to resolve (e.g., a mishap during a presentation), whereas long-term situations require a persistent plan of action (e.g., working to achieve a positive performance appraisal). Within these two broad domains, each situation was further classified into one of three categories: situations with high-stakes consequences, threats to self-image, and situations requiring self-discipline.

Table 2

Taxonomy for MTSJT Scenario Development

Classification	Description	Example
Acute – High-stakes	A scenario requiring performance pertaining to a situation in which the consequences are high-stakes	Being asked to give an important presentation
Acute – Threat to self-image	A scenario involving a reaction to an immediate potential threat to self-image	Dealing with disrespectful behavior from your coworker
Acute – Self-discipline	A scenario involving dedication to a mundane task to succeed	Working on a necessary project instead of attending a social event
Long term – High-stakes	A scenario involving performance despite chronic pressure and important outcomes	Adjusting to a new promotion

Long term – Threat to self-image	A scenario involving a threat to self-image that persists in one’s mind over time.	Working to improve behavior after a negative performance appraisal
Long term – Self-discipline	A scenario involving dedication to achieve an overarching goal	Exerting effort to achieve a new promotion

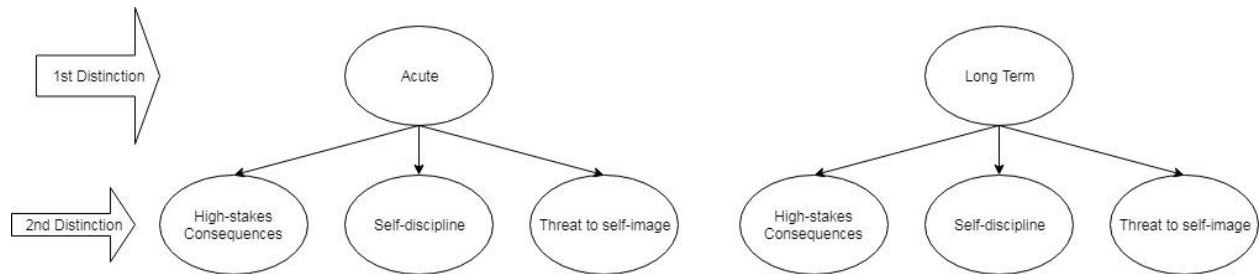


Figure 2. Taxonomy of workplace situations used to create the MTSJT. The first distinction involves the timing of the issue, while the second distinction involves the nature of the issue.

High-stakes situations involved consequences that are contingent upon one’s performance (e.g., acute high-stakes situation – an important project is due tomorrow; long-term high-takes situation - you have six weeks to improve your performance). Threats to self-image involve a degree of personal adversity relating to one’s perception of him/herself (e.g., acute threat - a coworker being disrespectful; long-term threat - being passed up for a promotion). Finally, self-discipline situations require dedication and adherence to repetitive or mundane tasks to be successful (e.g., acute self-discipline - taking on a daily mundane task; long-term self-discipline - working weekends).

In total, six scenarios were written to describe acute high-stakes situations and acute self-image issues; seven scenarios were written for acute self-discipline, long-term high-stakes, long-term self-image, and long-term self-discipline issues. Considering that not every dimension of MT was represented within each scenario, Table 3 describes how response options were allocated across the dimensions of MT as well as the guiding framework of the MTSJT.

Table 3

MTSJT Response Options Broken Down by SCMT Dimension and Taxonomy Categorization

	AH	AS	AD	LH	LS	LD	Total:
AC	5	3	7	4	2	2	23
EC	6	5	5	2	5	2	25
UF	1	5	2	7	5	7	21
TP	3	2	2	7	5	5	24
GO	3	3	5	1	4	5	27
Total:	18	18	21	21	21	21	120

Note: AH = Acute high-stakes; AS = Acute self-image threat; AD = Acute self-discipline; LH = Long-term high-stakes; LS = Long-term self-image; LD = Long-term self-discipline; AC = Attention control; EC = Emotional control; TP = Task persistence; UF = Utilization of feedback; GO = Goal-setting orientation; 36 items were negatively coded.

Situations were designed to cover a wide variety of issues, including both intrapersonal issues (e.g., being personally challenged by a daunting task at work) and interpersonal issues (e.g., dealing with inappropriate coworker behavior). Most response options were designed to represent adaptive responses that would result in remedying the situation. In contrast, 36 response options were negatively coded to represent maladaptive behaviors that would not remedy the situation. A behavioral-tendency (i.e., “would” instead of “should”) response format was chosen in order to measure the construct with regard to intent (i.e., real over ideal). Studies have found that behavioral tendency response options can have better criterion-related validity than knowledge-based response options (Ployhart & Ehrhart, 2003)

As indicated by Gucciardi et al.’s (2015) conceptualization of MT, MT includes not only relevant behaviors but also attitudes and beliefs. Thus, while most items ask the respondents to indicate the likelihood they would engage in each of the following behaviors, 17 scenarios

included a behavior in the item stem and asked how the respondent would think and feel in certain situations, given certain behaviors. In this way, the attitudes and beliefs reflected in MT would be presumably captured, providing a more comprehensive assessment of the construct space.

Pilot study. A pilot study was conducted to ensure that: 1) the response options were perceived by participants to be representative of each dimension, and 2) all response options within a situation were similar with regard to their social desirability.

Participants were provided with 21 situations, as well as each of the three response options. Participants were *not* asked to indicate the likelihood they would engage in each behavior; rather they engaged in a Q-sort task where they were asked to assign each of the response options to a specific dimension of MT. Then, they were asked to rate on a scale from 1 (not at all) to 7 (extremely) the social desirability of the response option. The goal of the pilot study was not to delete response options but rather to edit them so that each response option matched its intended dimension and had a similar social desirability score with other response options within each situation.

MTSJT – Final Form. The aim of the current study was to develop a final form of the MTSJT. Although 40 scenarios were generated for the initial study, the final form of the MTSJT was intended to be between ten and fifteen scenarios. Criteria for retaining scenarios was based on fit indices from a factor analysis and factor loadings. The overall MT scores, as well as a score for each of the subscales, were correlated with other measures in order to further develop the understanding of the MT construct space.

Cross-structure analyses

To identify the construct's place within a nomological net, three measures of other constructs were included: the MTI, the Perceived Stress Scale (PSS), and the Mini International Personality Item Pool (Mini-IPIP).

Convergent validity. A current measure of MT - the MTI (Appendix C; Gucciardi et al., 2015) - was included. This eight-item measure asks respondents to indicate the extent to which they believe a statement is true of themselves (1 = false, 100% of the time, 7 = true, 100 % of the time). Example items include “I consistently overcome adversity” and “I am able to use my emotions to perform the way I want to.”

In addition, Cohen, Kamarck, and Mermelstein's (1983) PSS was included in the survey battery as well (Appendix E). This ten-item measure asks participants to indicate how often (0 = never, 4 = very often) they had specific thoughts or feelings throughout the last month. Example items include, “In the last month, how often have you felt that you could not cope with all the things you had to do?” and, “In the last month, how often have you been able to control irritations in your life?”

Cohen et al. (1983) demonstrated the measurement's validity by showing associations with health outcomes. Plus, subsequent research has supported the reliability and validity of the measure (Roberti, Harrington, & Storch, 2006). Given the emphasis on situational measurement in the current study, items were slightly adapted to place the respondent within a work situation (e.g., “In the last month, how often have you felt that you could not cope with all the things you had to do *at work*.”).

Divergent validity. The Mini-IPIP (Appendix F; Goldberg, 1999) is a 20-item personality measure that captures the facets of extraversion, conscientiousness, emotional

stability, agreeableness, and openness. Respondents rate the extent to which they believe the statements are descriptive of them. Example items include “Am the life of the party,” and “Often forget to put things back in their place.” Across samples, the factor structure of the Mini-IPIP has been supported (Baldasaro, Shanahan, & Bauer, 2012; Li, Sang, Wang, & Shi, 2012). In addition, convergent validity, internal consistency, criterion-related validity, as well as construct validity have been demonstrated (Donnellan, Oswald, Barid, & Lucas, 2006).

Analyses

All analyses were conducted using SPSS Ver. 23, and MPLUS. Exploratory (EFA) and confirmatory (CFA) factor analyses were used to identify the underlying factor structure of the measure. A series of correlation analyses were used to identify relationships among measures.

Chapter 4

Results

Pilot Study

The pilot study was conducted to ensure that: 1) the response options were viewed as representative of their intended dimensions, and 2) the response options within a scenario were generally perceived as equally socially desirable. The pilot study was conducted in iterative fashion such that after collecting ten to fifteen responses for a scenario, the wording of items was edited as necessary before presenting the scenario to additional respondents. In total, 82 responses were collected from students at a large Southeastern University.

Q-sort task. Participants first engaged in a Q-sort task, where they were asked to assign each response option to a dimension of MT. Response options were deemed to be representative of their intended dimension if they satisfied one of two criteria: 70% of respondents placed it in the correct dimensions, or 50% of respondents placed it in the correct dimension and no other dimension received 20% of the allocations. It is noteworthy that these criteria were aspirational, rather than firm cutoffs. Because factor analysis requires a large number of items, responses that

did not meet these criteria were still retained. The aim was to edit responses as necessary throughout the pilot study in order to obtain as many responses as possible to satisfy these criteria.

After several iterations, it became clear that the goal-orientation responses were not being correctly identified, as few response options received more than 20% of the allocations. Many goal-orientation responses were being assigned to the emotional-control dimension. In order to prevent contamination of construct validity, the goal-orientation dimension was dropped from the measurement model. Any response options that met the abovementioned criteria for any other dimension were kept as measures of that dimension, even if it was not theoretically proposed to measure that dimension. For example, in one case, 70% of the allocations intended to measure a goal-orientation response were categorized as emotional control, and therefore the response option was kept as an emotional-control response.

As a result of dropping this dimension, the Regulatory Focus Questionnaire (Lockwood, Jordan, & Kunda, (2002); Appendix G) was included in the focal study to assess approach-avoid goal-orientation among participants. The intention behind the inclusion of this questionnaire was to determine if a positive correlation existed between individuals' scores on the MTSJT and the approach goal-orientation measure.

The final results showed that 21 of 40 scenarios had all three options identified correctly, 15 of 40 scenarios had 2 of 3 response options correctly identified, and 4 of 40 scenarios had 1 of 3 response options correctly identified. In total, 97 of the 120 (81%) response options were correctly identified, with 30% representing task persistence, 30% representing emotional control, 20% reflecting attention control, and 20% reflecting utilization of feedback. Of the 23 response options identified incorrectly, 20% were intended to measure task persistence, 17% were

intended to measure emotional control, 17% were intended to measure attention control, and 46% were intended to measure utilization of feedback.

Social desirability. In addition to completing the Q-sort task, participants were asked to rate the social desirability of each response option on a seven-point Likert scale. Across respondents, mean levels of social desirability were calculated. A total of 34 scenarios contained response options that had means within 1.5 points of each other; 5 scenarios contained response options that had means within 1.51-2.0 points of each other; 1 scenario contained response options with means greater than 2.0 points away from each other. In addition, 39/40 scenarios contained response options that were all on the same polar end of the scale.

The one scenario that did not meet this criterion had a response option with a mean social desirability rating around the midpoint of the scale, which made it possible for slight deviations in other response option means to end up on opposite sides of the scale (i.e., one response option was slightly above the scale midpoint and one was slightly below, suggesting that although they were on different sides of the midpoint, they were within an acceptable range of each other). In general, it was determined that social desirability was not a prevalent threat to participants' decision-making.

Focal Study

Data screening. Prior to conducting the factor analyses, data were screened such that only participants who passed all three attention checks and indicated they were recently employed were included in the analyses. One hundred and forty-three participants were removed for not passing all three attention checks, and one hundred and fifteen participants were removed because they were not recently employed. This resulted in the removal of 258 participants,

leaving a total sample size of 325. Table 4 depicts the demographics of both the EFA ($N = 202$) and CFA sample ($N = 123$), as well the overall sample ($N = 325$).

Table 4

Age, Gender, Occupational Status, and Ethnicity of Each Sample

	Overall	EFA Sample	CFA Sample
Age in Years M(SD)	19.37 (1.1)	19.25 (1.1)	19.57 (1.1)
Gender N(%)			
Female	239 (73.5)	151 (74.8)	88 (71.5)
Male	84 (25.8)	50 (24.8)	34 (27.6)
Prefer not to respond	2 (.7)	1 (.5)	1 (.8)
Occupational Status N(%)			
Full time	22 (6.7)	12 (5.9)	10 (8.1)
Part time	276 (84.9)	174 (86.1)	102 (82.9)
Internship	27 (8.7)	16 (7.9)	11 (8.9)
Ethnicity N(%)			
White	237 (72.9)	152 (75.2)	85 (69.1)
Hispanic or Latino	18 (5.5)	12 (5.9)	6 (4.9)
Black or African American	15 (4.6)	7 (3.5)	8 (6.5)
Asian/Pacific Islander	39 (12)	22 (10.9)	17 (13.8)
Other	16 (4.9)	9 (4)	7 (5.7)
N	325	202	123

EFA. All 120 response options were entered into the EFA model. An oblique (Quartimin) rotation was used because the dimensions of MT were not proposed to be orthogonal. Additionally, maximum likelihood was used as the estimation technique. Initial evaluation of the Scree plot (depicted in Figure 3) showed that a four-factor model fit the data best. This was determined by the elbow point on the Scree plot, above which substantial increases in the eigenvalues of the factors were observed. Although the Kaiser-Guttman rule indicates that eigenvalues above one are substantive, these represented item-factors as a function of responses being nested within scenarios and thus were not interpreted. This initial model

showed poor fit, $\chi^2(6666) = 11348.341$, $p < .01$, CFI = .55, RMSEA = .06, SRMR = .06; thus, some scenarios were removed in order to improve model-fit.

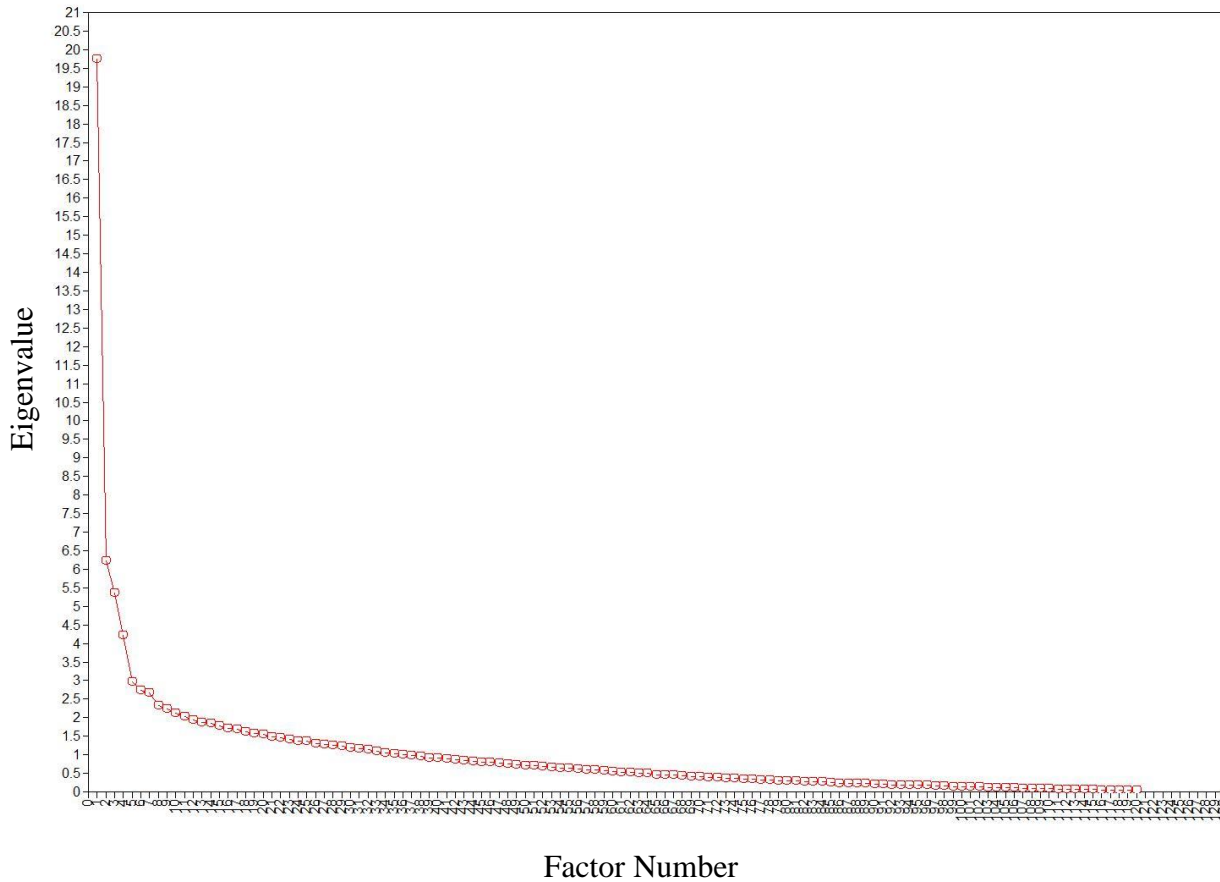


Figure 3. Scree plot for initial four-factor model in EFA analysis

Initially, whole scenarios were considered for deletion. For the four-factor solution, scenarios were deleted based on the following criteria: 1) all three response options had factor loadings below .3; 2) all three response options had factor loadings above .3 on two or more factors; and 3) all three response options within the scenario loaded onto the same factor, suggesting that the scenario itself was driving responses. A series of EFAs was conducted in iterative fashion, with one scenario being deleted between iterations. Factor loadings were

reexamined between each iteration to determine how the values adjusted as a result of deleting the scenario.

A total of 24 scenarios were eliminated based on these criteria. A Scree plot (see Figure 4) of the 16 remaining scenarios (48 response options) shows three factors above the elbow. After evaluating the remaining response options, it became clear that the fourth factor was a statistical artifact, as there was no consistent pattern of loadings that mapped onto a hypothesized factor. Further evaluation of the response options indicated the first three factors were: task persistence, a combination of attention control and utilization of feedback, and emotional control. The model-fit indices for the three-factor model were improved in comparison to the previous four-factor solution, $\chi^2(987) = 1641.25, p < .01, CFI = .76, RMSEA = .06, SRMR = .06$.

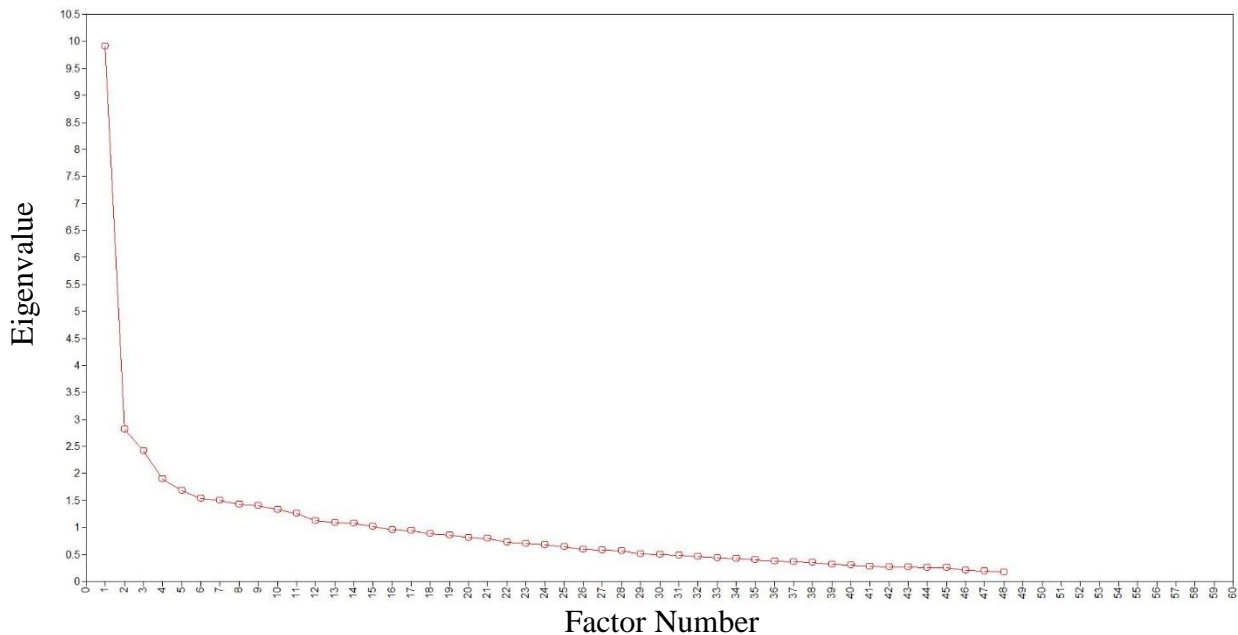


Figure 4. Scree plot for revised three-factor model with 16 scenarios in EFA analysis.

From this point forward, the three-factor model was interpreted. Four scenarios were again eliminated based on the same criteria mentioned above (i.e., loadings below .3, cross-loading of response options, or all response options loading on the same factor). This yielded a three-factor model that consisted of 12 scenarios and 36 response options. At this point, the EFA process was conducted again (beginning with all 120 response options) while interpreting the three-factor solution from the beginning, in order to determine if good responses had been thrown out too early in the process of interpreting the four-factor solution. This did not produce any benefits, as no additional scenarios improved model-fit.

When examining the factor loadings (depicted in Table 5) for the 12 scenarios retained for final inclusion, attention-control responses loaded on utilization of feedback and task-persistence factors, but the factor loadings for the attention-control response options were lower in most cases. Generally speaking, task-persistence response options had an average loading of .46 on Factor 2, while attention-control responses had an average loading of .34. Similarly, utilization of feedback responses had an average loading of .47 on Factor 3, while attention control had an average loading of .25. There were no cases where an attention-control response had a factor loading above .3 on Factor 1, which had an average loading of .4 for emotional-control responses. As a result, attention-control response options were dropped from the scale.

Table 5

EFA Factor Loadings for Three-factor Model – 12 Scenarios and 36 Response Options

Scenario	Factor 1 (EC)	Factor 2 (TP)	Factor 3 (UF)
Scenario 1			
TP_1	-.043	.612	.073
EC_1	.469	-.049	.020
AC_1	.057	.414	.140
Scenario 8			
AC_2	.068	.168	.332
UF_1	.003	.061	.114

EC_2	.207	.028	.342
Scenario 9			
UF_1	.339	.085	.328
TP_2	.236	.581	-.077
EC_2	.806	.011	.032
Scenario 11			
EC_3	.767	.021	-.054
TP_3	.086	.556	.044
UF_2	.108	.211	.379
Scenario 12			
TP_	.006	-.028	.383
UF_3	.069	.079	.303
EC_4	.355	.128	-.121
Scenario 15			
TP_4	.189	.507	.065
UF_4	.082	-.045	.690
AC_	.081	.470	.179
Scenario 22			
AC_	.158	.193	.384
UF_5	.202	-.064	.590
TP_5	-.044	.493	.104
Scenario 23			
TP_6	-.119	.695	-.204
AC_	-.165	.347	.309
UF_6	-.081	.193	.443
Scenario 24			
TP_7	.017	.583	.023
AC_	.214	.132	.426
UF_7	-.039	-.004	.697
Scenario 28			
AC_	.013	.465	.235
UF_8	-.166	.046	.687
TP_8	.169	.453	.105
Scenario 30			
AC_	.123	.049	.033
EC_5	.257	.143	.174
TP_9	-.050	.658	.032
Scenario 34			
EC_	-.082	.289	.417
UF_9	-.228	.150	.482
TP_10	-.052	.398	.215

Note: Bold indicates comparisons between attention control, task persistence, and utilization of feedback.

At this point, the individual response options that did load onto their hypothesized factor were dropped to improve model-fit. Therefore, certain scenarios contained only 2/3 response options in the measurement model. After removing attention control from the model and response options with small loadings or cross loadings, twelve responses were dropped from the scale. Ultimately, a three-factor model with 11 scenarios and 24 response options fit the data best, $\chi^2(207) = 325.65, p < .01, CFI = .91, RMSEA = .05, SRMR = .05$. Figure 5 depicts the Scree plot for this solution.

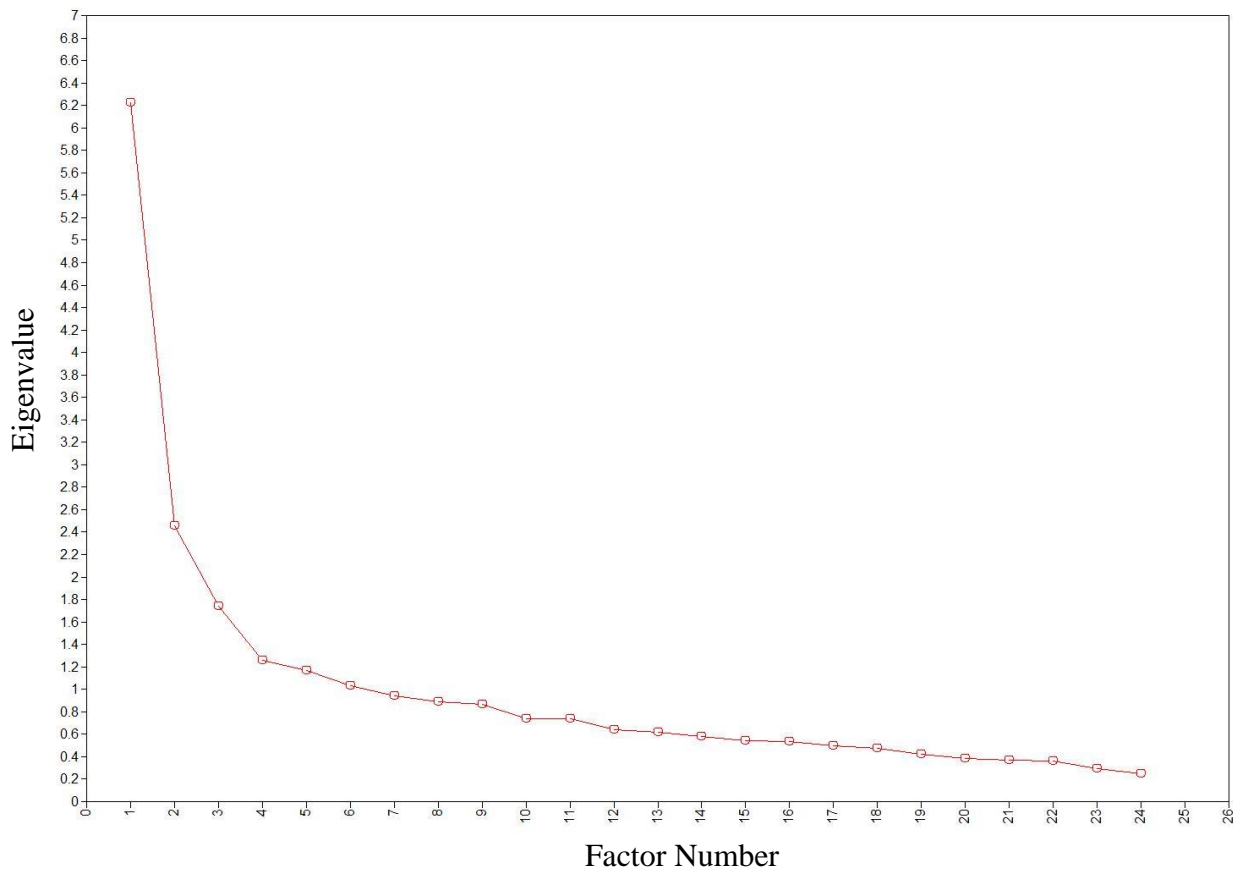


Figure 5. Scree plot for final four-factor EFA model with 11 scenarios and 24 response options.

Table 6 provides the factor loadings for the final EFA solution. Based on a substantive interpretation of the factor loadings, the three factors were task persistence, emotional control, and utilization of feedback. Task persistence was assessed via ten response options, utilization of

feedback was assessed with nine response options, and emotional control was assessed with five response options. Emotional control had small estimated correlations with task persistence ($r = .15$) and utilization of feedback ($r = .11$), while task persistence and utilization of feedback had a large correlation, $r = .51$.

Table 6

Final EFA Factor Loadings for Three-factor Model – 11 Scenarios and 24 Response Options

Scenario	Factor 1 (EC)	Factor 2 (TP)	Factor 3 (UF)
Scenario 1			
TP_1	-.053	.563	.129
EC_1	.457	-.025	-.013
Scenario 9			
UF_1	.340	.098	.310
TP_2	.233	.602	-.042
EC_2	.837	.008	.026
Scenario 11			
EC_3	.765	.001	-.060
TP_3	.077	.512	.122
UF_2	.144	.197	.385
Scenario 12			
UF_3	.066	.086	.282
EC_4	.339	.135	-.110
Scenario 15			
TP_4	.186	.455	.131
UF_4	.094	-.031	.689
Scenario 22			
UF_5	.189	-.070	.587
TP_5	-.058	.500	.087
Scenario 23			
TP_6	-.107	.699	-.179
UF_6	-.043	.174	.470
Scenario 24			
TP_7	.009	.564	.075
UF_7	-.043	.014	.706
Scenario 28			
UF_8	-.149	.058	.697
TP_8	.180	.415	.162
Scenario 30			
EC_5	.246	.190	.146
TP_9	-.041	.672	.048
Scenario 34			

UF_9	-.196	.143	.452
TP_10	-.059	.371	.241

Note: Factor loadings in bold indicate a significant loading on an intended factor

Although each scenario incorporates three response options, only response options that had loadings on the intended factor were scored in the measurement model. Thus, for nine of the eleven scenarios, only two of the response options were scored. However, in future administrations of the measure, the unscored response options will still be administered to the respondents, so as not to affect relative responding to the other response options.

Adding responses that had been previously removed back into the model did not improve the model-fit indices, suggesting that that this model provided the best fit to the data. Appendix H shows the scenarios that were included in the final EFA model

CFA. The 11 scenarios and 24 response options taken from the EFA were tested on a holdout sample (N = 123) using a CFA. Specifically, model-fit indices for the proposed hierarchical model were compared with model-fit indices for a unidimensional model (i.e., all response options load onto one general factor of MT) and scenario model, to test for method bias where all responses only load onto their respective scenario.

Model-fit indices are presented in Table 7. Although fit indices for the hierarchical model were superior to fit indices for the unidimensional model and the scenario model, the solution for the hierarchical model produced a nonpositive definite matrix. Nonpositive definite matrices occur when a matrix has an eigenvalue less than zero, which is logically impossible. Nonpositive definite matrices can be caused by model misidentification, a small sample size (e.g., less than 300), and multicollinearity among factors, among other causes. Further examination showed that the nonpositive definite matrix was caused by an estimated correlation between task persistence

and MT that exceeded one, suggesting that this model was an improper fit to the data due to multicollinearity between factors.

Table 7

CFA Model-fit Indices

Model	χ^2 (df)	<i>p</i>	CFI	RMSEA	SRMR
Hierarchical	410.19 (249)	<.01	.77	.07	.09
Unidimensional	507.84 (252)	<.01	.64	.09	.09
Scenario Model	381.04 (197)	<.01	.74	.09	.09
First-order	410.78 (249)	<.01	.77	.07	.09

As a result, a first-order model was tested wherein each response option loaded onto its intended dimension, but there was no hierarchical MT factor. This was done to test the multidimensional nature of the scale in the absence of the overarching MT factor. The first-order model demonstrated superior fit in comparison to the unidimensional model and the scenario model. It is important to note that none of the models tested demonstrated conventional levels of acceptable model-fit (i.e., CFI > .95; RMSEA and SRMR < .05). Thus, the first-order model was chosen because it had relatively best fit. Furthermore, examination of the modification indices did not provide any improvements that were congruent with theoretical rationale, and therefore were not performed. Figure 6 depicts the final model based on the CFA analyses.

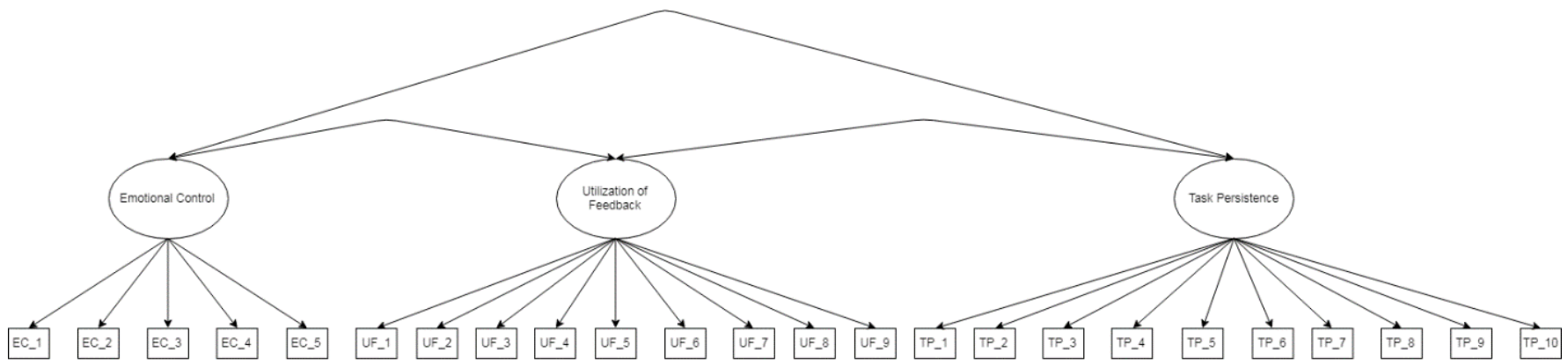


Figure 6. First-order model supported by CFA analysis.

Factor loadings from the first-order CFA model are presented in Table 8. All loadings were significant at the .05 level with one exception (EC_4, $p = .14$). In addition, 12 response options met criteria to be considered strong loadings ($>.55$), with two items meeting criteria to be considered excellent ($>.7$). Only three loadings failed to reach the .3 cutoff for an acceptable loading. Table 8 also presents the R^2 values for each item, which represents the amount of variance in the item that is accounted for by variance in the factor. R^2 values ranged from .02 to .59, with a mean value of .32, suggesting that the factors accounted for a substantial portion of the variance in the response options.

Table 8

Standardized Factor Loadings and Item R^2 Values for First-Order Model

Item	Factor			R^2 Value	R^2 S.E.
	TP	UF	EC		
Scenario 1					
TP_1	.55	-	-	.31*	.08
EC_1	-	-	.48	.24*	.09
Scenario 9					
UF_1		.21	-	.04	.04
TP_2	.58	-	-	.34*	.08
EC_2	-		.75	.56*	.12
Scenario 11					
EC_3	-	-	.77	.59*	.12
TP_3	.53	-	-	.28*	.08
UF_2	-	.58	-	.34*	.08
Scenario 12					
UF_3	-	.4	-	.16*	.07
EC_4	-		.15	.02	.03
Scenario 15					
TP_4	.62	-	-	.38*	.08
UF_4	-	.66	-	.44*	.08
Scenario 22					
UF_5	-	.69	-	.32*	.08
TP_5	.46	-	-	.21*	.08
Scenario 23					
TP_6	.5	-	-	.25*	.08
UF_6	-	.57	-	.48*	.08
Scenario 24					

TP_7	.42	-	-	.18*	.07
UF_7	-	.63	-	.39*	.08
Scenario 28					
UF_8	-	.54	-	.29*	.08
TP_8	.42	-	-	.18*	.07
Scenario 30					
EC_5	-		.22	.05	.05
TP_9	.63	-	-	.4*	.08
Scenario 34					
UF_9	-	.61	-	.39*	.08
TP_10	.52	-	-	.28*	.08

Note: * significant at .01 level

Estimated correlations among the factors in the CFA model were moderate to high in magnitude: $r = .38$ for task persistence-emotional control; $r = .71$ for task persistence-utilization of feedback; and $r = .24$ for utilization of feedback-emotional control. Finally, factor determinacies for each factor exceeded the cutoff of .8 (task persistence = .91, emotional control = .87, utilization of feedback = .92). These measure the relationship between the factor score and the true score and are an overall measure of the quality of the factor.

Taken in sum, the EFA and CFA results provided partial support for Hypothesis 1, indicating that a three-factor model fit the data best, characterized by factors of task persistence, emotional control, and utilization of feedback. Approach goal-orientation and attention control were not included in the final measurement model. Although the hierarchical MT factor could not be fit due to the nonpositive definite matrix, the problem was not the absence of a second-order MT construct. Rather, the problem was the justification of using something other than a general factor solution to fit the data.

The CFA results were “caught in between” the unidimensional solution and the hierarchical solution in the sense that the unidimensional model clearly did not fit the data, but the intercorrelation among the factors was too strong to fit the hierarchical model. At this time,

any conclusion about the structure of MT is premature. However, given the lack of fit for the general factor model, it is likely the hierarchical model would fit with a larger sample size.

Cross-structure validity analyses. For cross-structure validity analyses, an overall mean score for the MTSJT was calculated, as well as mean scores for each subscale. All scale scores within the study were normally distributed, with skewness values falling between 2 and -2, and kurtosis values falling within the range of 7 and -7. Finally, a box-plot analysis revealed that 20 cases fell outside the expected range that contains 95% of the normally distributed data on at least one measure, meeting criteria to be considered outliers. However, inspecting these cases individually showed that these outliers were not a result of careless responding, and were thus kept in the analyses.

Table 9 depicts the correlations among the MTSJT scores and scores on measures of convergent and divergent validity, using the overall sample of the study ($N = 325$). The overall MTSJT scores correlated positively with MTI scores ($r = .29$), and each subscale score of the MTSJT had small to modest correlations with the MTI scores ($r = .11$ to $.31$, $p < .01$), suggesting modest convergence but indicating that MTSJT scores likely predict criterion variance not captured by traditional MT self-report scales. Although this correlation is smaller in magnitude than the correlation observed in previous research between other self-report scales of MT (SMTQ and MTQ48, $r = .75$), such relationships may have been overestimated as a result of common-method variance due to the use of traditional self-report scales.

Table 9

Means, Standard Deviations, and Correlations of Measured Variables

	M	SD	1.	1a.	1b.	1c.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. MTSJT	5.5	.6	.84												
1a. TP	5.53	.79	.87*	.82											
1b. EC	4.43	1.07	.59*	.25*	.65										
1c. UF	6.06	.62	.78*	.57*	.2*	.75									
2. MTI	5.48	.78	.29*	.23*	.11*	.31*	.85								
3. O	3.67	.79	.13*	.06	.07	.17*	.19*	.7							
4. C	3.75	.77	.16*	.19*	.02	.12*	.36*	.07	.66						
5. E	3.31	.98	.14*	.09	.07	.17*	.18*	.21*	-.04	.82					
6. A	4.05	.73	.2*	.18*	.02	.23*	.12*	.2*	.09	.18*	.69				
7. ES	3.26	.81	.01	-.03	.06	.01	.33*	.1	.19*	.16*	-.1	.62			
8. PSS	2.52	.61	-.17*	-.17*	-.01	-.2*	-.38*	-.15*	-.31*	-.13*	-.09	-.49*	.84		
9. Avoid	5.78	1.38	.06	.07	.06	-.01	-.26*	-.07	-.2*	-.1	.0	-.37*	.41*	.81	
10. Appr.	7.38	1.1	.31*	.27*	.04	.37*	.5*	.3*	.27*	.17*	.18*	-.2*	-.36*	-.08	.88

Note: MTSJT = Mental Toughness Situational Judgment Test; TP = Task Persistence; EC = Emotional Control; UF = Utilization of

Feedback; MTI = Mental Toughness Index; O = Openness; C = Conscientiousness; E = Extraversion; A = Agreeableness; ES =

Emotional Stability; PSS = Perceived Stress Scale = Avoid = Avoid Goal Orientation; Appr. = Approach Goal Orientation;

*significant at .01 level; Chronbach's alpha along the diagonal.

In support of this argument, Arthur et al. (2015) found that scores on their behavior-based Mental Toughness Military Training Inventory (which measures MT by having military officers rate the frequency with which subordinates engage in mentally tough behavior) had smaller correlations with self-report SMTQ scores, $r = .27$ to $.43$. These findings suggest that correlations among measures of MT may be attenuated when one of the measures is not a traditional self-report measure. Although the current study still used self-report, the SJT format differs from traditional Likert-scales by emphasizing behavioral expression and a specific context, and therefore correlations are expected to be smaller in comparison typical values observed among self-report MT scales. Thus, the correlations among MTI scores and overall MTSJT scores, task-persistence scores, and utilization-of-feedback scores fall within a range that demonstrates modest convergence.

Additionally, correlations among MT scores and approach/avoidance goal-orientation measures were analyzed. Approach goal-orientation scores correlated with overall MTSJT scores ($r = .31$), task-persistence scores ($r = .27$), utilization-of-feedback scores ($r = .37$), and MTI scores ($r = .5$). These correlations suggest modest convergence between the constructs, in congruence with the hypothesized SCMT model. Avoidance goal-orientation scores were not related to the overall MTSJT scores ($r = .06$), task-persistence scores ($r = .07$), utilization-of-feedback scores ($r = -.01$) or emotional control scores ($r = .06$). However, avoidance goal-orientation scores correlated with MTI scores ($r = -.26$).

These findings shed light on the construct space of MT, considering that approach and avoidance goal-orientation are independent constructs. According to the SCMT model, individuals in a state of high MT are more likely to use approach goal-orientations, but this does not imply a negative association between MT scores and avoidance goal-orientation scores.

Thus, the positive correlations between approach goal-orientation scores and MTSJT scores support the convergent validity of the measure, while the lack of correlation between MTSJT scores and avoidance goal-orientation supports the divergent validity of the scale. Furthermore, the comparison of these findings with those pertaining to the MTI scores suggest differences regarding how the measures capture variance relating to goal-orientation, which may be due in part to differences in the measurement method (SJT vs. traditional Likert scale).

In addition, PSS scores correlated with overall MTSJT scores ($r = -.17$), task-persistence scores ($r = -.17$), utilization of feedback scores ($r = -.2$), and MTI scores ($r = -.38$). Emotional-control scores were not related to PSS scores ($r = -.01$). Although the correlations among most MTSJT scores with PSS scores were in the hypothesized direction, they were smaller in magnitude than hypothesized.

Past empirical research has shown that the strength of the relationship between MT and perceived distress varies. For instance, Gerber et al. (2013) observed correlations among MT scores and perceived distress in the range of $r = -.3$ to $-.4$ throughout a longitudinal study, while Gucciardi et al. (2015) found that MTI scores correlated with perceived distress scores, $r = -.52$. However, Kaiseler et al. (2009) observed the correlation between MTQ48 scores and self-report stressor intensity to be $-.19$. Taken at face value, the smaller magnitude for the relationship between MTSJT scores and PSS scores does not provide robust support for the cross-structure validity of the measure, although the correlation between MTSJT scores and PSS scores observed in the current study are similar to the correlation observed by Kaiseler et al. (2009).

Similar to correlations previously observed among MT measures, established findings using self-report, Likert-style measures of MT and perceived distress may have again overestimated the relationship between the constructs as a result of common-method variance.

Thus, although the relationship between MTSJT scores and PSS scores was smaller than most previous studies which have used other measures of MT, it does not necessarily suggest that the measures are assessing different constructs. Overall, the negative relationship between MTSJT scores and PSS scores provides preliminary evidence that MTSJT scores may be significant predictors of perceived distress levels.

Divergent validity was established by analyzing correlations with personality measures of the Big Five. Correlations between Big-Five scores and MTSJT scores were small in magnitude, ($r = -.027$ to $.2$). Importantly, these correlations were much smaller than correlations between the Big Five scores and MTI scores, $r = .12$ to $.36$. Ultimately, the small correlations among personality scores and dimensions of the MTSJT represent divergent validity from the Big Five, which was less evident for MTI scores. This suggests the MTSJT is capturing a separate construct than the traditional personality measures, in comparison to the MTI, which has modest overlap with personality scores.

Interestingly, correlations between MTSJT scores and Big Five scores were substantially smaller than previously reported correlations in MT research. For instance, Horsburgh et al. (2009) reported correlations between MT (assessed via the MTQ48) and all five personality scores ($r = .18$ for openness, $.43$ for conscientiousness, $.45$ for extraversion, $.2$ for agreeableness, and $.64$ for emotional stability). Thus, the results of the current study suggest that the MTSJT has superior divergent validity in relation to personality scores than other common measures of MT, such as the MTI and the MTQ48.

Overall, the results reported here provide mixed support for Hypothesis 2, which states that scores on the MTSJT will correlate with measures intended to establish convergent validity, while also demonstrating small to no correlations with measures intended to diverge from MT.

While MTSJT scores did correlate with scores on an existing measure of MT, approach goal orientation, and the PSS scores, they were smaller in magnitude than hypothesized. However, the scale demonstrated good divergent validity with measures of the Big Five and avoidance goal-orientation, as evident by correlations equal to or below .2. The divergent validity of the measure appears to be stronger in comparison to existing measures of MT.

Chapter 5

Discussion

The aim of the current study was to introduce a revised measurement model of MT, the Social Cognitive Mental Toughness Model (SCMT), grounded in social-cognitive and self-regulatory theory. An additional goal was to provide preliminary psychometric support for a new assessment of MT, the Mental Toughness Situational Judgment Test (MTSJT). This revised conceptualization of MT emphasizes the importance of measuring MT as a context-specific chronic preference, rather than a dispositional approach. Consistent with this context-specific perspective, the MTSJT is unique from previous measures of MT in that it places respondents in a work context. This argument is congruent with past research that suggests MT scores have a great deal of within-person variability across situations (Gucciardi et al., 2015) and may be best measured from a domain specific perspective (Hardy et al., 2014).

Conceptually speaking, the SCMT differs from other multidimensional models of MT (e.g., Clough et al., 2002; Sheard et al., 2009) in two ways: 1) task persistence and utilization of feedback are novel dimensions of MT previously not studied directly, and 2) dimensions of MT

are conceptualized and measured as the likelihood to engage in a mentally tough behavior or the motivation behind a behavior, rather than the likelihood to endorse a belief or attitude (e.g., “I have an unshakeable confidence in my abilities”).

Internal Structure of the MTSJT

For the hypothesized SCMT model (Figure 1), MT is the overarching construct consisting of the subdimensions of task persistence, utilization of feedback, emotional control, attention control, and approach goal-orientation. Ultimately, exploratory and confirmatory factor analyses recovered three factors – task persistence, utilization of feedback, and emotional control.

Although approach goal-orientation was ultimately dropped from the measurement model (because pilot study participants were unable to reliably identify the responses intended to represent this dimension), the significant correlations between the approach goal-orientation measure and both the MTSJT and the MTI suggest that approach goal-orientation is positively associated with MT. Such findings support previous research that indicates individuals in a state of MT are more likely to use approach coping styles to address issues (Kaiseler et al., 2008; Nicholls et al., 2008).

Attention control was also dropped from the final model of MT because items consistently cross-loaded on utilization of feedback or task persistence. Furthermore, the factor loadings for attention control items were consistently weaker than the utilization of feedback and task persistence items.

Two main explanations may account for the three-dimensional model found in the current study. First, while the MTSJT is based on a revised measurement model (the SCMT), the MTSJT is distinct from previous MT measures by directly assessing task persistence and utilization of

feedback. Although other MT measures include what might be task persistence and utilization of feedback, these items are subsumed under factors such as commitment to goals, buoyancy, and context knowledge. Given the prominence of task persistence and utilization of feedback in this model, other traditional components (e.g., attention control) may be less salient. Second, it may be that attentional control is indistinguishable from the other factors as a result of the SJT method used to assess MT. That is, using traditional self-report methods may allow for participants to distinguish the attention control dimension, but this dimension becomes obfuscated when using the SJT approach, perhaps due to the behavioral and contextual emphasis of the measure.

Given the lack of a hierarchical factor, MT may be characterized best as a composite personality construct, wherein the multidimensional construct is created by compositing several distinct constructs. For example, MT may be similar to the construct of core-self evaluations, which ties together traits, such as generalized self-efficacy, locus of control, self-esteem, emotional stability, that influence job attitudes and behaviors (Johnson, Rosen, & Levy, 2008). Researchers have debated how best to model the measurement of core self-evaluations, with some researchers proposing a hierarchical model (Judge, Locke, & Durham, 1997) while other researchers advocating that it is best modeled as an aggregate construct wherein the construct is caused by its indicators (Johnson et al., 2008).

This conceptualization is distinct from the model proposed in Figure 1 in that composite personality constructs do not have an overarching factor that drives the subdimensions, but rather are formative constructs caused by their indicators. Johnson et al. (2008) argue that constructs are best modeled in this manner if the subdimensions are not interchangeable (i.e., small correlations among all factors), if the subdimensions show unique effects when predicting

outcomes, and if different causal antecedents are identified for the different subdimensions. Johnson et al. concluded that core self-evaluations meet these criteria and as such are best measured and modeled using this approach.

The current study was not designed to assess such questions and therefore the results do not provide much evidence to evaluate this conceptualization. However, MTSJT scores correlated with approach goal-orientation scores, suggesting that although approach goal-orientation is not directly captured by the MTSJT, it may still be part of the SCMT measurement model as part of a composite personality construct. Additionally, the correlations among subscales of the MTSJT varied widely, as well as their relationships with outcomes such as perceived distress, suggesting they may not be interchangeable or predict equivocally. More research is needed to determine if MT is best modeled in this manner.

Although the conceptualization of MT as a composite personality construct is a possibility, the results of this study do not permit general conclusions about the structure of MT. Specifically, model-fit indices did not support the unidimensional model. Although the first-order construct model was superior to both the unidimensional and scenario models, indices for the first-order construct approach did not meet conventional standards for good model-fit. Furthermore, a hierarchical model of MT could not be evaluated due to the finding of a nonpositive definite matrix that was most likely attributable to multicollinearity among the factors, combined with a relatively small sample size.

In summary, the EFA results indicated strong evidence for a three-factor solution, whereas the CFA showed the three-factor model to have superior fit indices relative to the unidimensional model. Conceptually, it may be that the five factors proposed in the SCMT truly represent the subdimensions of MT, yet the SJT approach may not be suitable for extracting all

five factors. Alternatively, it may be that the revised SCMT proposed new factors (i.e., task persistence and utilization of feedback) that have not been included as factors in previous MT measurement models. Therefore, the SCMT may be a more appropriate representation of the MT construct.

Cross-Structure Validity of the MTSJT

The cross-structure validity of the MTSJT was assessed by examining correlations between MTSJT scores and scores on the MTI, PSS, and Mini-IPIP, with the results indicating that the MTSJT scores had relatively small correlations with all measures. Furthermore, the correlations between MTSJT scores and MTI scores were smaller than generally reported in studies comparing self-report measures of MT (Crust & Swann, 2011). Correlations among MTSJT scores and both perceived distress and Big Five personality scores were also smaller than correlations found using other self-report measures of MT (Gucciardi et al., 2015; Horsburgh et al., 2009).

There are at least three possible interpretations for the lack of convergent validity. First, the problem may be a function of common-method variance shared by traditional MT scales. The key argument for the common-method variance interpretation is that convergent validity among common MT scales is large, due in part to the fact that for each scale, participants rate levels of agreement with single statements. As such, the lack of convergent validity between the MTSJT and MTI could be due to differences in the assessment process. In support of the common-method argument, Arthur et al. (2015) found peer ratings of MT to be weakly correlated with traditional self-report assessments of MT.

Second, differences in the underlying measurement models that form the MTSJT and MTI may account for the lack of convergence. Third, the MTSJT might not be a measure of MT;

rather, it might measure a conceptually-related but empirically-distinct construct. That is, the MTSJT should exhibit divergent validity with the MTI. Thus, the most likely reason for the lack of convergence is a combination of the common-method variance issue and the fact that the underlying measurement models differ. Given the MTSJT was based on extensive reviews of conceptual definitions of MT, it is unlikely that the MTSJT is not measuring MT.

Critiques of current MT measures have questioned the construct validity of traditional self-report measures of MT (e.g., Birch et al., 2017; Crust & Swann, 2011; Gucciardi et al., 2012). Given the inconsistencies in terms of internal and cross-structure validity for previous measures, Gucciardi et al. (2011) advocated for the use of scenario-based assessment to avoid the issues inherent with traditional self-report measures of MT. The current study provided evidence to suggest the MTSJT avoids issues involving traditional self-report scales, an encouraging finding for advancing the assessment of MT.

Limitations

One limitation of this study pertains to the validity of the sample in relation to work experience. Although participants were screened to ensure they had been employed at least part time within the last six months, most participants were not full-time employees, and therefore, they likely had minimal workplace experience to reference when completing the measure.

In addition, participants were predominantly white females. The demographic makeup of the population for which the MTSJT is intended consists of many more males, as well as more individuals from ethnically diverse backgrounds. Given the observed differential impact of gender (Roxburgh, 1996) and ethnic minorities (Evans, Bryant, Owens, & Koukos, 2004) in perceived job distress, a more representative sample would be beneficial.

Furthermore, the study was characterized by a generally small sample size, which suggests the study may be underpowered. Although estimates for the minimum sample size necessary for EFA vary, several researchers have argued that sample sizes needed to be larger than 250 (Catell, 1978; Comrey & Lee, 1992; Norusis, 2005), suggesting the results may be impacted by low sample size.

Similarly, the current study is characterized by a generally low sample size for the CFA. Wolf, Harrington, Clark, & Miller (2013) found that minimum sample size requirements for CFAs varied between 190 and 460, although it varies as a function of the number of factors, number of indicators, and the strength of the loadings. Thus, it is apparent that the CFA in the current study may be underpowered. This pertains directly to the nonpositive definite matrix observed when testing the hierarchical model. As Wothke (1993) demonstrated, sample sizes below 300 may be affected by sampling error, which have the potential to cause nonpositive definite matrices.

Finally, all data were collected cross-sectionally. Cross sectional data can inflate correlations among measures. This is particularly important for the relationship between MTSJT and PSS scores, given that previous research suggests that MT is best used in the workplace to predict performance as an antecedent of perceived distress (Gucciardi et al., 2015). Thus, a longitudinal investigation between MTSJT scores and perceived distress is merited.

Future Directions

Future research should seek to address the limitations reviewed above, and build upon this foundational research by exploring further: 1) psychometric issues pertaining to MTSJT, 2) criterion-related validity issues, 3) MT as a causal antecedent, and 4) the role of the situation in the measurement of MT.

Psychometric issues. To provide more robust evidence for the factor structure of the scale, a larger sample that is more representative of relevant subgroups while also consisting of predominantly fulltime employees is needed. In addition, a measurement invariance study comparing the factor structure of the MTSJT between employed, currently unemployed (but employed in the past) and individuals who have never been employed is necessary. Given the MTSJT was constructed to capture MT in the context of work, such a study would help to shed light on the extent to which the validity of the measure is dependent upon the employment experience of the individual.

Additionally, future research should examine the measurement structure of the MTSJT and other MT measurement scales in combination with measures of similar constructs, such as grit, hardiness, self-motivation, and resilience. Simultaneously, examining MTSJT/MT scores along with scores on these related measures would help establish a nomological network of constructs related to MT. The fundamental question is whether all these alternative constructs are a manifestation of the “jangle fallacy” whereby the same underlying construct is merely given different labels (Fogarty & Perara, 2016).

Criterion-related validity issues. Furthermore, future research should apply the scale to predict organizational criteria. Scores on SJTs (even those designed to measure constructs other than job knowledge) typically add incremental validity over cognitive ability and personality in the prediction of job performance (Lievens, Peeters, & Schollaert, 2008). Thus, the main advantage of using the SJT framework is the criterion validity of the measure, which should be established by examining the MTSJT’s association with job performance.

More specifically, MTSJT scores may provide incremental validity beyond traditional self-report MT scales when predicting outcomes. Arthur et al. (2015) showed that their behavior-

based measure of MT provided incremental validity above the SMTQ in the prediction of military training outcomes. The advantages of using the MTSJT to predict variance in job performance beyond that accounted for by traditional MT scales are: 1) it may avoid some of the response issues inherent with traditional self-report scales (e.g., social desirability, faking), 2) situations are workplace specific rather than using a general measure of MT, thereby placing both the predictor (i.e., MTSJT) and outcome (i.e., job performance) in the same context, and 3) response options are representations of mentally tough behavior, instead of abstract traits. Thus, scores on the MTSJT may have a stronger relationship with actual frequencies of workplace behavior in comparison with general measures of MT.

Regarding specific organizational criteria, future research should investigate the predictive validity of the measure in both selection and training contexts. Specifically, researchers should investigate the effectiveness of the MTSJT at predicting criteria such as job performance, frequencies of counterproductive work behaviors, active learning, turnover, absenteeism, and position within an organizational hierarchy, among others.

MT as a causal antecedent. Researchers may be interested in exploring structural models for examining the relationships among constructs. In addition to those mentioned above, researchers might examine potential mediators between MT scores and measures of performance. For example, Gucciardi et al. (2015) tested a model wherein the relationship between employee MT and supervisor's ratings of job performance was mediated by perceived distress of the employee. Future research could replicate such work using MTSJT scores, as well as explore other potential mediators such as self-efficacy, use of adaptive coping styles, and self-motivation, among others.

To supplement field research, laboratory studies using the MTSJT should be conducted to investigate further the role of MT as a causal antecedent. Laboratory studies have the added benefit of using a multitude of different methodologies, thereby avoiding the common method bias discussed above. For instance, such studies could examine relationships between MTSJT scores and attention control (measured by dual-task studies), physiological measures of distress, or in-lab task persistence.

Expanding the role of the situation. The current study contributed to the assessment of MT by placing the participants directly in a workplace context via the SJT method. The final form of the MTSJT consisted of situations representing both acute and long-term issues, as well as high-stakes scenarios, threats to self-image, and situations requiring discipline. However, future researchers can build upon this context-based assessment of MT either by writing SJTs to assess MT in contexts such as the military, athletics, and academics, or by broadening the taxonomy of situations used to assess MT.

For example, Rauthmann et al. (2014) created a broad taxonomy of characteristics individuals perceive about a situation. Rauthmann et al. classified situational characteristics according to “Eight DIAMONDS”: Duty, Intellect, Adversity, pOsitivity, Negativity, Deception, and Sociality. These characteristics indicate elements of a situation that an individual perceives (e.g., “Being blamed for something” indicates adversity; “Situation affords an opportunity to demonstrate intellectual capacity” indicates intellect.). Such a taxonomy may be useful for identifying how MT functions based on perceived situational characteristics across different domains of life. For example, an individual may engage in mentally tough behavior in Adversity situations across the contexts of work, sport, social life, etc.

As such, an investigation of broader situational aspects as they pertain to the expression of mentally tough behavior is warranted. Such an investigation would help shed light on whether MT is expressed based on a function of the overarching elements of the context (e.g., work, school, military) or the underlying perceptions of the specific situation (e.g., Duty, Adversity), and the interaction between them. Finally, future research could investigate how the taxonomy created for the current study compares with other taxonomies of situations (e.g., Rauthmann et al. 2014) for identifying situations requiring MT.

Conclusion

Recently, researchers have investigated the role of MT as a predictor of job performance, and research relevant to its use in the workplace continues to grow. Despite this, there is a lack of consensus regarding how best to conceptualize and measure MT. Specifically, MT measurement has suffered from: 1) the absence of context, 2) a positive manifold among dimensions of MT, and 3) biases inherent in the traditional self-report scales used to assess the construct.

The current study attempted to address these limitations by introducing a revised measurement model of MT, the SCMT, and developing an SJT measure based on the SCMT. Empirical support was found for three of the five factors specified within the SCMT – task persistence, utilization of feedback, and emotional control. The proposed advantage of the MTSJT is that it placed respondents in a workplace context to assess their likelihood of engaging in mentally-tough behavior at work. Taken in sum, the internal and cross structure analyses showed promise for the MTSJT as an assessment of MT in the workplace. Overall, this research has laid a foundation for future researchers interested in assessing MT workplace settings.

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Appendix A

Psychological Performance Inventory (PPI; Loehr, 1986)

1. I see myself as more of a winner than a loser in competition
2. I get angry and frustrated during competition
3. I become distracted and lose my focus during competition
4. Before competition, I see myself performing perfectly
5. I am highly motivated to play my best
6. I can keep strong positive emotion flowing during competition
7. I am a positive thinker during competition
8. I believe in myself as a player/performer
9. I get nervous or afraid in competition
10. It seems my mind starts racing 100 mph during critical moments of competition
11. I mentally practice my physical skills
12. The goals I've set for myself as a player/performer keep me working hard
13. I am able to enjoy competition even when I face lots of difficult problems
14. My self-talk during competition is negative
15. I lose my confidence very quickly
16. Mistakes get me feeling and thinking negatively
17. I can clear interfering emotion quickly and regain my focus
18. Thinking in pictures about my sport/competition/performance comes easy for me
19. I don't have to be pushed to play or practice hard. I am my own best igniter.
20. I tend to get emotionally flat when things turn against me during play
21. I give 100 percent effort during play, no matter what

22. I can perform toward the upper range of my talent and skill
23. My muscles become overly tight during competition
24. I get spacey during competition
25. I visualize working through tough situations prior to competition
26. I'm willing to give whatever it takes to reach my full potential as a player
27. I practice with high positive intensity
28. I can change negative moods into positive ones by controlling my thinking
29. I'm a mentally tough competitor
30. Uncontrollable events like the wind, cheating opponents, and bad officials/judges get me
very upset
31. I find myself thinking of past mistakes or missed opportunities as I play
32. I use images during play that help me perform better
33. I get bored and burned out
34. I get challenged and inspired during tough situations
35. My coaches would say I have a good attitude
36. I project the outward image of a confident fighter
37. I can remain calm during competition when confused by problems
38. My concentration is easily broken
39. When I visualize myself playing, I can see and feel things vividly
40. I wake up in the morning and am really excited about playing and practicing
41. Playing this sport gives me a genuine sense of joy and fulfillment
42. I can turn crisis into an opportunity

Appendix B

Sports Mental Toughness Questionnaire (SMTQ; Sheard et al., 2009)

Item	Subscale
I interpret potential threats as positive opportunities	Confidence
I have an unshakeable confidence in my ability	Confidence
I have qualities that set me apart from other competitors	Confidence
I have what it takes to perform well under pressure	Confidence
Under pressure, I am able to make decisions with confidence and commitment	Confidence
I can regain my composure if I have momentarily lost it	Confidence
I am committed to completing the tasks I have to do	Constancy
I take responsibility for setting myself challenging targets	Constancy
I give up in difficult situations	Constancy
I get distracted easily and lose my concentration	Constancy
I worry about performing poorly	Control
I am overcome by self-doubt	Control
I get anxious by events I did not expect or cannot control	Control
I get angry and frustrated when things do not go my way	Control

Appendix C

Mental Toughness Index (MTI; Gucciardi et al., 2015)

1. I believe in my ability to achieve my goals
2. I am able to regulate my focus when performing tasks
3. I am able to use my emotions to perform the way I want to
4. I strive for continued success
5. I effectively execute my knowledge of what is required to achieve my goals.
6. I consistently overcome adversity
7. I am able to execute appropriate skills or knowledge when challenged.
8. I can find a positive in most situations.

Appendix D

Original Mental Toughness Situational Judgment Test (MTSJT)

Scenarios are categorized based on the specific dimension of the guiding framework that best describes them. Each corresponding dimension of the SCMT is bolded in parentheses immediately following the response option. Asterisks indicate a reverse coded item

Acute – High-Stakes

1. A coworker is absent. Your supervisor asked you to perform some of your coworker's tasks for the day, but your day is planned with very little free time. What is the likelihood you would engage in each of the following behaviors?
 - a. Stay at work longer than usual until you've completed your tasks and your coworker's tasks (**task persistence**)
 - b. Focus your time on the most important tasks so you can leave work without working late. (**attention control**)
 - c. Spend time during lunch relieving stress so you don't feel overwhelmed by the added tasks (**emotional control**)

2. You reminded a coworker several times to complete an important task he/she is obligated to do, as your work is contingent upon this task. You find out the task has not been completed by the deadline. You decide not to address the issue. What is the likelihood you would think and feel in each of the following manners?
 - a. You're concerned that upsetting your coworker will make your job more difficult in the future (**avoid goal orientation**)
 - b. You're too upset to speak to the coworker (**emotional control**)

- c. You don't believe the coworkers recent behavior is truly representative of their abilities (**utilization of feedback**)
- 3. Your computer crashes and you have lost many files essential to your job. What is the likelihood you would engage in each of the following behaviors?
 - a. Inform your supervisor you cannot complete your tasks because the computer crashed (**task persistence***)
 - b. Contact the information/technology department to complain about the computer issues (**emotional control***)
 - c. Refuse to work in an alternate office with a coworker because you find it difficult to maintain your focus around others (**attention control***)
- 4. You are working at home and your company calls to instruct you to Skype into a conference call in an hour. The simplest plan is to Skype from home, but you don't have great connectivity. What is the likelihood you would engage in each of the following behaviors?
 - a. Take the Skype meeting and pay careful attention by ignoring the poor connection as best as possible (**attention control**)
 - b. Take the meeting and calmly explain your situation to your coworkers so they understand (**emotional control**)
 - c. Seek an alternative way to connect to the meeting, even if it means going elsewhere (**task persistence**)
- 5. You are travelling to give a team presentation. One of your coworkers is delayed in traffic and is going to miss the presentation. You decide to take over the coworker's

responsibilities. What is the likelihood you would think and feel in each of the following manners?

- a. You can block out the distractions to give a good presentation (**attention control**)
 - b. You aren't nervous because you know the material well enough to compensate for the loss of the coworker (**emotional control**)
 - c. You are excited to use this opportunity to demonstrate the team's abilities (**approach goal orientation**)
6. You must give an important presentation. When you arrive, you discover the projector screen you were going to use is broken. You decide to give the presentation anyway.

What is the likelihood you would think and feel in each of the following manners?

- a. You can block out distractions to give a competent presentation (**attention control**)
- b. You are confident in your abilities and knowledge of material (**emotional control**)
- c. You believe you will upset other people involved if you ask to reschedule the meeting (**avoid goal orientation**)

Acute Self-image

7. You overhear some coworkers spreading nasty rumors about you. You decide not to confront them about the rumors.
- a. You want to block out distractions that stop you from completing your tasks (**attention control**)
 - b. You don't want to make enemies in the office (**avoid goal orientation**)
 - c. You aren't emotionally bothered by the rumors (**emotional control**)

8. One of your supervisors treated you extremely rudely. You decide to minimize the number of interactions with your supervisor as much as possible. What is the likelihood you would think and feel in each of the following manners?
- You don't want your supervisor's behavior to distract you from completing your tasks (**attention control**)
 - You are concerned he will continually treat you poorly if you interact with him (**utilization of feedback**)
 - You want to manage any feelings of frustration (**emotional control**)
9. Your supervisor is disappointed with a project you completed with a coworker. You just didn't mesh with the coworker, but the blame has been placed entirely on you. What is the likelihood you would engage in each of the following behaviors?
- Ask not to work with this coworker in the future (**utilization of feedback**)
 - Complete extra work to make-up for the disappointing project (**task persistence**)
 - Calmly inform your supervisor that the responsibility should be split between you and your coworker (**emotional control**)
10. You were placed in charge of a team of coworkers, one of which is upset by the task that you asked of them and challenged your authority as the leader. What is the likelihood you would engage in each of the following behaviors?
- Ask the coworker why he/she was upset to determine if you treated them unfairly (**utilization of feedback**)
 - Calmly inform them that disrespectful treatment will not be tolerated (**emotional control**)

- c. Remove the coworker from your team while taking on his or her responsibilities for the project (**task persistence**)
11. You made a critical mistake on the job, and are required to discuss it tomorrow with your supervisor. What is the likelihood you would engage in each of the following behaviors?
- a. Spend some time before the meeting reviewing the details of the mistake to identify what may have caused it (**attention control**)
 - b. Tell your supervisor that you've made it your personal goal not to make this mistake again (**approach goal orientation**)
 - c. Ask your supervisor for suggestions about how to avoid making the mistake in the future (**utilization of feedback**)
12. A coworker took credit for a task that you completed very well. You decide to address the issue with your coworker. What is the likelihood you would think and feel in each of the following manners?
- a. You want to address the problem head on to earn your recognition (**approach goal orientation**)
 - b. You want to inform the coworker their behavior has caused you to avoid working with them in the future (**utilization of feedback**)
 - c. You want to inform the coworker that you are not upset (**emotional control**)

Acute Self-discipline

13. You consider yourself very proficient in using a specific software required for your job, but many coworkers struggle with it. Your company has required all employees to attend a day long training on how to use the software, which you attend. What is the likelihood you would think and feel in each of the following manners?

- a. You want to focus to pick out anything new you might be able to learn (**attention control**)
 - b. You don't want your absence to reflect poorly on you (**avoid goal orientation**)
 - c. You can control your frustration by acknowledging the session is what is best for the company (**emotional control**)
14. You have an extremely boring project due at the end of the week that requires you to complete basic tasks. One of your favorite coworkers asks you to leave work early to attend a fun social event. What is the likelihood you would engage in each of the following behaviors?
- a. Go to a distraction-free place to complete the tasks as efficiently as possible so you can attend the event (**attention control**)
 - b. Leave work to attend the fun event to maintain your favorable relationship (**approach goal orientation**)
 - c. Attend the event but come back to work after the event to work on the project (**task persistence**)
15. Your company introduced new technology that you are now required to use. The technology is hard to use and has a steep learning curve. What is the likelihood you would engage in each of the following behaviors?
- a. Spend some extra time during your lunch break learning how to use the device (**task persistence**)
 - b. Ask a proficient coworker to teach you how to use the device (**utilization of feedback**)

- c. Remove distractions from your workplace to focus on mastering the device
(attention control)
16. You must take a few classes your company is offering to earn the promotion you've been anticipating. What is the likelihood you would engage in each of the following behaviors?
- a. Voice your frustrations about the extra time to your coworkers (**emotional control***)
 - b. Attend the class only because you're afraid it will look bad if you don't (**avoid goal orientation**)
 - c. Bring your laptop so you can work on other projects in class (**attention control***)
17. A coworker has been frequently taking personal phone calls during work hours, creating distractions that have slowed your productivity. You address the coworker about the issue. What is the likelihood you would think and feel in each of the following manners?
- a. You are unable to block out the distractions to complete your work (**attention control***)
 - b. You are upset about the disrespect from your coworker (**emotional control***)
 - c. You are concerned your supervisor will be upset with you for performing poorly as a result (**avoid goal orientation**)

18. A coworker frequently makes a large mess in the workplace and makes no effort to clean up. You always must clean up his or her mess before you can complete your work. What is the likelihood you would engage in each of the following behaviors?
- Inform your supervisor that you can't complete your tasks because the mess in the workplace is distracting (**attention control***)
 - Tell the coworker that his or her behavior is immature and doesn't belong in the workplace (**emotional control***)
 - Do not address the issue with your supervisor or coworker and continually allow the mess to affect your work (**utilization of feedback***)
19. Your company is requiring you to attend a 3-hour session on workplace etiquette. Some coworkers are upset about the meeting, but everyone attends the meeting. What is the likelihood you would think and feel in each of these manners?
- You want to focus to identify specific ways you can improve your behavior in the work place (**attention control**)
 - You want your supervisor to know that you are committed to the company (**approach goal orientation**)
 - You can control any upset feelings to lead by example (**emotional control**)

Long-term High-Stakes

20. You have a rough draft of a project that your supervisor edited. He/she provided you with a few criticisms to address before the project due date, which is a week away. You create a plan to address his or her criticisms. What is the likelihood you would think and feel in each of these manners?

- a. You don't want to receive another negative review when the final product is due
(avoid goal orientation)
- b. You want to incorporate his or her feedback to improve the product **(utilization of feedback)**
- c. You are willing to work as hard as necessary to address the criticisms **(task persistence)**

21. Your supervisor has asked you to complete a project in one week with a team of coworkers. As the deadline nears, one of your coworkers has been continually slacking in his or her duties. What is the likelihood you would engage in each of the following behaviors?

- a. Inform your supervisor you would not like to work with that coworker again in the future **(utilization of feedback)**
- b. Stay later and work weekends to compensate for the coworker's slacking **(task persistence)**
- c. Have a candid yet respectful discussion with the coworker about the value of teamwork **(emotional control)**

22. You have been working on an extremely difficult project that is due next week, but you are nowhere near finished. What is the likelihood you would engage in each of the following behaviors?
- a. Write down a list of the most crucial parts of the project to focus on those **(attention control)**
 - b. Listen to an experienced coworker's advice about how best to complete the project **(utilization of feedback)**
 - c. Set aside a block of time on Saturday to complete the project **(task persistence)**
23. You've been recently hired and have been given plenty of new responsibilities. Your probationary period ends in just two weeks, at which point the company will decide whether to keep you or not. What is the likelihood you would engage in each of the following behaviors?
- a. Work during the weekends leading up to the end of the probationary **(task persistence)**
 - b. Rewrite your daily schedule so that you can focus on the most relevant responsibilities first **(attention control)**
 - c. Listen to suggestions from coworkers on how to improve your performance **(utilization of feedback)**
24. You've been working on a project that you thought would be quick, but has become increasingly difficult as it has developed. Your supervisor has become impatient waiting for you to finish. What is the likelihood you would engage in each of the following behaviors?

- a. Have a working lunch every day this week to complete extra tasks (**task persistence**)
 - b. Write down the most essential parts of the project to focus on those first (**attention control**)
 - c. Listen to the advice of one of your successful coworkers regarding how best to complete the project (**utilization of feedback**)
25. You asked for personal time off, but due to a sudden emergency that requires one of your coworkers to miss work, your supervisor has asked you to come into work on the days you requested to have off, and you agree. What is the likelihood you would think and feel in each of the following manners?
- a. You are willing to work extra time because the job needs to get done (**task persistence**)
 - b. You view your supervisor's proposition to you as a sign that he/she trusts in you as an employee (**utilization of feedback**)
 - c. You are capable of managing the negative emotions associated with your ruined plans (**emotional control**)
26. You've been promoted quickly to a new position, despite having little experience. The role comes with responsibilities you were not expecting. What is the likelihood you would engage in each of the following behaviors?
- a. Delegate certain responsibilities to others so that you can focus on the most important tasks (**attention control**)
 - b. Inform your supervisor that you think some of the responsibilities are over your head (**utilization of feedback**)

- c. Work weekends so that you can get ahead on responsibilities (**task persistence**)

Long-term Self-image

27. Your supervisor announced today that he/she is retiring and applications will be accepted to fill the role. Your qualifications meet the expectations of this job, but there is a large pool of very qualified applicants. What is the likelihood you would engage in each of the following behaviors?

- a. Decide not to apply for the position because you don't want to risk failing (**avoid goal orientation**)
- b. Listen to your supervisor's advice regarding whether you should apply (**utilization of feedback**)
- c. Put in some extra time to perfect your application before submitting (**task persistence**)

28. You feel you've been performing very poorly at your job as of late, and want to make some changes. A coworker recommends you talk to your supervisor about this issue.

What is the likelihood you would engage in each of the following behaviors?

- a. Remove distractions from your workplace environment so you can focus (**attention control**)
- b. Incorporate any suggestions for improving performance that your supervisor might have (**utilization of feedback**)
- c. Attend extra training events to improve your abilities (**task persistence**)

29. You have been performing very well at your job as of late, but your supervisor doesn't appreciate you.

- a. Tell your supervisor that he/she should be ashamed of how he/she is treating you
(emotional control*)
 - b. Start taking short cuts on your tasks **(task persistence*)**
 - c. Avoid the issue all together because you don't intend to cause any problems
(avoid goal orientation)
30. You have heard from coworkers that your company is intending on laying off a vast number of workers from a variety of positions. You ignore the rumors. What is the likelihood you would think and feel in each of the following manners?
- a. You view the rumors as distractions from your job **(attention control)**
 - b. You want to maintain the morale of the coworkers **(emotional control)**
 - c. You want to demonstrate your value to the company **(approach goal orientation)**
31. You were passed up for a promotion you felt you deserve by a less experienced coworker. What is the likelihood you would engage in each of the following behaviors?
- a. Tell some of the other coworkers in the office how you feel slighted that the committee made such a poor choice **(emotional control*)**
 - b. Begin looking for other employment opportunities **(utilization of feedback*)**
 - c. Consistently take overly long lunches **(task persistence*)**
32. Your longtime supervisor retired, and the company decided to hire an outside supervisor rather than promote you. You decide to address the hiring committee directly. What is the likelihood you would engage in each of the following behaviors?
- a. You want to inform the company that you feel they made a poor choice
(emotional control*)

- b. You want to inform the company of why you deserved the job (**utilization of feedback***)
 - c. You want to inform the company that you will not apply for future opportunities (**task persistence***)
33. There is a promotion opportunity and a coworker tells you that you would be a perfect fit.

What is the likelihood you would engage in each of the following behaviors?

- a. Apply for the job because you trust your coworker's opinion (**utilization of feedback**)
- b. Avoid applying because you don't want to deal with the consequences should you fail to get the job (**avoid goal orientation**)
- c. Apply for the job because you are personally confident that you are qualified (**emotional control**)

Long-term Self-discipline

34. You have received an exceptional performance review from your supervisor, indicating you should keep up the excellent work by creating a plan to maintain your level of performance. What is the likelihood you would think and feel in each of the following manners?
- a. You want to solidify yourself as one of the top employees (**approach goal orientation**)
 - b. You take pride in the positive comments made by your supervisor (**utilization of feedback**)
 - c. You acknowledge the fact that you need to continue to put in long hours to perform well (**task persistence**)

35. You received an employee of the month award from your supervisor. You want to keep performing well next month. What is the likelihood you would think and feel in each of the following manners?
- a. You are concerned if you don't win the reward again, you'll be viewed as regressing (**avoid goal orientation**)
 - b. You are capable of reflecting on aspects you did well in your job so you can continue improving (**utilization of feedback**)
 - c. You are more confident about your ability to perform well (**emotional control**)
36. You received a very large pay raise for performing well during the last year. You make a plan regarding how you are going to maintain your performance. What is the likelihood you would think and feel in each of the following manners?
- a. You acknowledge fact that the raise reflects your outstanding performance (**utilization of feedback**)
 - b. You continue exerting a high degree of effort into all your tasks (**task persistence**)
 - c. You are aware that the additional responsibilities could affect your ability to perform your tasks (**avoid goal orientation**)
37. Your company introduced a rewards program for performing well on the job. To earn the top prizes requires you to work harder than typical. What is the likelihood you would engage in each of the following behaviors?
- a. Write down a list of tasks you should focus on to achieve the top prizes (**attention control**)

- b. Come in on the weekends because you want to work towards achieving the top prize (**task persistence**)
 - c. Ask your supervisor for ideas about how to obtain the top prizes (**utilization of feedback**)
38. You have been given a task that is below your job qualifications that is likely to take you several weeks to complete. You decide not to work too hard on the project. What is the likelihood you would think and feel in each of the following manners?
- a. You are upset about the assignment (**emotional control***)
 - b. You view the task as pointless (**task persistence***)
 - c. You take this as a sign that your supervisor doesn't have faith in your abilities (**utilization of feedback***)
39. Your supervisor has informed you that you'll be travelling during a time that conflicts with an important personal event that you told your supervisor about sometime ago. You ask if accommodations can be made so you don't have to miss the event. What is the likelihood you would think and feel in each of the following manners?
- a. You believe that you wouldn't be able to focus while on the job (**attention control***)
 - b. You are unwilling to listen to your company's justification as to why you need to travel (**utilization of feedback***)
 - c. You're concerned your family will not understand why you missed the event (**avoid goal orientation**)
40. The department of the company that you work in received special recognition for exceptional performance. You make a plan to keep up your good performance moving

forward. What is the likelihood you would think and feel in each of the following manners?

- a. The recognition has made you proud of your specific contributions to the department (**utilization of feedback**)
- b. You're aware that continuing to work long hours is necessary to keep up this performance (**task persistence**)
- c. You're concerned about other departments surpassing your department (**avoid goal orientation**)

Appendix E

Perceived Stress Scale – Work (PSS-W; Cohen et al., 1983)

1. In the last month, how often have you been upset because of something that happened unexpectedly at work?
2. In the last month, how often have you felt that you were unable to control the important things in your work life?
3. In the last month, how often have you felt nervous and “stressed” at work?
4. In the last month, how often have you felt confident about your ability to handle your work problems?
5. In the last month, how often have you felt that things were going your way at work?
6. In the last month, how often have you found that you could not cope with all the things that you had to do at work?
7. In the last month, how often have you been able to control irritations in your life at work?
8. In the last month, how often have you felt that you were on top of things at work?
9. In the last month, how often have you been angered because of things that were outside of your control at work?
10. In the last month, how often have you felt difficulties at work were piling up so high that you could not overcome them?

Appendix F

Mini International Personality Item Pool Scale (Mini-IPIP; Goldberg, 1999)

Item	Subscale
Am the life of the party	Extraversion
Talk to a lot of different people at parties	Extraversion
Don't talk a lot	Extraversion
Keep in the background	Extraversion
Sympathize with others' feelings	Agreeableness
Feel others' emotions	Agreeableness
Am not really interested in others	Agreeableness
Am not interested in other people's problems	Agreeableness
Get chores done right away	Conscientiousness
Like order	Conscientiousness
Often forget to put things back in their proper place	Conscientiousness
Make a mess of things	Conscientiousness
Have frequent mood swings	Emotional Stability
Get upset easily	Emotional Stability
Am relaxed most of the time	Emotional Stability
Seldom feel blue	Emotional Stability
Have a vivid imagination	Intellect/Imagination (Openness)
Have difficulty understanding abstract ideas	Intellect/Imagination (Openness)
Am not interested in abstract ideas	Intellect/Imagination (Openness)
Do not have a good imagination	Intellect/Imagination (Openness)

Appendix G

Regulatory Focus Questionnaire (Lockwood, Jordan, & Kunda, 2002)

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 frequently imagine how I will achieve my hopes and aspirations.
4. I often think about the person I am afraid I might become in the future.
5. I often think about the person I would ideally like to be in the future.
6. I typically focus on the success I hope to achieve in the future.
7. I often worry that I will fail to accomplish my goals.
8. I often think about how I will achieve success.
9. I often imagine myself experiencing bad things that I fear might happen to me.
10. I frequently think about how I can prevent failures in my life.
11. I am more oriented toward preventing losses than I am toward achieving gains.
12. My major goal right now is to achieve my ambitions.
13. My major goal right now is to avoid becoming a failure.
14. I see myself as someone who is primarily striving to reach my "ideal self" - to fulfill my hopes, wishes, and aspirations.
15. I see myself as someone who is primarily striving to become the self I "ought" to be - to fulfill my duties, responsibilities, and obligations.
16. In general, I am focused on achieving positive outcomes in my life.
17. I often imagine myself experiencing good things that I hope will happen to me.
18. Overall, I am more oriented toward achieving success than preventing failure.

Appendix H

MTSJT – Final Form

Note: *indicates the response option is not scored

1. A coworker is absent. Your supervisor asked you to perform some of your coworker's tasks for the day, but your day is planned with very little free time. What is the likelihood you would engage in each of the following behaviors?
 - a. Stay at work longer than usual until you've completed your tasks and your coworker's tasks (**task persistence**)
 - b. Focus your time on the most important tasks so you can leave work without working late*
 - c. Spend time during lunch relieving stress so you don't feel overwhelmed by the added tasks (**emotional control**)

2. Your supervisor is disappointed with a project you completed with a coworker. You just didn't mesh with the coworker, but the blame has been placed entirely on you. What is the likelihood you would engage in each of the following behaviors?
 - a. Ask not to work with this coworker in the future (**utilization of feedback**)
 - b. Complete extra work to make-up for the disappointing project (**task persistence**)
 - c. Calmly inform your supervisor that the responsibility should be split between you and your coworker (**emotional control**)

3. You made a critical mistake on the job, and are required to discuss it tomorrow with your supervisor. What is the likelihood you would engage in each of the following behaviors?
 - a. Spend some time before the meeting reviewing the details of the mistake to identify what may have caused it*

- b. Tell your supervisor that you've made it your personal goal not to make this mistake again (**emotional control**)
 - c. Ask your supervisor for suggestions about how to avoid making the mistake in the future (**utilization of feedback**)
- 4. A coworker took credit for a task that you completed very well. You decide to address the issue with your coworker. What is the likelihood you would think and feel in each of the following manners?
 - a. You want to address the problem head on to earn your recognition*
 - b. You want to inform the coworker their behavior has caused you to avoid working with them in the future (**utilization of feedback**)
 - c. You want to inform the coworker that you are not upset (**emotional control**)
- 5. Your company introduced new technology that you are now required to use. The technology is hard to use and has a steep learning curve. What is the likelihood you would engage in each of the following behaviors?
 - a. Spend some extra time during your lunch break learning how to use the device (**task persistence**)
 - b. Ask a proficient coworker to teach you how to use the device (**utilization of feedback**)
 - c. Remove distractions from your workplace to focus on mastering the device*
- 6. You have been working on an extremely difficult project that is due next week, but you are nowhere near finished. What is the likelihood you would engage in each of the following behaviors?
 - a. Write down a list of the most crucial parts of the project to focus on those*

- b. Listen to an experienced coworker's advice about how best to complete the project (**utilization of feedback**)
 - c. Set aside a block of time on Saturday to complete the project (**task persistence**)
- 7. You've been recently hired and have been given plenty of new responsibilities. Your probationary period ends in just two weeks, at which point the company will decide whether to keep you or not. What is the likelihood you would engage in each of the following behaviors?
 - a. Work during the weekends leading up to the end of the probationary (**task persistence**)
 - b. Rewrite your daily schedule so that you can focus on the most relevant responsibilities first*
 - c. Listen to suggestions from coworkers on how to improve your performance (**utilization of feedback**)
- 8. You've been working on a project that you thought would be quick, but has become increasingly difficult as it has developed. Your supervisor has become impatient waiting for you to finish. What is the likelihood you would engage in each of the following behaviors?
 - a. Have a working lunch every day this week to complete extra tasks (**task persistence**)
 - b. Write down the most essential parts of the project to focus on those first*
 - c. Listen to the advice of one of your successful coworkers regarding how best to complete the project (**utilization of feedback**)

9. You feel you've been performing very poorly at your job as of late, and want to make some changes. A coworker recommends you talk to your supervisor about this issue.

What is the likelihood you would engage in each of the following behaviors?

- a. Remove distractions from your workplace environment so you can focus*
 - b. Incorporate any suggestions for improving performance that your supervisor might have (**utilization of feedback**)
 - c. Attend extra training events to improve your abilities (**task persistence**)
10. You have heard from coworkers that your company is intending on laying off a vast number of workers from a variety of positions. You ignore the rumors. What is the likelihood you would think and feel in each of the following manners?
- a. You view the rumors as distractions from your job*
 - b. You want to maintain the morale of the coworkers (**emotional control**)
 - c. You want to demonstrate your value to the company (**task persistence**)
11. You have received an exceptional performance review from your supervisor, indicating you should keep up the excellent work by creating a plan to maintain your level of performance. What is the likelihood you would think and feel in each of the following manners?
- a. You want to solidify yourself as one of the top employees*
 - b. You take pride in the positive comments made by your supervisor (**utilization of feedback**)
 - c. You acknowledge the fact that you need to continue to put in long hours to perform well (**task persistence**)