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ACHIEVEMENT MOTIVATION: EXAMINATION OF EXPLICIT AND IMPLICIT
MEASUREMENTS IN TWO STUDIES

by

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Abstract

Two theories that seek to explain personality are explicit traits (Allport, 1937) and implicit motives (Murray, 1938; McClelland, 1951). The present research investigates both implicit and explicit cognitions (specifically cognitions related to achievement motivation). Scores on three implicit measures, one explicit measure, and cognitive ability were obtained (N = 294) as well as performance on an attention task. Study 1 examined the theoretical similarities and differences among the implicit measures, as well as their relationship with an explicit measure. No significant correlations were observed among the implicit measures, and only the IAT correlated with the explicit measure. Factor analysis revealed that the implicit measures loaded on separate factors. Study 2 examined how the implicit measures combine with the explicit measure to predict performance and task continuation while manipulating feedback and task setting. Implicit and explicit achievement motivation interacted with feedback and task setting to predict performance; however findings were not consistent across implicit measures. Results indicate that additional research is required to understand better the construct of implicit achievement motivation.

Achievement Motivation: Examination of Explicit and Implicit Measurements in Two Studies

Interest in personality assessment among organizational psychologists has ebbed and flowed over the past 50 years. Personality tests were originally thought to have little predictive validity (Guion, 1965; Guion & Gottier, 1965). The 20 years or so that followed is humorously described by Goldberg's (1993) statement, "Once upon a time, we had no personalities," (p. 26). He goes on to add, "Fortunately, times change." There was a resurgence of interest in personality in the 1990's. Many factors played a role in this renewed interest, including the rise of the five-factor model, the 'tentative' resolution of the person-situation debate, and meta-analyses demonstrating the validity of various personality dimensions for predicting work-related behaviors (Smith & Schneider, 2004).

Along with the current popularity of personality, there are many theories that seek to explain human behavior. Two of these theories represent very different domains. Allport (1937) and those that followed him described personality in terms of stable, explicit traits. However, Murray (1938) and McClelland (1951) described personality in terms of dynamic, implicit motives. These different paradigms of personality have led to two different techniques of personality measurement. Traditionally, trait theorists have used direct self-report surveys while motive theorists have relied on indirect assessments using projective techniques. The current research proposes to study both of these domains, their relationship to one another, and their ability to predict behavior.

Focal Construct

There are many areas within personality that could be examined but one dimension in particular, Conscientiousness, has shown consistently to be a valid predictor

regardless of the criterion measure (Barrick, Mount, & Judge, 2001). In meta-analyses Conscientiousness has shown to be predictive ($r > .20$) for all occupational groups and all job-related criterion types studied (Barrick & Mount, 1999; Hough, Eaton, Dunnette, Kamp, & McCloy, 1990). Also, as part of the U.S. Army Selection and Classification Study (Project A), McHenry, Hough, Toquam, Hanson, and Ashworth (1990) found that achievement and dependability (two facets of Conscientiousness) were valid predictors of targeted criteria. Achievement motivation is one dimension of personality where a large body of research exists that employs implicit and explicit measures. Given that achievement is a valuable predictor in organizational research and already has a bevy of relevant findings, the current research will focus on this domain.

In the achievement motivation research, it became clear early-on that motive dispositions derived from picture-story exercises differed from motive dispositions measured by self-reported desires or interests (McClelland, Atkinson, Clark, & Lowell, 1953). McClelland and colleagues (1953) found that the two measures didn't correlate significantly with one another, a finding that was confirmed many times over the next 35 years (Atkinson & Litwin, 1960; Heckhausen, 1980; Heckhausen & Halisch, 1986; Korman, 1974; Kreitler & Kreitler, 1976; McClelland, 1958). Despite the prevalence of this finding, research continued without stopping to consider why they weren't correlated.

It wasn't until 1989 that McClelland, Koestner, and Weinberger wrote the first article to introduce and discuss the difference between 'implicit' and 'explicit' measures. They noted that few facts in psychology were as well established as the lack of

correlation between the two measures, yet psychologists had difficulty accepting that fact.

“They have generally reacted in one of two ways: (a) by concluding that the story-based motive measures are worthless (Campbell & Fiske, 1959; Entwisle, 1972) or (b) by concluding that the reason for the lack of correlation is that the self-report measures have not been designed properly (J. Raven, 1988),” (McClelland, Koestner, and Weinberger, 1989, p. 692).

This sentiment has led to both camps of measurement promoting their preferred systems of assessment while discounting alternative measurements. However some have realized that the differences in the approaches of measurement are less important than the fact that two different aspects of personality are involved: latent motives and traits. Research focusing on only one type of cognition may lack the predictive power that it would have obtained had both types been considered. Smith and Schneider (2004) argue that integration of the two approaches could represent one of the most promising future directions for personality psychology. Therefore, the present research will investigate both implicit and explicit cognitions (specifically cognitions related to achievement motivation), and how they combine to predict outcome behaviors.

Study 1 will focus on the methodology for measuring implicit and explicit cognitions. While self-report is the most universally accepted approach for measuring explicit cognitions, there are several methods of tapping implicit cognitions. These methods will be compared, including their theoretical similarities and differences and their relationship with explicit self-report measures. Study 2 will then examine how each implicit measure combines with a traditional explicit measure of achievement motivation to predict performance and other important behavioral outcomes.

Before the research specifics can be examined, we must first take a step back and look at the measures themselves. First, a review will be provided of explicit and implicit

measurement and the theory behind the available measures of achievement motivation. Then for the first study, a summary of previous research examining the relationship between explicit and implicit achievement motivation measures will be presented. Finally, for the second study, a summary of previous research examining how implicit and explicit measures combine to predict achievement behaviors will be provided.

Measuring Explicit Cognitions

Explicit social cognitions are the conscious and controlled thoughts that an individual has about his or her behavior, affect, cognition, needs, values, and attitudes (Greenwald & Banaji, 1995). These cognitions are readily available through conscious introspection and typically are measured using direct self-report surveys (Greenwald & Banaji, 1995). Self-report inventories are the primary source of data for personality research (Schwarz, 1999).

Mayer, Faber, and Xu (2007) recently reviewed seventy-five years of literature on motivation measures (1930-2005). They found that the most frequently used self-judgment measure of motivation is the Personality Research Form (PRF; Jackson, 1999), followed by the Edwards Personal Preference Schedule (EPPS; Edwards, 1959). The use of the EPPS, however, has fallen off sharply in the last few decades. The current research proposes to utilize the Achievement scale of the Personality Research Form.

Measuring Implicit Cognitions

Implicit cognitions are the unconscious and automatic thoughts that an individual has about his or her behavior, affect, cognition, needs, values, and attitudes (Greenwald & Banaji, 1995; LeBreton et al., 2006). Implicit cognitions, by definition, exist outside of conscious awareness and therefore are not available for conscious self-report. Instead,

these cognitions must be assessed indirectly (Greenwald & Banaji, 1995; Winter et al., 1998). Historically, researchers interested in the indirect assessment of implicit cognitions have relied on projective techniques such as the Thematic Apperception Test (TAT; Lilienfeld, Wood & Garb, 2000). More recently, other methods have been developed such as implicit association tests (IATs; Greenwald, McGhee, & Schwartz, 1998) and conditional reasoning tests (CRTs; James, 1998). Each is reviewed below.

Thematic Apperception Test (TAT). Although Murray (1938) is credited with the development of the TAT, it was McClelland and colleagues' research on the achievement motive and their development of an empirically justified system of content analysis that led to the test's transition to personality psychology (Winter, 1999). McClelland, Atkinson, Clark, and Lowell (1953) adopted a modified TAT procedure to create a scoring system by comparing story content in an achievement arousal condition versus a neutral condition. They found that the story content from the arousal condition frequently included achievement imagery as well as criteria relating to an achievement goal. The presence of these criteria was used to derive an overall score for implicit achievement motivation. McClelland and colleagues reasoned that individuals who scored high on implicit achievement motivation in the neutral condition must be in a state of "chronic achievement arousal" and therefore concluded that a valid measure of achievement motivation could only be achieved in a neutral setting (McClelland & Koestner, 1992).

In completing the TAT, the respondent is asked to write a brief "imaginative" story in response to a number of ambiguous picture cues. A standard set of prompts for story writing is generally used (e.g., What is happening? Who are the people? What is

being thought? What is wanted? By whom?). Pictures are shown for a short period of time (20-30 seconds) and a time limit is set for writing (ranging from 30 seconds to 5 minutes). The stories are then coded for the presence of various types of achievement imagery by trained raters.

To aid in scoring of TAT stories and other similar materials, Winter (1994) created the *Manual for Scoring Motive Imagery in Running Texts* (first edition published in 1982). This manual is often used by researchers to train scorers and ensure inter-scoring agreement. The scoring rules and definitions outlined in the manual are “adapted from the original systems for scoring the achievement, affiliation-intimacy, and power motives in brief imaginative stories spoken or written by people who take the Thematic Apperception Test (TAT) (see Atkinson, 1958, chapters 12, 13, and Appendix I; McAdams, 1980; and Winter, 1973, Appendix I for the original motive scoring systems, which have also been reprinted in Smith, 1992),” (Winter, 1994, pps. 1-2).

There is substantial research to support the predictive validity of motives measured with the McClelland TAT for a range of behavior (McClelland, 1985). However, there has also been much criticism of the TAT for being uneconomical to administer and score, having low internal consistency and test-retest reliability, and inconsistently and weakly correlating with actual behavior (McClelland, Koestner, & Weinberger, 1989). Many research articles have defended the TAT, and Emmons (1993) notes that psychometric criticism of the measure has generally subsided. McClelland and colleagues argue that the inconsistent and weak correlations with criterion variables are because the TAT is more predictive of spontaneous behavior over time, whereas self-

report measures are more predictive of short-term, situation-specific choice behavior (McClelland et al., 1989; Weinberger & McClelland, 1990).

In organizational settings, the TAT has been shown to predict income, job level, and professional rank (Spangler, 1992) and managerial promotions (McClelland & Boyatzis, 1982). The TAT has also been used in integrative models of personality to predict interpersonal problems and career choice (Winter et al, 1998). However, the TAT is still not always a pragmatic choice for organizations. As mentioned previously, administration and scoring is time-consuming and costly. Concerns surrounding the psychometric issues still persist. And, to the extent that projective tests lack face validity for job applicants, another problem with using the TAT could be decreased applicant acceptance of the selection process (Steiner & Gilliland, 1996). This situation could lead to legal difficulties for the organization.

New developments in computer stimulus presentation and response-timing software paved the way for newer techniques for assessing implicit personality. One of the most prominent among the ‘new school’ techniques, the Implicit Association Test, is reviewed next.

Implicit Association Test (IAT). Greenwald and Banaji (1995) define an implicit construct as “the introspectively unidentified (or inaccurately identified) trace of past experience that mediates R” where R is the category of responses that are assumed to be influenced by that construct (p.5). They noted that implicit cognition could reveal associative information that people were either unwilling or unable to report.

The IAT was developed by Greenwald, McGhee and Schwartz (1998) as a way to assess automatic evaluative distinctions (implicit attitudes). The IAT examines automatic

associations between a bipolar target concept (such as self and other) and a bipolar attribute concept (pleasant or unpleasant words). The basic principle is that it should be easier for people to categorize two concepts using the same response key if the concepts are evaluatively congruent than if they are incongruent. The technique is to ask participants to quickly place targets into categories by pressing keys that are assigned to each category. The IAT score is determined by the difference in speed of categorization for each target concept. Using this method, participants' implicit positive versus negative attitudes have been assessed regarding many bipolar attitude dimensions, including self versus others (Greenwald & Farnham, 2000) and men versus women (Haines & Kray, 2005). A number of scoring algorithms exist for the IAT. In 2003, Greenwald and colleagues (2003) evaluated a variety of algorithms on a wide range of psychometric criteria (sensitivity to known influences, correlations with parallel self-report measures, internal consistency, and resistance to extraneous procedural influences) on very large internet samples. They found that the *D* algorithm strongly outperformed the other scoring procedures and it is now the recommended scoring method. The *D* algorithm has since been shown to have additional psychometric benefits over the conventional scoring procedures (Back, et al., 2005; Cai, et al., 2004; Mierke & Klauer, 2003).

In 2008, Frank Landy discussed the IAT and stereotype research through a focal article. The article was followed by 13 commentaries. Although Landy (2008) criticized research using the IAT in laboratory settings, many of the commentaries strongly defended the usefulness of laboratory research utilizing the IAT (e.g., Greenwald, 2008; Hanges & Ziegert, 2008; Rudman, 2008). Rudman (2008) points out that the IAT has passed extensive tests of possible alternative explanations for its results, and is the only

implicit measure whose scoring procedure has been improved to combat better unwanted sources of variance (e.g., Nosek et al, 2007).

IAT measures have typically displayed good internal consistency (Greenwald & Farnham, 2000) and are relatively insensitive to procedural variations such as the number of trials, the number of exemplars per concept, and the time interval between trials (Greenwald et al., 1998; Nosek, Greenwald & Banaji, 2005). One drawback of the IAT is that response latencies can be unreliable so large numbers of trials are required to reach acceptable reliability (Edwards & Parry, 1993). Also, research has only recently begun on personality-based IATs, so their use in organizational research is limited (e.g., Steffens & Konig, 2006; Egloff, Schwerdtfeger & Schmukle, 2005). Nonetheless, the IAT is the dominant method for assessing implicit associations because of its robust psychometric features, flexibility, and resistance to faking (Nosek et al., 2007). Another new type of ‘new school’ test developed to assess implicit personality is the Conditional Reasoning Test, which is reviewed next.

Conditional Reasoning Test for Achievement Motivation (CRT-AM). The CRT-AM was developed by James (1998) as a new method of personality measurement based on conditional reasoning. In the domain of achievement motivation, people whose need to achieve dominates their need to avoid failure often *reason* differently than people whose need to avoid failure dominates their need to achieve.

Consider that whether someone chooses to approach or avoid a demanding task is largely determined by how they would respond to questions such as, “How likely is my succeeding or failing at this task?” or, “To what extent is success on this task affected by my persistence and effort?” Answering these questions requires the individual to process

information cognitively (James & Mazerolle, 2002). They must interpret what demanding, success, intensity, and persistence means to them; this is called framing. Someone may frame a difficult task as stressful while another would frame the same task as challenging. To frame an event is to place it in a cognitive schema. Cognitive schemata are the filters through which all external stimuli pass and give events personal meaning. Over time, individuals develop “framing proclivities” and tend to interpret the same or similar events with similar frames. These influences are referred to as *implicit social cognitions* because people are not necessarily aware of them (Greenwald & Banaji, 1995).

The process of assigning meaning using framing proclivities and then making decisions based on that meaning is a *reasoning* process. One interesting feature of this process is that people whose need to achieve dominates their need to avoid failure often answer the questions posed above *differently* than do people whose need to avoid failure dominates their need to achieve. The reasoning is “conditional” on the personalities of the individuals doing the reasoning (James, 1998). “Basically, people with opposing needs often behave differently in the same environment, in part because they have different ideas about what constitute reasonable adjustments to that environment,” (James & Mazerolle, 2002, p. 38).

However, no matter which need is dominant, almost everyone believes that their particular reasoning is rational and objective (James & Mazerolle, 2002). To justify their behavior, these individuals depend on implicit biases in reasoning. James (1998) introduced the term *justification mechanisms* (JMs) to refer to these biases. Justification mechanisms are defined as implicit biases whose purpose is to define, shape, and

otherwise influence reasoning so as to enhance the appeal of behaving in a manner consistent with a disposition or motive. Tables 1 and 2 list the JMs for Achievement Motivation and Fear of Failure.

CRT items appear to be inductive reasoning problems, but they are designed so that respondents with different implicit cognitive biases tend to solve the problem in different ways. Using the CRT, it becomes possible to infer which motive is dominant: the motive to achieve or the motive to avoid failure. This inference is made by assessing which justification mechanisms seem to be more logical to the respondent. If a person consistently sees the argument for approach as more logical then it is inferred that this person's relative motive strength favors the need to achieve. Conversely, if a person consistently prefers the argument for avoidance then it is inferred that this person's relative motive strength favors the need to avoid failure

James (1998) developed a set of conditional reasoning problems to measure what a person considers more logical: reasoning based on JMs for achievement motivation (AM) or reasoning based on JMs for fear of failure (FF). See Table 3 for an illustrative problem. This problem requires analysis of the question, Does striving to achieve cause stress-related illnesses? The stem of the problem advocates an answer of yes. The reasoning task is to find a weakness in this assertion. Choices B and C are not reasonable answers to the problem so that leaves only A and D as possible alternatives. One of these answers is based on a JM for achievement motivation and the other is based on a JM for fear of failure. Which answer a person judges to be reasonable depends on whether his or her reasoning is based on AM or FF justification mechanisms.

Individuals high in achievement motivation strongly disagree with the assertion in the stem that people who strive to achieve are increasing their risk for heart attacks. A number of AMs (e.g., highly motivated scholars, authors, physicians, executives, and lawyers) were interviewed by James (1998) in the process of problem development. They supplied counterarguments such as,

“(a) the assertion overstates the case—many successful people live long lives free of cardiovascular disease; (b) there is no necessary connection between an achievement orientation and stress—in addition to overload, stress is caused by such things as taking on highly boring tasks, impatience, and elevated levels of hostility, and none of these factors is necessarily associated with striving to succeed; and (c) the assertion fails to consider alternative causes—cardiovascular disease has many causes in addition to stress, including controllable factors such as cholesterol level, weight, smoking, and exercise” (James, 1998, p. 139).

This kind of reasoning is indicative of the JM called, “positive connotation of achievement striving.” Answer choice A was designed to draw out some of this conditional reasoning. This choice, if seen as logical, identifies a serious logical weakness to the assertion of the problem stem that achievement striving enhances the risk of cardiovascular disease. In selecting this alternative, a respondent endorses the implicit argument that there is little to no association between achievement striving and both impatience and hostility (James, 1998). This reasoning would be expected for AMs.

For some individuals, however, the assertion in the problem stem that achievement striving increases stress and the risk of a heart attack provides reasonable justification for avoiding achievement-oriented tasks. This reasoning is based on two JMs for fear of failure. The first JM is “negative connotation of achievement striving,” which describes a predilection to assume that achievement striving causes stress. The second JM is “leveling,” which involves associating this increased stress with increased risk of cardiovascular disease.

Interviews conducted with recognized FFs (based on demonstrated behavior) supported the hypothesis that people high in fear of failure would agree with the problem stem. Although they were aware of at least some of the counterarguments, recognized FFs were particularly sympathetic to the inference that striving to achieve increases the risk of heart attack. They assumed that,

“...evidence can be garnered to support the assertion—business executives, for example, have an abnormally high rate of heart attacks... FFs also believe implicitly that the obverse corroborates the assertion—people who take a more relaxed approach to work are less likely to demonstrate symptoms of stress such as exhaustion, illness, burnout, and chronic anxiety about performance” (James, 1998, pps. 140-141).

Basically, FFs tend to agree with the problem stem, however, the task is to find a logical weakness with the argument. To deal with these occasions, James (1998) constructed the *wounding response*. This logical solution only “wounds” the argument in the stem. This way it is possible to satisfy the requirement of finding a logical weakness but only cause minor logical damage to it. Answer choice D is the wounding response. The fact that a number of non-ambitious people have heart attacks weakens the argument that striving to succeed is the only cause of heart attacks but it leaves open the logical possibility that it could be a contributing factor.

Multiple conditional reasoning problems have been developed, each of which offers a choice between AM and FF solutions. James (1998) used the differences in conditional reasoning to develop a measurement system to assess the dispositional component of resultant achievement motivation (Atkinson, 1957; McClelland, 1985). This component consists of the strength of the latent motive to achieve in relation to the latent motive to avoid failure (James & Mazerolle, 2002). James (1998) refers to the difference in the relative strengths of these two latent motives as the Relative Motive Strength (RMS). The objective is to determine whether an individual consistently prefers

AM or FF alternatives. Respondents who consistently choose AM alternatives are believed to have a dominant motive to achieve. Conversely, respondents who consistently choose FF alternatives are believed to have a dominant motive to avoid failure. Lack of a consistent pattern suggests that neither motive dominates, so the relative motive strength is considered “indeterminate.”

In addition to the CRT-AM, James has also developed a test measuring implicit aggressive reasoning (CRT-A; James, McIntyre, Glisson, Green, Patton, & LeBreton, et al., 2005). Research on the CRT-A has shown that conditional reasoning items are not highly susceptible to faking or impression management (LeBreton, Barksdale, Robin & James, 2007). The CRT-AM has been shown to predict academic performance (James, 1998) and assessment-center performance (Bing et al., 2001). CRTs can be administered in mass testing situations and their standardized scoring makes them easy to score and cost-effective.

Summary

What has been provided so far is a review of explicit and implicit measures of achievement motivation. Explicit measures are typically self-report surveys; the Personality Research Form (PRF) is the most frequently used for achievement motivation. Implicit measures of achievement motivation are more varied. Historically, psychologists employed ‘old school’ projective techniques such as the Thematic Apperception Test (TAT). More recently, other ‘new school’ methods have been developed such as the Implicit Association Test (IAT) and Conditional Reasoning Test of Achievement Motivation (CRT-AM). What has not yet been discussed is how these measures are related to each other. What is the degree of convergence between the

implicit measures? What is the degree of divergence between the implicit and explicit measures? Study 1 will attempt to address these questions.

Study 1: Relationship Between Implicit and Explicit Measures

All three measures discussed so far (the TAT, IAT and CRT-AM) were designed to measure implicit orientations towards achievement motivation. The methods used to assess this orientation, however, are quite different. The TAT uses projective methods to assess implicit *motives*, the IAT uses response latencies to assess implicit *attitudes*, and the CRT-AM uses conditional *reasoning* to assess implicit cognitions. How do these approaches relate to one another?

Only two studies to date have examined the relationship between these implicit measures (Sheldon, King, Houser-Marko, Osbaldiston, & Gunz, 2007; Ziegler, Schmukle, Egloff & Bühner, 2010). Both studies utilize the ‘old school’ TAT and the ‘new school’ IAT. Sheldon and colleagues assessed implicit orientations towards power and intimacy, while Ziegler and colleagues assessed achievement motivation. Their findings (which will be discussed shortly) shed some light on the relationship between implicit *motives* and implicit *attitudes*. The current study proposes to investigate the relationship between implicit *motives*, *attitudes*, and *cognitions*.

This research should not only link current implicit achievement motivation measures with the accumulated knowledge on latent motives, but also vice versa, integrate the classic but somewhat disconnected concept of latent motives into modern social cognition research.

First, a summary of previous research findings on the TAT and IAT will be presented. Then, based on these findings and the theoretical background of the TAT, the IAT, and CRT-AM, the predicted relationship between the three will be outlined.

Previous Research Comparing Implicit Measures

Sheldon and colleagues (2007) set out to see if there was theoretical overlap between McClelland's concept of latent motives assessed by projective tests and the constructs assessed by latency-based measures. They assessed implicit orientations towards power and intimacy using the TAT and a variant of the IAT (Greenwald, McGhee, & Schwartz, 1998) and found the correlation was not as large as expected ($r = 0.17, p < 0.05$). By using typical reliabilities for both measures for a correction of attenuation, the estimated true score correlation is close to 0.30 (Banse & Greenwald, 2007). This correlation indicates that they at least have some overlap, but also clear differences.

To investigate this relationship further, Sheldon and colleagues (2007) also examined the factor structure among the two implicit measures (TAT and IAT), two explicit measures, and two goal setting variables. The explicit measures used were the Personality Research Form (PRF; Jackson, 1984) and the Aspirations Index (AI; Kasser & Ryan, 1996). The two goal setting variables were a measure of perceived locus of control (PLOC) and a measure of goal importance (IMP).

The exploratory factor analysis suggested a two and four component solution. For the two component solution, the first factor was defined by the IAT (0.53), the TAT (0.69), the PRF (0.60), and the AI (0.61) and the second factor was defined by the two goal variables (PLOC = 0.75, IMP = 0.86). This pattern suggests that the two implicit

measures converge with one another and also with the explicit measure and value measures, whereas the goal measures load on their own factor. For the four factor component solution, the first factor was defined by the two goal variables (PLOC = 0.80, IMP = 0.86), the second factor was defined by the PRF and AI (0.71 and 0.89), the third factor was defined by the TAT (0.94) and the fourth factor was defined by the IAT (0.95). This pattern suggests that goals, motives/values, the TAT and the IAT supply distinctive information.

The results of these two solutions shows evidence that the two implicit measures converge with one another and with the explicit measures when the number of available factors is low, but diverge from the explicit measures and *each other* when the number of factors is allowed to increase. This makes sense because at a high level both the implicit and explicit measures are assessing the construct of power and intimacy. When additional distinction is allowed, the differences in methods by which they assess the construct become clear. In summary, Sheldon and colleagues' (2007) research found that the TAT and IAT are somewhat correlated, but also load on separate factors when allowed additional variance.

Ziegler and colleagues (2010) conducted a similar study on achievement motivation using the TAT and IAT, as well as a third implicit measure called the Objective Achievement Motivation Test (OAMT; Schmidt-Atzert, 2004). They found that the correlation between the TAT and IAT was non-significant ($r = .03$), as well as the correlation between the TAT and the OAMT ($r = .09$) and between the IAT and the OAMT ($r = -.05$).

They used structural equation modeling to conduct a confirmatory factor analysis and test the theory that all of the implicit measures loaded on one latent variable. The model did not converge properly, which the authors' note is not surprising given the lack of intercorrelations between the measures. Thus, they conclude that there is no relationship between the implicit measures. In sum, these two studies present conflicting findings with regards to the relationship between the TAT and the IAT. Previous research on these measures can help in understanding these findings.

The TAT and IAT have some similar properties. Both have been shown to predict spontaneous behavior and behavioral choices in ways that self-report measures do not (McConnel & Leibold, 2001; Rudman & Glick, 2001). Both operate largely automatically (Greenwald et al, 1998). Both are shown to be harder for applicants to disguise their answers and less susceptible to impression-management than self-report measures (Egloff & Schmukle, 2002; Schnable, Banse & Asendorpf, 2006; Steffens, 2004). Finally, both are thought to represent dispositional constructs that are at least somewhat stable over time (Egloff, Schwerdtfeger, & Schmukle, 2005; McAdams, 2001).

There are, at the same time, important differences between the TAT and the IAT. The IAT is typically used to assess ingrained evaluative *attitudes* towards stimulus objects, which bias responses to those objects. In contrast, the TAT is thought to assess fundamental *motives* embedded within personality that orient the perceptual system. Another difference is the methodologies used by each measure. The story-based approach of the TAT should tap fundamental meaning-making systems within the person, whereas the IAT's response latency only taps automatic connections that occur when certain concepts are associated (Sheldon et al., 2007).

TAT and IAT. Only two studies have directly examined the relationship between the TAT and the IAT, and their findings are conflicting. Despite the non-significant correlations found by Ziegler and colleagues (2010), the theory suggests that they should be related, as Sheldon and colleagues found (2007). Accordingly, it is predicted that there will be a weak but significant correlation between the TAT and IAT when used to measure achievement motivation.

Hypothesis 1. The TAT and IAT will be significantly, positively correlated and this correlation will be small in size.

These findings shed some light on the relationship between implicit *motives* and implicit *attitudes*, but how do implicit *cognitions* fit in? The current study proposes to investigate this question.

TAT and CRT-AM. The theoretical foundation of the CRT-AM is based on reasoning and forces that bias reasoning, so it should be closely related to the meaning-making systems measured by the TAT. Recall that the motive to achieve is latent, which means that individuals high in achievement motivation “are not aware that an underlying force is partially responsible for energizing, selecting, and directing their actions toward devoting intense and persistent effort to demanding tasks,” (James & Mazerolle, 2002, p.132). What they are aware of is the end products of these forces, which are strong desires to take on challenging tasks and to compete with others and win. They are also aware that they associate a positive affect with these tasks. They cannot, however, explain why they have these associations nor can they control the strength of the positive affect.

The TAT, as previously discussed, is meant to estimate the strength of the latent *motive* to achieve. It is called a “projective” test because it is designed to stimulate

respondents to reveal inaccessible motives by projecting their feelings, defenses, and justifications onto the stories they are asked to write about ambiguous stimuli (e.g., pictures) (McClelland, Atkinson, Clark & Lowell, 1953).

The CRT-AM is also designed to estimate the relative motive strength of achievement motivation; however it does so using conditional *reasoning*. The reasoning is “conditional” because it’s based on the personalities of the individuals doing the reasoning (James, 1998). Conditional reasoning “conveys the notion that differences in motives, framing proclivities, and implicit theories shape, define, and guide reasoning so as to furnish a predictable pattern of individual differences in the judgments of what are and are not reasonable behaviors in the same environment,” (James & Mazerrole, 2002, p. 17).

Based on the theoretical background of the TAT and the CRT-AM, it is hypothesized that the two measures will have a significant, positive correlation, as they both assess the effect of achievement motivation biases on implicit cognitions. This correlation will be high enough to indicate a modest relationship, but not so high as to indicate that they are interchangeable.

Hypothesis 2. The TAT and CRT-AM will be significantly, positively correlated and this correlation will be moderate in size.

IAT and CRT-AM. The IAT measures the relative strength of association between pairs of concepts. The underlying assumption is that responses should be faster and more accurate when categories that are closely related share a response, as compared to when they do not (Lane, Banaji, Nosek & Greenwald, 2007). These ingrained evaluative attitudes bias peoples’ response to objects, but this response is made in a matter of milliseconds. The CRT-AM is based on reasoning and forces that bias

reasoning, but that reasoning is based on a rational and objective process (since the individual is unaware of the justification mechanisms biasing their reasoning) that may require additional cognitive resources. For this reason, it is predicted that the correlation between the IAT and the CRT-AM will be similar to that between the IAT and the TAT – significant and positive, but weak in strength due to their differences in methodology and focal construct.

Hypothesis 3. The IAT and CRT-AM will be significantly, positively correlated and this correlation will be small in size.

In addition to the relationship among implicit measures, the current research also aims to examine the relationship between implicit and explicit measures of achievement motivation. First, a summary of previous research comparing the two measurement domains will be discussed. Then, based on these findings, the predicted relationships will be outlined.

Previous Research Comparing Implicit and Explicit Measures

Recall that McClelland and colleagues (1953) found early on in achievement motivation research that motive dispositions derived from self-report measures and picture-story exercises didn't correlate significantly with one another. Critics argued that this lack of correlation provided evidence of poor convergent validity (Campbell & Fiske, 1959). McClelland (1987) has argued that the two are uncorrelated because they are measures of distinct aspects of personality and therefore shouldn't be correlated. Spangler (1992) conducted a meta-analysis of questionnaire and TAT measures of need for achievement and found an average correlation of .09, which was statistically significant but clearly quite small. Since that meta-analysis, additional research using the TAT has also found the correlation to be significant but small ($r = .26$, Sheldon et al.,

2007; $r = .17$, Thrash, Elliot, & Schultheiss, 2007) or non-significant ($r = .06$, King, 1995; $r = .06$, Schultheiss & Brunstein, 2001; $r = .08$, Schultheiss, Yankova, Dirlikov & Schad, 2009; $r = .08$, Ziegler et al., 2010).

Meta-analytic research has found that correlations between the IAT and explicit measures vary widely (Greenwald, Poehlman, Uhlmann & Banaji, 2009; Hofmann, Gawronski, Gschwendner, Le & Schmitt, 2005; Nosek, 2005). Within personality research correlations have been found to be significant but small for general personality traits ($r = .17$, Greenwald, et al., 2009) and Conscientiousness ($r = .18$, Grumm & von Collani, 2007; $r = .22$, Steffens & Konig, 2006). The study by Sheldon and colleagues (2007) previously reviewed found the correlation for implicit and explicit power and intimacy to be non-significant ($r = .03$). Previous research examining achievement motivation has also found the correlation to be non-significant ($r = -.07$, Brunstein & Schmitt, 2004; $r = .08$, Ziegler et al., 2010).

Only one research article to date has compared the CRT-AM and explicit achievement motivation; however this article contains two studies that utilize different participant samples and different explicit measures (Bing et al., 2007). The first study used an undergraduate sample and a researcher-created six-item measure of achievement motivation cognitions. The questionnaire used a 5-point semantic differential-response format with opposing anchors (i.e., *I would like to be a high achiever at school, but I am not hung up about it* and *I have a burning desire to be a high achiever at school*). The critical correlation for this study was non-significant ($r = .11$). The second study used working adults competing to become trainees in a leadership development program at a large utility company. The achievement via independence (Ai) scale of the California

Psychological Inventory (CPI) self-report questionnaire was used as the measure of achievement-related explicit cognitions. The critical correlation for this study was significant and the highest seen between an implicit and explicit measure of achievement motivation ($r = .31, p < .05$). It cannot be determined from this research whether the conflicting findings are due to differences in the participant group, the explicit measure, or common method variance.

Current Research

TAT. McClelland (1987) has argued that the TAT and explicit measures are uncorrelated because they are tapping distinct aspects of personality and therefore shouldn't be correlated. Based on this theory and previous research findings, it is hypothesized that the correlation between the TAT and explicit measure of achievement motivation will be non-significant.

Hypothesis 4. The TAT and explicit measure will not be significantly correlated.

IAT. Research using the IAT has found the correlation of interest to vary widely, but the two studies looking specifically at achievement motivation found the correlation to be non-significant (Brunstein & Schmitt, 2004; Ziegler et al., 2010). Based on these findings, it is predicted that the correlation between the IAT and explicit measure will be non-significant.

Hypothesis 5. The IAT and explicit measure will not be significantly correlated.

CRT-AM. The only study examining the relationship between the CRT-AM and explicit achievement motivation found conflicting results, so no specific hypothesis is presented for the CRT-AM, and instead it is proposed as a research question.

Research Question. Is there a significant relationship between the CRT-AM and explicit achievement motivation?

Factor Analysis

To understand further the relationship between implicit and explicit measures of achievement motivation, the current research examined the amount of convergence and divergence between the two measurement types. This comparison was accomplished by examining the factor structure of the TAT, the IAT, the CRT-AM, an explicit measure of achievement motivation, and a cognitive ability measure. The explicit measure was the Achievement Motivation scale of the Personality Research Form because it has been used in several studies examining implicit and explicit personality and therefore aids in making comparisons between this studies' results and the findings of previous research. The cognitive ability measure was the Wonderlic Personnel Test (WPT-Q; Wonderlic, 2007). This measure was included because the CRT-AM has been found to correlate with mental ability (Bing et al., 2007), and I wanted to ensure that the measure is more closely related to achievement motivation than to intelligence.

To examine the factor structure, an exploratory factor analysis was performed on the TAT, the IAT, the CRT-AM, the Personality Research Form (PRF), and the Wonderlic Personnel Test (WPT-Q). It was expected that the implicit and explicit measures would load on separate factors, supporting previous findings and the theoretical distinction between the two. What was unclear was what the factor structure of the three implicit measures would be, and how closely cognitive ability will relate to the CRT-AM.

When combined, the findings from both predictions illuminate the relationship amongst three different implicit measures, and between implicit and explicit measures of achievement motivation.

Method

Participants and Procedure. Participants were 322 psychology and business students who took part in the study in exchange for course credit. Per IRB requirements, students were given the option to have their data removed from the study after being debriefed on the deception (see Study 2). Seven students elected to be excluded from the study. An additional 20 participants were removed from the sample because they were missing one of the predictor measures (usually due to technical difficulties with the research software). Another thirteen participants were removed from the study because they were discerned to have poor participation effort. That is, two were directly observed during the study randomly keying responses, and the other 11 were deemed “poor participants” based on their total time spent on the CRT-AM (average time to complete was 16.6 minutes, while these deleted participants had improbable times of under 4 minutes).

The final resulting sample was 294 participants, of which 67.3% were female. Average age was 26.0 years ($SD = 8.22$). Ethnic composition of the sample was 69.2% Caucasian, 21.8% African American, 12.9% Asian, and 6.1% other.

Participants completed the Achievement Motivation scale of the PRF, the IAT, the cognitive ability measure, the picture story exercise, and the conditional reasoning test (in that order). Lastly, they completed a concentration task (see Study 2) that is not associated with this study.

Participants were told that they were completing assessments designed to measure critical thinking skills, problem solving skills, perceptual speed, and selective attention.

They were given several examples of jobs that utilize these skills, and asked to answer the assessments as if they were applying for one of those jobs.

The PRF was referred to as the “personality test” so as not to reveal the specific purpose of the measure. The IAT was described as a word classification exercise. The cognitive ability measure was labeled as such. The TAT was labeled “picture story exercise” so as not to bias responses. The CRT-AM must be presented as a logic test to be effective. The concentration task was explained as a measure of speed and accuracy.

Measures

Brief Implicit Association Test (BIAT). The Brief Implicit Association Test (BIAT; Sriram and Greenwald, 2009) was used to assess implicit achievement motivation. The shorter version of the full-length IAT (Greenwald et al., 1998) was selected because it is psychometrically similar but requires one-third the number of trials. In presenting the BIAT to the participants, the current study closely followed the procedure described in Greenwald et al., (1998). The target discrimination was Me vs. Others, and the attribute discrimination was Successful vs. Not Successful. The attribute labels were used because these categories are strongly associated with competent performance within achievement-related contexts and because they were used in previous IAT research (Brunstein & Schmitt, 2004). The stimulus materials consisted of four self-related (I, Me, Myself, Mine) and four other-related items (They, Them, Their, Theirs), as well as eight Successful items (e.g. competent) and eight Not Successful items (e.g. inefficient). Self and other items were adopted from Nosek, Banaji, and Greenwald (2002). The attribute adjectives were inspired by standard questionnaire measures of

achievement motivation as well as previous IAT research (Brunstein & Schmitt, 2004). The full list of adjectives can be found in Appendix A.

During the BIAT, a series of words were presented at the center of the screen that either did or did not belong to one of two categories represented on the top of the screen (e.g., Me/Successful). Participants' task was to press a right-hand response key if the word belonged to either of the two categories (Me/Successful) and a left-hand response key if it belonged to neither category.

In the full-length IAT, all four categories remain on the screen in both blocks (e.g., Me, Others, Successful, Not Successful). The BIAT is different in that only two categories were shown on the screen at any one time (e.g., Me and Successful in one block; Me and Not Successful in the other block); thus, three focal categories were employed within a given BIAT, whereas one category (e.g., Others) is never shown on the screen and therefore is referred to as a non-focal category (Sriram and Greenwald, 2009). 'Others' was the non-focal category in this BIAT. This design has the advantage of focusing participants' attention on the three focal categories, such that implicit associations with the non-focal category (e.g., Others) become less relevant. BIAT scores were therefore more straightforward to interpret because they reflected associations between focal categories and were less confounded by associations with the non-focal category than in the full-length IAT.

There were two blocks of 20 trials each, and from each block the first four practice trials were excluded from analyses as is typically done (for details, see Sriram and Greenwald, 2009). BIAT data were treated with the improved scoring algorithm (D_1 measure) as described by Greenwald, Nosek, and Banaji (2003): (a) trials with latencies

greater than 10,000 ms were eliminated¹; (b) error trials were included in the analysis by using the latency between stimulus presentation and correct response (built-in error penalty); (c) the mean latency for the critical trials of the Me/Successful block was subtracted from the mean latency for the critical trials of the Me/Not Successful block; and (d) the BIAT effect was computed by dividing this difference by the individual respondent reaction time standard deviation. Thus, the higher the BIAT effect, the more achievement-oriented the estimated implicit motive of a given participant. Scores on the BIAT can range from -2 to +2. Scores in this research ranged from -1.15 to 1.42 ($M = .50$, $SD = 0.43$).

Conditional Reasoning Test – Achievement Motivation (CRT-AM). The CRT-AM consists of 15 inductive reasoning problems, each of which offers a choice between Achievement Motivation (AM) and Fear of Failure (FF) solutions. Respondents were given a score of +1 for every AM alternative they selected, a zero for every logically incorrect alternative they selected, and a -1 for every FF alternative they selected (James & Mazerolle, 2002). These scores were then summed to arrive at a composite score on the Relative Motive Strength (RMS) scale. The objective is to determine whether an individual consistently prefers AM or FF alternatives. The scoring protocol suggested by James (1998) was used, which results in scale scores with a potential range of -15 to +15. Higher scores indicate the presence of achievement-related implicit cognitions, whereas lower scores indicate implicit fear-of-failure cognitions. Scores in this research ranged from -8 to 14 ($M = 1.97$, $SD = 4.22$). Internal consistency reliability was .63. Previous research has found reliabilities of .62 and .73 (Bing et al., 2007).

Picture Story Exercise. The third measure of implicit achievement motivation was a TAT-type picture story exercise. Participants wrote imaginative stories about five pictures according to the standard instruction used in motivation research (Smith, 1992):

You are going to see a series of pictures, and your task is to tell a story that is suggested to you by each picture. Try to imagine what is going on in each picture. Then tell what the situation is, what led up to the situation, what the people are thinking and feeling, and what they will do.

In other words, write as complete a story as you can – a story with plot and characters.

You will have 20 seconds to look at a picture and then 4 minutes to write your story about it. I will keep time and tell you when it is time to finish your story and get ready for the next picture.

There are no right or wrong stories or kinds of pictures, so you may feel free to write whatever story is suggested to you when you look at a picture. Spelling, punctuation, and grammar are not important. What is important is to write out as fully as possible the story that comes into your mind as you imagine what is going on in each picture.

The pictures shown were those used by Brunstein and Maier (2005; see Appendix B): a boy in a checked shirt, two women in lab coats, a woman and a man on a trapeze, two men in a workshop, and a young woman working on the balance beam. These pictures have been used in numerous previous studies (Smith, 1992). Picture order was randomized for each participant. Stories were coded independently by two raters who were trained using Winter's (1994) *Manual for Scoring Motive Imagery in Running Text*. Raters first learned the scoring system and then had to exceed 85% inter-scorer agreement on expertly scored calibration materials that are contained in the manual. On research materials, raters showed 91% inter-scorer agreement (agreement = $[2 \times \text{no. of agreements between Scorers 1 and 2 on the presence of achievement-motive imagery}] / [\text{no. of times Scorer 1 scored motive imagery} + \text{no. times Scorer 2 scored motive imagery}]$). Scores were determined by summing the total number of motive images (averaged across raters) and dividing by the number of stories (five). Scores ranged from 0 to 2.80 ($M = 0.92$, $SD = 0.58$). There is no pre-defined range for this measure, but

previous research has found similar scores for the picture “two women in lab coats” ($M = 1.08$, $SD = 0.93$) and the picture “trapeze artists” ($M = 0.76$, $SD = 0.83$) (Pang, 2010).

Personality Research Form (PRF). The explicit measure of achievement motivation was the Achievement Scale of Jackson’s (1984) Personality Research Form. The PRF is one of the most highly-cited psychological assessments, having been referenced over 1,500 times in research literature. The Achievement Scale is comprised of 16 true-false questions that describe habits and preferences that are either consistent or inconsistent with the motive domain. Therefore, the possible range of scores is 0 to 16. Actual research scores ranged from 2 to 16 ($M = 10.99$, $SD = 3.02$). Internal consistency reliability was .69.

Wonderlic Personnel Test – Quicktest (WPT-Q). The WPT-Q is the short form measure of the WPT, a cognitive ability measure that has been used by thousands of organizations since 1937. The WPT-Q is a 30-question, 8-minute timed test of cognitive ability. Possible scores on the measure range from 0 to 50. Participant scores ranged from 11 to 37 ($M = 22.47$, $SD = 5.18$).

Results

Descriptive Statistics. Means, standard deviations and correlations among study variables are presented in Table 4. Examination of the standard deviations in Table 4 indicates that many of the measures exhibited limited variance. For the BIAT, most scores (76.4%) fell between 0 and 1 resulting in a negatively skewed distribution of scores (-.49). The TAT also showed a small amount of variance, with 66.6% of scores falling between 0 and 1. A score less than 1 indicates the participant had an average of

less than 1 instance of achievement motivation imagery per story. The distribution was positively skewed (.78), which makes sense because scores cannot be less than zero.

The CRT-AM showed a range close to the full range of the scale, but still less than adequate variance. Skewness and kurtosis measures indicated a normal distribution. However, a mean of 1.97 combined with the normal distribution resulted in 54.1% of the sample scoring between -3 and +3.

The PRF showed adequate variance, and also exhibited a range that nearly matched the possible range of the scale. The distribution was negatively skewed (-.48).

The Wonderlic showed adequate variance and a large range. The lowest score was an 11, which is slightly concerning, considering that a score of 10 suggests a person is literate and we used a college sample (Wonderlic, 1999). The sample average of 22.47 is slightly higher than the normative average for the test (mean=21), but lower than the median score for someone with 2 years of college education (median=26; Wonderlic, 1999). The distribution was positively skewed (.40). As suggested by Tabachnick and Fidell (2007), the skewed measures were transformed using the square-root methodology.

Sample Differences. An independent samples *t*-test was run to check for gender differences. Given males typically score 1-2 points higher than females on the Wonderlic in samples with at least one year of college education (Wonderlic, 1999), we similarly found such a gender effect, with males scoring significantly higher on the Wonderlic than females (males $M = 23.4$, females $M = 22.0$; $t(2, 292) = 2.24$, $p < .05$, $d = .27$).

A one-way ANOVA was run to check for race differences. Given Caucasian test takers typically score 5-7 points higher than minority groups on the Wonderlic (Wonderlic, 1999), significant main effects for race were found for the Wonderlic ($F(3,$

290) = 21.19, $p < .01$; $\eta^2 = .18$), as well as the TAT ($F(3, 290) = 4.48$, $p < .01$; $\eta^2 = .04$), the CRT-AM ($F(3, 290) = 6.57$, $p < .01$; $\eta^2 = .06$), and the PRF ($F(3, 290) = 4.24$, $p < .01$; $\eta^2 = .04$). Sample sizes, means, and standard deviations are presented in Table 5. Post-hoc pairwise analyses revealed that for the Wonderlic, the Caucasian group scored significantly higher than every other group ($p < .01$) while there were no significant differences among the minority groups. For the TAT, the CRT-AM, and the PRF, the significant differences were between Caucasian and Asian participants ($p < .01$). These effects were large ($d = 0.58, 0.75$, and 0.61 , respectively).

Given the differences found between the Caucasian and Asian groups combined with the lack of differences between the Caucasian group and the other two minority groups, an additional series of independent t-tests were computed to compare the Asian group to the rest of the sample to examine whether the Asian group might need to be considered an outlier population.

The Asian group was found to score significantly lower than the rest of the sample on the TAT ($t(2, 260) = 2.52$, $p < .05$; $d = 0.49$), the CRT-AM ($t(2, 260) = 3.47$, $p < .01$; $d = 0.64$), the PRF ($t(2, 260) = 3.10$, $p < .01$; $d = 0.57$), and the Wonderlic ($t(2, 260) = 3.13$, $p < .01$; $d = 0.56$). These findings point towards treating the Asian group as separate from the rest of the sample. The differences in Wonderlic scores were expected, however, the other three measures were not anticipated to have differences by race. Previous meta-analytic research has found that most personality scales showed negligible differences by race (Foldes, Duehr, & Ones, 2008). Even when differences were found at the facet level for Achievement, they were in the direction that Asians scored higher than Caucasians.

I suspected that there might be another issue at play contributing to group differences. While collecting these research data, I observed that many of the Asian students appeared to speak English as a second language. Also, anecdotally the TAT raters commented that many of the stories were written in “broken English.” Closer examination of the stories written by the Asian participants revealed that many of them could be described in such a manner. The entire dataset was then re-examined by a TAT rater who was blind to the participant race. The rater identified any stories demonstrating sentence and grammar structure that indicated the participant might struggle with the English language (referred to as the ESL group). Of the 38 Asian participants, 37 were coded as being ESL. In addition, 4 Caucasian participants and 3 participants who indicated their race as “Other” were coded as being ESL, for a total of 44 ESL participants.

With the 44 ESL participants removed, the independent samples *t*-test was rerun to check for gender differences. The Wonderlic remained the only measure exhibiting a gender effect, with males scoring significantly higher than females (males $M = 24.6$, females $M = 22.4$; $t(2, 238) = 2.24$, $p < .05$, $d = .26$).

The one-way ANOVA to check for race differences was also rerun. The main effect for race were only found again for the Wonderlic ($F(2, 236) = 46.19$, $p < .01$; $\eta^2 = .16$). All research analyses were computed both including and excluding the ESL participants. The EFA demonstrated fewer cross-loadings when the ESL participants were removed from the sample. I surmise that the ESL students may have struggled to understand the terms presented in the personality measures, and that contributed to the significant mean differences on the measures (which, in turn, affected the regression

analyses) and the un-interpretable components on the factor analysis. Therefore, all analyses focus on the sample excluding the ESL participants. Future research should directly examine this ESL hypothesis, or consider offering parallel measures written in the participants' native language.

Correlation Analysis. To test Hypotheses 1-6, refer to the correlation matrix in Table 5. Hypotheses 1-3 proposed that the implicit measures (the TAT, BIAT and the CRT-AM) would be significantly, positively correlated with one another. These hypotheses were not supported, as the three measures had zero or near zero correlations (TAT to BIAT $r = .00$, TAT to CRT-AM $r = .00$, BIAT to CRT-AM $r = -.03$).

Hypotheses 4 and 5 proposed that the TAT and the BIAT would not be significantly correlated with the explicit measure of achievement motivation (PRF). The TAT was not significantly correlated with the PRF ($r = .03$). However, the BIAT and the explicit measure were found to have a small, significant correlation ($r = 0.14, p < .05$). No specific hypothesis was presented for the correlation between the CRT-AM and the PRF, and instead it was proposed as a research question. The correlation was non-significant ($r = .07$).

Although not hypothesized, the cognitive ability measure was included because the CRT-AM has been found to correlate with mental ability (Bing et al., 2007). The same was found in this study, as the two had a moderate significant correlation ($r = 0.30, p < .01$). It should also be noted that the cognitive ability measure was positively correlated with the TAT ($r = 0.15, p < .05$).

Factor Analysis. A principal axis factor analysis was conducted on the five measures. The number of factors was determined based on eigenvalues and the scree test

(Cattell, 1966). The initial solution yielded eigenvalues of 1.42, 1.09, 1.00, 0.83, and 0.65, suggesting a three component solution might be interpretable. The three component solution was examined using a promax rotation. The first factor was defined by the CRT-AM (0.85) and the cognitive ability measure (0.72). The second factor was defined by the BIAT (0.83) and the PRF (0.67). The third factor was defined by the TAT (0.97). No cross-loadings exceeded 0.24. This three-factor pattern suggests that the CRT-AM converged with the cognitive ability measure, the BIAT measure converged with the PRF (the explicit measure), while the TAT stood alone on its own factor.

It should be noted that the inter-correlations between the measures are low, or in some cases near zero, and moderate to large inter-correlations are mathematically required for factor analysis – the absence of such will result in a solution with nearly as many components as there are variables. Therefore, interpretation of all the factor analyses should keep this consideration in mind.

Discussion

The current findings contribute to the body of research on implicit and explicit achievement motivation by examining the relationship between the ‘old school’ TAT and two ‘new school’ implicit measures (the BIAT and the CRT-AM), as well as the relationship with an explicit measure (the PRF).

It was hypothesized that the three implicit measures would be significantly positively correlated with one another, but those hypotheses were not supported. A recently published study (Ziegler, Schmukle, Egloff & Bühner, 2010) examined the relationship among three implicit achievement motivation measures: an IAT, a picture-story exercise, and German latency-based measure called the Objective Achievement

Motivation Test (Schmidt-Atzert, 2004). Zeigler et al. (2010) found non-significant correlations near zero among the implicit measures, which is consistent with the current research. They also performed a confirmatory factor analysis based on the hypothesis that all three measures comprised one construct, and were unable to establish model convergence. The current research found that the three implicit measures loaded on separate factors. In contrast to these findings, Sheldon and colleagues (2007) found that the two implicit measures (TAT, IAT) loaded on the same factor.

The current findings and those of Zielger and colleagues (2010) suggest that the implicit achievement motivation measures do not appear to represent one construct. All three measures utilized in the current research were designed to measure implicit orientations towards achievement motivation; however the methods used to assess this orientation are quite different. The TAT uses projective methods to assess implicit *motives*, the BIAT uses response latencies to assess implicit *attitudes*, and the CRT-AM uses conditional reasoning to assess implicit *cognitions*. Based on the current research, it would appear that the differences in approach lead to differences in interpretation of achievement motivation, and therefore measure different aspects of achievement motivation.

It should be noted that the variance in these measures was low, which also would make it difficult to find any significant inter-correlations. However, Ziegler et al. (2010) had similarly small variance in their IAT ($M = 0.37$, $SD = 0.26$) but larger variance in their other measures, and still did not find significant inter-correlations. Given that this lack of correlation among the implicit measures has only been found twice, future

research should continue to utilize multiple implicit measures and examine their relationship to one-another.

Another limitation to this research was that the internal consistency reliability for the CRT-AM was low. While this study was being conducted, a revised version of this measure was developed (Form N; Kim, Lee, Toker & James, 2011). The number of items in the revised form increased from 15 items to 24, and now contains more items written in everyday life and workplace settings (as opposed to academic settings), and features simplified item wording and fewer item answer choices. The revised form also exhibited increased internal consistency reliability and greater variance compared to the previous version. Future research should utilize this revised form to examine the relationships between implicit and explicit measures of achievement motivation.

Another potential limitation is that the current research utilized the Brief Implicit Achievement Motivation measure (BIAT), while the majority of the previous research in this area has used the full-length measure. The BIAT has been shown to be psychometrically equivalent to the IAT (Sriram & Greenwald, 2007), but future research might benefit from using the full IAT to make comparisons to other research.

The only significant correlation within the achievement motivation measures was between the explicit measure (the PRF) and the BIAT, although this correlation was small ($r = .14$). This relationship was also observed in the factor analysis, where the PRF and IAT loaded on the same factor. These findings are inconsistent with previous achievement motivation research that found no significant correlation between the IAT and an explicit measure (Brunstein & Schmitt, 2004; Ziegler et al., 2010). However, previous meta-analytic research has found correlations to be significant but small

between IAT and self-report measures for general personality traits ($r = .17$, Greenwald, et al., 2009) and Conscientiousness ($r = .18$, Grumm & von Collani, 2007; $r = .22$, Steffens & Konig, 2006). Additional research needs to be done in the topic area of achievement motivation to allow for a meta-analysis of this domain.

The other significant correlations observed were with cognitive ability. Both the TAT ($r = .15$) and the CRT-AM ($r = .30$) correlated with the Wonderlic. The third implicit measure (the BIAT) did not correlate with cognitive ability. All three measures utilized in the current research were designed to measure implicit orientations towards achievement motivation; however the methods used to assess this orientation are quite different. While the cognitive demands in each test might differ, the influence of cognitive ability is observed with two of the measures and therefore raises the question of construct validity for the implicit tests.

Between the factor analysis results and the correlational findings, it would appear that the differences in approach lead to differences in interpretation of achievement motivation, and therefore measure different aspects of achievement motivation. Or it could be that another variable moderates the relationship between the implicit measures. Either way, the findings point to the conclusion that the implicit measures lack construct validity.

This study examined the relationship between the ‘old school’ implicit predictor TAT and the ‘new school’ implicit predictors (BIAT and CRT-AM), along with an explicit measure (the PRF) and cognitive ability. This is an important first step, but as Banse and Greenwald (2007) point out, “it would be extremely informative to simultaneously use old and new school implicit measures to predict motive-relevant

behavior such as respondent and operant achievement behavior that has been previously found to be differentially related to explicit and implicit motive measures,” (p. 374).

Study 2 aims to address this issue.

Study 2: Integrating Implicit and Explicit Achievement Motivation

One way to understand the achievement motivation domain is to establish if there are any statistical and theoretical communalities among the three implicit measures, the explicit measure, and a cognitive ability test. An additional approach is to answer the call from Banse and Greenwald (2007) by using a ‘new school’ and ‘old school’ implicit measure to predict achievement behavior. Since implicit and explicit cognitions are theoretically distinct, research focusing on only one type of cognition may lack the predictive power that it would have obtained if both types had been used. There is growing appreciation for the theoretical and practical value that both implicit and explicit social cognitions have in helping to explain behavior (Bing, LeBreton, Davison, Migetz, & James, 2007; Greenwald & Banaji, 1995; Koestner, Weinberger, & McClelland, 1991; Schultheiss et al., 2009; Thrash, Elliot, & Schultheiss, 2007; Westen, 1991; Winter et al., 1998).

The current research examines how three implicit measures – the “old school” TAT, and the “new school” BIAT and CRT-AM – combine with a traditional self-report explicit measure to predict achievement behavior. A brief review of previous research integrating implicit and explicit personality measures will be provided next. Then predictions for the current research will be presented.

Previous Research Integrating Implicit and Explicit Achievement Motivation

Considerable research has been conducted comparing implicit and explicit measures of personality (Brunstein & Maier, 2005; Brunstein & Schmitt, 2004; Greenwald & Banaji, 1995; Greenwald et al., 2009; Grumm & van Collani, 2007; Hogan, 1991; King, 1995; McClelland, Koestner & Weinberger, 1989; Mischel & Shoda, 1995; Schultheiss & Brunstein, 2001; Schultheiss, Yankova, Dirlikov & Schad, 2009; Sheldon et al, 2007; Spangler, 1992; Steffens & Konig, 2006; Thrash, Elliot & Schultheiss, 2007; Winter, Stewart, Klohnen & Duncan, 1998) and found a growing consensus that they are distinct but related motivational systems. A smaller subset of this research has focused specifically on the motive of achievement motivation. What follows is a summary of the existing research comparing implicit measures of achievement motivation using the TAT or IAT and an explicit measure.

Recall that in 1989, McClelland and colleagues wrote the first article to introduce and discuss the difference between ‘implicit’ and ‘explicit’ measures. They summarized research that implicit and explicit measures of the same motive seldom correlate significantly with each other and often relate to different classes of behavior. Implicit motives appear to be better at predicting behavioral trends over time, while self-attributed (or explicit) motives predict immediate choices (McClelland, 1980).

McClelland and colleagues (1989) also noted that individual differences in implicit and explicit motives predict behavior only in the presence of appropriate *incentives*. They noticed in the literature that implicit motives are mainly activated by incentives experienced in doing something, whereas self-attributed motives were usually activated by explicit, often social, incentives such as rewards, prompts, expectations, or

demands. This observation led them to make the distinction between *social* incentives and *activity* incentives.

Social incentives are characteristics of situations such as rewards, prompts, expectations, demands, and norms that come from outside the task itself. Social achievement incentives include challenging goals set by an experimenter (McClelland, Atkinson, Clark & Lowell, 1958), achievement-oriented instructions in an experiment (McClelland, Clark, Roby & Atkinson, 1958) and achievement work norms (Spangler, 1992). Individuals who score high on implicit achievement motivation have shown to be more influenced by salient external social demands (McClelland, Koestner & Weinberger, 1989).

Activity incentives, on the other hand, are characteristics of the task itself. The person high in implicit achievement motivation is reinforced by performing the task. Activity achievement incentives include moderate task risk (Atkinson, 1957; Atkinson & Feather, 1966; Atkinson & Litwin, 1960; Weinstein, 1969), task contingency (Raynor, 1969, 1970), achievement work content (McClelland, Atkinson, Clark & Lowell, 1958) and time pressure (McClelland et al., 1989). It is relatively well established (McClelland, 1985) that individuals high in implicit achievement motivation do better at challenging tasks than those low in implicit achievement motivation because such tasks provide the maximum incentive of feeling good from doing something better. Conversely, those same individuals often do worse when the challenging incentive isn't present in the task, that is, when the task is very easy (Atkinson, 1958).

McClelland and colleagues (1989) surmised that *social* incentives interact with self-attributed motives but not implicit motives, while *activity* incentives interact with

implicit motives but not self-attributed motives. Said another way, these results suggest that implicit motives are more likely to be aroused by *activity* incentives, whereas explicit motives are more likely to be aroused by explicit *social* incentives or demands. This incentive structure is theoretically important because it may help to explain other differences that have been found between the two types of motives and lead to a more comprehensive understanding of the nature of human motivation.

Spangler (1992) meta-analyzed 105 randomly selected empirical research articles using questionnaire and TAT measures of achievement motivation. Neither questionnaires nor the TAT predicted achievement behavior well in the absence of appropriate incentives. The TAT in the presence of *activity* incentives predicted behavior well, and questionnaires in the presence of *social* incentives strongly predicted behavior.

While these findings build a strong case for the importance of considering incentives, it should be noted that this research relied almost exclusively on post-hoc interpretation of previous research. Relatively few attempts have been made to systematically vary such factors within one study (cf. Nicholls, 1984). Brunstein and Maier (2005) recently made such an attempt (using the TAT and an explicit measure of achievement motivation). They manipulated the incentive present by altering the task instructions given to participants. In the *ego-focused* setting (*social* incentive), participants were told that college students who are successful in their education achieve high performances on mental concentration tasks, and that high performance on the task was indicative of future career success. In the *task-focused* setting (*activity* incentive), no mention of future career success was made. A manipulation check found that participants

in the *ego-focused* setting were more tense and less relaxed than those in the *task-focused* setting.

In addition to setting incentive, Brunstein and Maier (2005) examined the relationship between task feedback and achievement motivation. Feedback is an important element in achievement motivation research because it allows the participant to understand their performance level. There are several ways to present feedback information. In the aforementioned study, bogus task performance feedback was provided to participants via two methods: self-referenced and norm-referenced. *Self-referenced* feedback informed them about how their level of performance on a concentration task compared with how they had performed in previous test blocks. *Norm-referenced* feedback informed them how their current and past level of performance compared with a (fictitious) social reference group. Each type of feedback was presented in two conditions: *ascending* (improved performance) or *descending* (decreased performance). In summary, each participant received two types of feedback (self-reference and norm-referenced) after every test block, and each type of feedback could be ascending or descending.

In addition to the criterion variable *task performance*, Brunstein and Maier (2005) also measured *task continuation* by asking participants if they wanted to continue the concentration test task after a specified number of test trials, or if they preferred to switch to a task unrelated to achievement (additional picture story exercises). To ensure a socially neutral situation, participants were told that both types of data were needed so there was no preference on the part of the experimenter as to which activity they chose. Measuring *task continuation* provides an important additional aspect of behavior because

it is *decisional* in nature (as opposed to performance, which measures *effort*). It also allows for individuals to withdraw from the performance-oriented task situation in favor of a less stressful task without fear of negative social judgments by the experimenter. This is an important factor because individuals who are low in achievement motivation often prefer to avoid demanding tasks, but will continue when they think that withdrawal would be socially undesirable (James, 1998).

By manipulating setting incentive and feedback, Brunstein and Maier (2005) made several interesting findings. Overall, the only time that implicit motives (measured via the TAT) and explicit motives interacted was to predict *task performance* in the *ego-focused* setting. Explicit motives alone predicted *task continuation*, in both the *task-focused* and *ego-focused setting*. Implicit motives alone predicted *task performance* in the *task-focused* setting.

Brunstein and Schmitt (2004) conducted a similar study but used the IAT as the implicit measure of achievement motivation. This study manipulated the presence or absence of feedback. The feedback was only presented in *self-referenced* format, and included both *positive* and *negative* feedback. The study did not manipulate the type of setting incentive, but rather used a procedure identical to that of the *task performance* setting from the TAT research. The outcome variables were *task performance* (identical to the TAT research) and *task enjoyment*, measured by four self-report items (“I enjoyed working on this test,” “This test was quite challenging,” “Performing this test was boring,” and “Working on this test was a waste of time”).

The researchers found that participants’ *task performance* was significantly better and *task enjoyment* was significantly higher in the presence of feedback compared to the

no-feedback condition. They found that implicit achievement motivation (measured via the IAT) predicted increased *task performance* in the presence of feedback, but not in the no-feedback condition. Explicit achievement motivation predicted *task enjoyment* in the presence of feedback, but not in the no-feedback condition.

Taken together, the studies by Brunstein and Maier (2005) and Brunstein and Schmitt (2004) show the importance of the presence of feedback, and that results vary based on the type of setting incentive. Overall, the only time that implicit motives (measured via the TAT) and explicit motives interacted was to predict *task performance* in the *ego-focused* setting (Brunstein & Maier, 2005). Explicit motives alone predicted *task continuation*, in both the *task-focused* and *ego-focused setting* (Brunstein & Maier, 2005) and *task enjoyment* (Brunstein & Schmitt, 2004). Implicit motives alone predicted *task performance*, and only in the *task-focused* setting (Brunstein & Maier, 2005; Brunstein & Schmitt, 2004).

These findings are inconsistent with research conducted by Bing and colleagues (2007) comparing the Conditional Reasoning Test of Achievement Motivation (CRT-AM) and an explicit measure. In the first study, the researchers presented undergraduate participants with cryptoquote puzzles under severe time constraints (a *task-focused* setting) where task withdrawal was not feasible. As the puzzles were unsolvable (a fact unknown to the participants) it was not possible to measure performance so the criterion measures were *effort* and *persistence*. They found that implicit and explicit achievement motivation interacted to predict the outcome measures, and that both implicit and explicit measures exhibited a significant curvilinear effect. This result contradicts previous research in that the interaction was found in a *task-focused* setting as opposed to an *ego-*

focused setting. However, the criterion measures were *effort* and *persistence*, not *performance* as with previous research, not allowing for a direct comparison. The difference in findings could be due to the incongruent criterion measures.

Bing and colleagues (2007) also tested their model under considerable less time pressure in two additional studies. They found that in an undergraduate management course (an *ego-focused* setting), *performance* measured via course grade was predicted by both implicit and explicit achievement motivation, but the interaction was not significant. This finding was replicated in a second sample using working adults competing to become trainees in a leadership development program at a large utility company; *performance* measured via assessment center in-basket exercise was predicted by both implicit and explicit achievement motivation, but the interaction was not significant. The results of these studies are inconsistent with previous research that found significant interactions under ego-focused conditions (Brunstein & Maier, 2005).

Bing and colleagues (2007) predicted the difference in findings across their studies and attributed them to the variation in time pressure and option to withdraw from the task. This illustrates important differences between research using experimental tasks compared to “real world” measures taken over time. The current research uses a time-pressured experimental task similar to that employed by Brunstein and Maier (2005) and Brustein and Schmitt (2004).

The current research will increase our understanding of how the BIAT, TAT and CRT-AM are related by comparing their abilities to predict achievement outcomes under identical conditions.

Summary

The research done by Brunstein and Maier (2005), Brunstein and Schmitt (2004, and Bing and colleagues (2007) strongly supports McClelland and colleagues' (1989) claim that implicit and self-attributed motives to achieve represent two orthogonal psychological needs that respond to specific standards of excellence and predict different types of behavior. The Brunstein and Maier (2005) study also supports and expands upon the findings of Spangler (1992) that incentives are necessary to elicit achievement behavior, and that implicit and explicit measures predict differently depending on the type of incentives present. This combination of findings strengthens the importance of integrating implicit and explicit measures of achievement motivation, and using different types of incentives to capture the full range of prediction.

To date, the CRT-AM has only been used in three studies (Bing et al, 2007). The researchers note that social incentives were not present in the unsolvable puzzle task. They argue that since academic performance is related to future salary (Roth & Clarke, 1998) and organizational decisions were made on assessment center performance, both settings should have had extrinsic social incentives. They add that future research “should test this speculation more directly by varying the socially laden nature of rewards for the same group of study participants” (p. 380). The CRT-AM also has not been used under any type of feedback condition.

The present study aims to increase understanding of the relationship between the TAT, BIAT, and CRT-AM by using all three measures and an explicit measure in an experimental setting that manipulates both incentives and feedback. By using all three measures in identical conditions with the same criterion measures direct comparisons can be made between them.

Current Research Integrating Implicit and Explicit Achievement Motivation

The current research examines how three different implicit measures of achievement motivation combine with an explicit measure to predict achievement-related behaviors. The achievement-related behaviors are *task performance* and *task continuation*. *Task performance* is a popular criterion measure for most organizational research and is also prevalent in the achievement motivation research so it is a fitting behavior to measure. *Task continuation* is an appropriate criterion measure for achievement motivation because it taps persistence; some personality prototypes should be more likely to persist at challenging tasks, while others should prefer to remove themselves from the situation when possible.

Aspects of the task situation are also manipulated. Recall that McClelland and colleagues (1989) noted that individual differences in implicit and explicit motives predict behavior only in the presence of appropriate *incentives*. As such, the current research examines both a *task-focused* setting and an *ego-focused* setting.

Task feedback is another variable that is examined. Feedback is important because personality prototypes should react differently to positive or negative appraisals of their performance. Accordingly, the current research manipulates feedback source (*self-referenced* and *norm-referenced*) and direction (*positive* or *negative*).

For purposes of ease of explanation, the research is broken apart into two sub-studies. The first study (Study 2a) is the *task-focused* setting, and the second study (Study 2b) is the *ego-focused* setting. This allows for the research results to be discussed in terms of a 2 (self-referenced feedback: positive or negative) X 2 (norm-referenced feedback: positive or negative) factorial. At the conclusion, a joint analysis of the data

obtained from both studies is conducted. By comparing results from both studies, the current research is able to examine how setting affects the predictions of the integrated model of achievement motivation on behavior.

Study 2a: Task-focused Setting

Task involvement arises in situations in which participants are presented with tasks that offer moderate challenges, but do not exhibit social-extrinsic pressures to do well (Nicholls, 1984). Under such relatively neutral conditions, individuals strive to master the task and feel pride in success resulting from effort.

Before feedback is given, predictions can be made on *baseline performance* levels as a measure of general performance. Recall that implicit motives are better at predicting behavior over time, especially in the presence of activity (*task*) incentives (McClelland, 1980). It is therefore hypothesized that implicit achievement motivation (AM) will predict baseline performance.

Hypothesis 1. There will be a significant main effect for implicit achievement motivation on baseline performance.

Once feedback is given, *task performance* can be established. In a task-focused context, the implicit motive to achieve is linked with self-improvement concerns and therefore is responsive to self-referenced standards of excellence (Breckler & Greenwald, 1986; Brunstein & Maier, 2005; Koestner & McClelland, 1990; Thrash & Elliot, 2002). Therefore, *self-referenced* feedback is expected to affect *task performance*, but no significant relationships are predicted for *norm-referenced* feedback.

Failure has a stronger effect than success on the arousal of achievement states (McClelland et al., 1953) so it is expected that *negative* self-referenced feedback will

increase task performance, specifically in those with high implicit achievement motivation. *Positive* self-referenced feedback is not expected to affect task performance.

Hypothesis 2. In the task-focused setting, there will be a significant interaction between implicit AM and self-referenced feedback for task performance.

In addition to task performance, *task continuation* is another important outcome variable. Recall that explicit achievement motivation is better at predicting immediate choices (McClelland, 1980). The decision to persist or quit a given task is affected by ability-related certainty (or uncertainty) obtained by comparing one's own performance to the performance of others (Trope, 1986). Therefore, *norm-referenced* feedback is expected to affect *task continuation*, but no significant relationships are predicted for *self-referenced* feedback.

Negative feedback violates the positive view that individuals with high explicit AM have about their intellectual capability and creates a state of uncertainty, at least with respect to the task at hand (Trope, 1983). It is expected that *negative* norm-referenced feedback will predict task continuation, especially in individuals who are high in explicit AM. *Positive* norm-referenced feedback is not expected to affect task continuation.

Hypothesis 3. In the task-focused setting, there will be a significant interaction between explicit AM and norm-referenced feedback for task continuation.

The general principals guiding these predictions is that in a task-focused setting, *self-referenced* feedback is expected to affect *task performance*, while *norm-referenced* feedback is expected to affect *task continuation* (Brunstein & Maier, 2005). Implicit AM is better at predicting behavioral trends over time and self-attributed (explicit) AM is better at predicting immediate choices (McClelland, 1980).

Method

Participants. Participants are the same as Study 1.

Experimental Design. The experimental design was a 2 (self-referenced feedback: positive or negative) X 2 (norm-referenced feedback: positive or negative) within-persons factorial. The directions of the two types of feedback were varied separately, thus yielding four combinations. Participants were randomly assigned to conditions. Each condition contained at least 30 participants, with the largest condition containing 43 participants.

Experimental Task. The experimental task was modeled after the methodology used by Brunstein and Maier (2005). Using the same task allows for easier comparison of results across studies. The task is based on Brickenkamp and Zillmer's (1998) d2 Test of Attention, a mental concentration test designed to assess individual differences in perceptual speed and selective attention. Effective performance on this task requires a great deal of mental effort, making it a suitable instrument to assess the effects of motivational variables (Brunstein & Gollwitzer, 1996). The d2 Test is traditionally administered via paper-and-pencil, but administering it via computer allowed for integrating feedback mid-task. What follows is a summarized version of the procedure.

Stimulus materials. The Inquisit (Version 3.0; 2008; Millisecond Software) software package for stimulus presentation and data collection was used. Responses were made using a two-key response pad with millisecond response registration. The letters *d* or *p* were displayed at the center of the computer monitor. The letters were accompanied by one or two vertical dashes placed on the top or at the bottom of the respective letter. Some examples are depicted below (although only one letter is presented at a time):

'	"	'	'	"	"	'	'
d	p	d	p	p	d	p	d
"	'	"	"			"	'

Participants were instructed to press one key if a *d2* (i.e., a *d* having two dashes) appeared on the screen and to press the other key if a non-*d2* (i.e., a *d* having more or fewer than 2 dashes or a *p* no matter how many dashes it has) appeared on the screen. Participants completed a block of practice trials to familiarize themselves with the task. All participants were instructed to perform as quickly and accurately as they could.

A “block” was made up of 20 *d2*s and 20 non-*d2*s, presented in random order. Participants completed one test block. They then proceeded on to the experimental task, consisting of two baseline blocks and six test blocks. Blocks 1 and 2 determined response speed in the absence of feedback (*baseline performance*). Blocks 3 through 8 incorporated feedback. Each test block took less than one minute to complete.

Feedback manipulation. Participants received false feedback on their performance. Each participant was provided with both self-referenced and norm-referenced feedback. The feedback was presented in two separate diagrams (see Appendix C). The order of the two diagrams was counterbalanced across participants. Each diagram was a graph of task performance; block number was plotted on the horizontal axis and performance scores were plotted on the vertical axis. The first pair of diagrams was presented just after Block 2, following the test instructions (described next). These diagrams refer to the participant’s performance during Blocks 1 and 2. After each additional test block another data point was added to the graph.

Self-referenced diagrams were scored with points. Participants were told that the number of points they earned depended on both the speed and accuracy of their response, however they didn’t know the scaling of the test. Norm-referenced diagrams were scored with percentile rank. Participants were told that these scores would inform them about

the percentage of other students who had scored at or below his or her own performance score.

Test instructions. After completion of the baseline blocks (Blocks 1 and 2) participants received additional information about the task. The experimenter made every effort to create a neutral but serious testing atmosphere. Next, the instructions explained that receiving feedback was integral to the task. Feedback allowed participants to monitor their performance on each block. Participants were shown sample diagrams of self-referenced and norm-referenced scores and their meaning. The instructions explained that changes in performance would not necessarily match changes in percentile rank (e.g., an improvement in performance will sometimes fail to translate into a higher percentile rank because other students could have improved to an even greater extent). The instructions also noted that most participants get better with practice and the software program accounts for this fact and adjusts performance scores accordingly (e.g., an improvement in one's individual performance will occasionally fail to translate into a higher performance score, because the increase in speed was not enough to make up for the practice effect). This information was conveyed to increase the plausibility of negative feedback patterns.

After the six test blocks, the instructions indicated that participants could either continue with the test task or switch to a different task. The alternative task presented a non-achievement-related activity. The instructions explained that there were additional pictures similar to those presented at the beginning of the study (the picture story exercise) that were out of date and needed additional story data. Before responding to this message, participants were asked to appraise their performance. Then they were asked to

decide if they wanted to continue with the test task or wanted to switch to the picture story task. Participants were required to indicate their choice by pressing one of two response keys. After making their choice, participants were then asked if they felt any pressure to continue with the concentration task. Lastly, they were shown a screen that fully debriefed them on the deception present in the research and gave them the opportunity to have their data removed from the research sample if they felt uncomfortable. As mentioned earlier in Study 1, seven students elected to be excluded from the study.

Predictor Measures. The measures were those used in Study 1 (the Conditional Reasoning Test – Achievement Motivation, the Brief Implicit Association Test, a TAT-type Picture Story Exercise, the Personality Research Form, and the Wonderlic Personnel Test – Quicktest).

Cognitive ability was treated as a control variable as it has been shown to correlate with the CRT-AM (Bing et al., 2007) and with performance on the d2 Test of Attention (Brickenkamp & Zillmer, 1998) in previous research.

Criterion Measures. The following criterion measures were used.

Task performance. In the study conducted by Brunstein and Maier (2005), two means were computed for each participant on the basis of the reaction times (RTs) recorded during the two baseline blocks (Blocks 1 and 2) and the six test blocks (Blocks 3-8), respectively. They “supposed that residual changes in response latency from the baseline to the test phase should provide a sensitive measure of the effects of different types and patterns of feedback on task-related efforts” (p. 210).

Brunstein and Maier (2005) defined task performance as the amount of time taken to complete the blocks (either Blocks 1 and 2 or Blocks 3-8) divided by the total number of items across blocks. I believe that this approach is not a true measure of *performance*, but rather a measure of *effort* (despite the fact that it is referred to by Brunstein and Maier as task performance) because it does not take into account errors of omission or commission. Errors of omission occur when relevant items (*d2s*) are not indicated (i.e., the participant presses the key associated with non-*d2s* when a *d2* is presented on screen). Errors of commission occur when irrelevant items (non-*d2s*) are indicated (i.e. the participant presses the key associated with *d2s* when a non-*d2* is presented on screen).

The current research accounts for errors by providing an error penalty of 500ms per error, which has been found to be a successful strategy (Greenwald, Nosek & Banaji, 2003). The current study also examined performance by treating test blocks as a repeated measure. No significant results were found so only the test block average is discussed.

Task continuation. Task continuation was measured in terms of a participant's decision either *to quit the test task* (-1) or *to continue the test task* (1).

Manipulation Checks. After completing Block 8, participants were asked to indicate on a 5-point scale how satisfied they felt with their performance. They were also asked to recall whether their scores increased or decreased (task score recall), and whether their percentile rank increased or decreased (percentile rank recall). Finally, they were asked to indicate on a 5-point scale if they believed the feedback was accurate (belief of accuracy). These questions served as a check on the effectiveness of the feedback.

In addition, participants were asked to indicate on a 5-point scale how “tense” they felt at that point in time and how “relaxed” they felt at that moment. They were also asked to indicate on a 5-point scale how much they agreed with the statements: “High performance on mental concentration tasks is related to success in college,” and “High performance on mental concentration tasks is a predictor of career success.” These ratings served to examine the impact of different instructions provided in Study 2a and 2b on participants’ affective state.

Results

Notes on Data Analyses. To account for individual differences in general response speed, participants’ baseline performance was treated as a covariate in the analysis. Bing and colleagues’ (2007) integrated model only allows for one implicit measure of achievement motivation to be used. As a result all analyses were completed three times, once each for the BIAT, the TAT, and the CRT-AM.

Manipulation Check. A 2 (self-referenced feedback: positive or negative) X 2 (norm-referenced feedback: positive or negative) analysis of variance (ANOVA) was computed for performance satisfaction scores and belief in accuracy to test whether there was a positive main effect for type of feedback. There were no significant findings. In the self-referenced feedback group, participants’ satisfaction scores, although not significantly different, tended to be in the direction expected, with those receiving ascending feedback tending to indicate more satisfaction than those receiving descending feedback (3.58 vs. 3.39). The scores for accuracy were nearly identical (3.32 vs. 3.30). In the norm-referenced feedback group, participants’ satisfaction and accuracy scores, although not significantly different, were in the expected direction, with those receiving

ascending feedback feeling more satisfied (3.63 vs. 3.37) and feeling that their scores were more accurate (3.46 vs. 3.18).

A chi-square test for independence was computed for task score recall and percentile rank recall to examine whether participants could remember the direction of the feedback they received. The relationship between self-referenced feedback and task score recall was significant, $\chi^2(2, N = 122) = 79.65, p < .00$. Participants in the ascending feedback condition were more likely to recall that their score had increased, while participants in the descending feedback condition were more likely to recall that their score had decreased. The relationship between norm-referenced feedback and percentile rank recall was also significant, $\chi^2(2, N = 122) = 100.45, p < .00$. Participants in the ascending feedback condition were more likely to recall that their percentile rank had increased, while participants in the descending feedback condition were more likely to recall that their percentile rank had decreased. This indicates that participants were paying attention and the feedback direction was salient enough to be noticed and remembered.

Task Performance. All continuous variables were standardized (i.e. centered and divided by their respective standard deviations) so that they were on the same scale. Feedback factors were coded 1 for *ascending* and -1 for *descending*. See Table 6 for descriptive statistics on task performance.

Hypothesis 1 was tested using a hierarchical regression analysis for *baseline performance*. In Step 1, the covariate (cognitive ability) was entered. In Step 2, the implicit and explicit measures were entered. In Step 3, the interaction term was entered.

It was hypothesized that only the implicit achievement measure would significantly predict *baseline performance* above and beyond cognitive ability.

Cognitive ability significantly predicted baseline performance, $F(1, 113) = 15.84$, $p < .001$ and accounted for 10.9% of the variance. Hypothesis 1 was not supported, as none of the implicit measures (or the explicit measure) significantly predicted baseline performance above and beyond cognitive ability. The regression was repeated without the covariate, but the implicit and explicit measures still failed to reach significance.

Hypothesis 2 was tested using a hierarchical regression analysis for *task performance*. In Step 1, both covariates (cognitive ability and baseline performance) were entered. In Step 2, both predictors (implicit and explicit AM) and both feedback factors (self-referenced and norm-referenced) were entered. In Step 3, all of the 2-way interactions were entered. This analysis was conducted for each of the implicit achievement motivation measures. Only the IAT showed significant results, and thus is discussed. None of the triple interactions, however, were significant, and are thus not reported.

The set of predictors displayed in Table 7 significantly predicted task performance, $F(2, 112) = 24.33$, $p < .00$. Entry of baseline performance and cognitive ability in Step 1 accounted for 69.7% of the variance in task performance. The entry of the predictors and feedback factors in Step 2 were not significant ($\Delta R^2 = .00$, n.s.). The entry of the 2-way interactions in Step 3 was significant ($\Delta R^2 = .04$, $p < .05$).

It was hypothesized that only the interaction between implicit AM and self-referenced feedback would be significant. An examination of the regression weights in Step 3 revealed that the interaction between self-referenced feedback and the BIAT

predicted task performance (see Figure 1). Hypothesis 2 was not supported, however, because the interaction is opposite the predicted direction. Recall that task performance was measured in milliseconds, so shorter times indicate better performance. It was expected that negative self-referenced feedback would increase task performance, specifically in those with *higher* implicit achievement motivation. Positive self-referenced feedback was not expected to affect task performance. However, actual findings were that under negative self-referenced feedback, better task performance was shown by those with *lower* implicit achievement motivation. Those with higher implicit achievement motivation performed better under positive self-referenced feedback.

A significant interaction that was not hypothesized was also found. Explicit and implicit achievement motivation interacted to predict task performance. Using the procedures recommended by Cohen et al. (2003), the pattern of this interaction is presented in Figure 2. Participants with high implicit achievement motivation performed better when they also had high explicit achievement motivation. Participants with low implicit achievement motivation performed better when they also had low explicit achievement motivation. These results provide evidence that Congruent AMs and FFs performed better than the incongruent personality prototypes.

Task Continuation. Hypothesis 3 was tested using a polynomial logistic regression for *task continuation*. First, all continuous variables were standardized (i.e. centered and divided by their respective standard deviations). Feedback factors were coded 1 for *positive* and -1 for *negative*. Task continuation was coded 1 for *continue* and -1 for *quit*.

In Step 1, the covariate (cognitive ability) was entered. In Step 2, both predictors (implicit and explicit AM) and both feedback factors (self-referenced and norm-referenced) were entered. In Step 3, all of the 2-way interactions were entered. This analysis was conducted for each of the implicit achievement motivation measures. No significant results were found for any of the measures. Hypothesis 3 was not supported. Further investigation revealed that 91% of the sample chose to continue with the test task, so there was not enough variance in task continuation to examine differences.

Discussion

Brunstein and Maier (2005) found that implicit and explicit motives operate in parallel in a task-focused setting, such that they combine with different standards of excellence (self- vs. other-related feedback) to account for different types of behavior (effortful performance vs. self-reflected choices). Brunstein and Schmitt (2004) reinforced the importance of feedback in arousing achievement motivation. Bing and colleagues (2007) illustrated the difference between time-intensive experimental settings and long term “real world” settings. The current research employs all of these key factors to compare three implicit measures and how they interact with an explicit measure to predict achievement outcomes.

It was expected that, consistent with previous research, task performance would be predicted by implicit achievement motivation, and affected by self-referenced feedback. This interaction was found with the BIAT, albeit opposite to the predicted direction. It was expected that those with high implicit achievement motivation would perform better under negative self-referenced feedback because failure has shown to have a stronger effect than success on the arousal of achievement states (McClelland et al.,

1953). However, actual findings were that under negative self-referenced feedback, better task performance was shown by those with *low* implicit achievement motivation. It could be that the negative feedback was a stronger motivation for these individuals because a high fear of failure combined with a demanding task where withdrawal was not socially acceptable led to increased levels of effort so that they could avoid the negative feelings associated with performing poorly.

Recall that task performance was computed by taking the total latency time divided by the number of stimulus items, but also included a 500ms penalty for errors. This definition was used so that performance would measure a combination of speed and accuracy. In order to better understand the current findings, the regression analyses were also repeated using only speed and only accuracy. There were no significant findings for speed or accuracy. That means that the interaction observed between the BIAT and norm-referenced feedback was not a result of increased speed at the expense of accuracy, or increased accuracy at the expense of speed, but a slight adjustment of each to demonstrate improved performance. Previous research utilized the TAT to measure implicit achievement motivation, while this interaction was demonstrated only with the BIAT in the present research. It is possible that the relationship is opposite the expected direction due to theoretical differences in the TAT and BIAT, but because the interaction was not demonstrated (or disputed) with the TAT or the CRT-AM, this research is unable to test this notion.

It is also possible that the negative feedback had a stronger effect in arousing unpleasant feelings in those with low implicit achievement motivation, than in arousing the desire of high implicit AMs to demonstrate their abilities in the face of poor

performance. So another interpretation could be that the task was not perceived by those with high achievement motivation as being challenging enough to arouse achievement motives.

Future research should continue to use multiple implicit measures to determine if this interaction is dependent on the particular measure used, or a result of the direction of the feedback.

An additional BIAT interaction was observed that was not predicted. Explicit and implicit achievement motivation interacted to predict task performance. Participants with high implicit achievement motivation performed better when they also had high explicit achievement motivation. Participants with low implicit achievement motivation performed better when they also had low explicit achievement motivation. Said another way, participants with congruent personality prototypes (Congruent AM and Congruent FF) demonstrated better task performance than those with incongruent personality prototypes (Hesitant AM and AM Pretender).

Previous research is mixed with regards to interactions between implicit and explicit achievement motivation. Research conducted by Brunstein and Schmitt (2004) and Brunstein and Maier (2005) found that the only time that implicit motives (measured via the TAT) and explicit motives interacted was to predict task performance was in an ego-focused setting (Brunstein & Maier, 2005). However, research conducted by Bing et al. (2007) using the CRT-AM found that the two did interact to predict effort and persistence in a task-focused setting.

The interaction observed in the current research using the BIAT is consistent with the interaction observed using the CRT-AM. Oddly enough, the interaction was not

significant for the CRT-AM in the current research (or with the TAT). The BIAT was the only implicit measure to demonstrate significant interactions in the task-focused setting (although one of those was in the opposite direction predicted). Future research should continue to use multiple implicit measures to see if the relationships observed in previous studies are replicable and stable across measures and tasks. The findings of the current research have called into question the construct validity of implicit measures. The inconsistencies across research could be another indicator that not all implicit measures are equally effective in predicting performance on a particular task.

The other criterion variable of interest in the current research was task continuation. Unfortunately, nearly all of the participants (91%) chose to continue with the test task, so there was not enough variance in task continuation to test for any differences. It's unclear why participants chose the d2 task in larger numbers than the picture story exercise. Closer examination of the 9% of participants who did choose the TAT revealed no differences in scores on any of the predictor measures, manipulation check measures, or the performance measure. One possible explanation could be the length of time it took to complete each task. In the current research the TAT task was designed so that participants were required to spend 4 minutes writing about each story, for a total task time of around 20 minutes. The duration of the performance task was dependent on each participant's ability, but the total time was between 4 and 8 minutes. It is possible that participants preferred to continue with the performance task because they realized that it was the faster of the two options. Future research should consider the variable of task length when studying the criterion variable of task continuation.

A limitation of this study is that the task-focused setting is a relatively neutral atmosphere. Study 2b examines how ego-arousing instructions might alter the motive-behavior relationship.

Study 2b: Ego-Focused Setting

Ego involvement elicits the desire to demonstrate high ability relative to others (Nichols, 1984). When people engage in ego-involving activities they focus on information comparing them to other social groups, and often ignore information about how they are performing relative to their previous behavior (Butler, 1993; Jagacinski & Nicholls, 1979). As with the task-focused setting, baseline performance levels can serve as a measure of general performance before feedback is given. The hypothesis for baseline performance is the same as in the task-focused setting because the ego-focused instructions are not given until after the baseline test blocks are completed.

Hypothesis 4. There will be a significant main effect for implicit achievement motivation on baseline performance.

After baseline performance is established, feedback will be given throughout the experimental task and *task performance* will be established. Recall that McClelland (1980) concluded that explicit motives are better at predicting behavior over time. However, previous research has found that, in an ego-focused setting, implicit achievement motivation also predicts. Brunstein and Maier (2005) found that the measures interact to predict performance. Bing and colleagues (2007) did not find a significant interaction, but both measures significantly predicted performance. Since the current research uses a time-pressured task similar to that employed by Brunstein and

Maier (2005), it is expected that implicit and explicit achievement motivation will interact to predict *task performance*.

Given the ego-focused setting, participants should be focused on the competitive aspect of the situation. When people engage in ego-involving activities they often focus on social comparison information and ignore information about how they perform relative to their previous performance (Butler, 1993). Accordingly, *norm-referenced* feedback is expected to affect task performance, but no significant relationships are predicted for *self-referenced* feedback.

Difficulties in meeting a social norm is expected to elicit a strong desire for achievement, which will channel motivational energy driven by the implicit need for achievement into the concern for performing better than others driven by the explicit need for achievement (Brunstein & Maier, 2005). Therefore, *negative* norm-referenced feedback will increase task performance, specifically in those with high implicit *and* high explicit achievement motivation. *Positive* norm-referenced feedback is not expected to affect task performance.

Hypothesis 5. In the ego-focused setting, there will be a significant 3-way interaction between implicit AM, explicit AM, and norm-referenced feedback for task performance.

After the completion of the required test blocks, participants will be asked if they would like to continue with the task or quit and work on a different task. No previous research has found a significant interaction between implicit and explicit achievement motivation in the prediction of a cognitively-based choice. Accordingly, only explicit achievement motivation is expected to be related to task continuation.

As mentioned previously, the decision to persist or quit a given task is affected by ability-related certainty (or uncertainty) obtained by comparing one's own performance to the performance of others (Trope, 1986). Therefore, *norm-referenced* feedback is expected to affect *task continuation*, but no significant relationships are predicted for *self-referenced* feedback.

Unlike in the task-focused setting, *positive* norm-referenced feedback is expected to be the primary predictor of task continuation. This prediction is based on the finding that achievement-motivated people want to appear to have as much ability as possible, and therefore prefer to engage in tasks that are likely to disclose their strengths rather than their weaknesses (Kukla, 1978). Therefore, it is predicted that *positive* norm-referenced feedback will predict task continuation, especially in individuals who are high in explicit AM. *Negative* norm-referenced feedback is not expected to affect task continuation.

Hypothesis 6. In the ego-focused setting, there will be a significant interaction between explicit AM and norm-referenced feedback for task continuation.

Method

With one exception, the measures and procedures used in Study 2b were identical to those described in Study 2a. In Study 2b, all participants received the following ego-focused instruction prior to the feedback phase:

There is considerable evidence that college students who complete their education with great success achieve high performances at mental concentration tests. Moreover, the ability to concentrate on a given task constitutes an important prerequisite of career success. This test has been designed to assess students' capacity of concentrating on a given task. As we know, students differ widely with respect to this ability.

Results

Notes on Data Analyses. All analyses were completed three times, as in Study 2a, once with the BIAT, the TAT, and the CRT-AM.

Manipulation Check. A 2 (self-referenced feedback: positive or negative) X 2 (norm-referenced feedback: positive or negative) analysis of variance (ANOVA) was computed for performance satisfaction scores and belief in accuracy to test whether there was a positive main effect for type of feedback. No significant effects were found for belief in accuracy, and the scores were nearly identical for all groups. For performance satisfaction, there was a significant main effect for norm-referenced feedback, $F(1, 115) = 5.97, p < .05$. Participants receiving ascending feedback were more satisfied than those receiving descending feedback (3.89 vs. 3.42). Satisfaction scores were not significantly different between self-referenced feedback groups, but the scores were in the expected direction, with those receiving ascending feedback being more satisfied than those receiving descending feedback (3.74 vs. 3.59).

A chi-square test for independence was computed for task score recall and percentile rank recall to examine whether participants could remember the direction of the feedback they received. The relationship between self-referenced feedback and task score recall was significant, $X^2(2, N = 116) = 78.10, p < .001$. Participants in the ascending feedback condition were more likely to recall that their score had increased, while participants in the descending feedback condition were more likely to recall that their score had decreased. The relationship between norm-referenced feedback and percentile rank recall was also significant, $X^2(2, N = 116) = 87.22, p < .00$. Participants in the ascending feedback condition were more likely to recall that their percentile rank had increased, while participants in the descending feedback condition were more likely

to recall that their percentile rank had decreased. This indicates that participants were paying attention and the feedback direction was salient enough to be noticed and remembered.

Task Performance. All continuous variables were standardized (i.e. centered and divided by their respective standard deviations). Feedback factors were coded 1 for *positive* and -1 for *negative*. See Table 8 for descriptive statistics on task performance.

Hypothesis 4 was tested using a hierarchical regression analysis for *baseline performance*. In Step 1, the covariate (cognitive ability) was entered. In Step 2, the implicit and explicit measures were entered. In Step 3, the interaction term was entered. It was hypothesized that only the implicit achievement measure would significantly predict *baseline performance* above and beyond cognitive ability. Hypothesis 4 was not supported, as none of the implicit measures (or the explicit measure) significantly predicted baseline performance above and beyond cognitive ability.

Hypothesis 5 was tested using a hierarchical regression analysis for *task performance*. In Step 1, both covariates (cognitive ability and baseline performance) were entered. In Step 2, both predictors (implicit and explicit AM) and both feedback factors (self-referenced and norm-referenced) were entered. In Step 3, all of the 2-way interactions were entered. This analysis was conducted for each of the implicit achievement motivation measures. Only the TAT and CRT-AM showed significant results, so the BIAT is not discussed.

It was expected that the three-way interaction between implicit AM, explicit AM, and norm-referenced feedback would be significant. No significant triple interactions

were found, so Hypothesis 5 is not supported. However, two interactions that were not hypothesized were found to be significant.

The TAT analyses will be reviewed first. The set of predictors displayed in Table 9 significantly predicted task performance, $F(2, 115) = 13.90, p < .00$. Entry of baseline performance and cognitive ability in Step 1 accounted for 57.0% of the variance in task performance. The entry of the predictors and feedback factors in Step 2 did not reliably improve prediction of task performance ($\Delta R^2 = .01, n.s.$). The entry of the 2-way interactions in Step 3 also did not improve prediction of task performance ($\Delta R^2 = .03, n.s.$). An examination of the regression weights in Step 3 revealed that the interaction between self-referenced feedback and the TAT predicted task performance (see Figure 3); however the lack of increase in R^2 indicates that this interaction is not adding to the prediction of task performance above and beyond the effects of baseline performance and cognitive ability. The interaction will be reviewed, but the practical significance of the finding will be interpreted with caution.

Recall that task performance was measured in milliseconds, so shorter times indicated better performance. Under negative norm-referenced feedback, participants with higher implicit achievement motivation had better task performance than those with lower implicit achievement motivation. Under positive norm-referenced feedback, participants with lower implicit achievement motivation had better task performance than those with higher implicit achievement motivation.

The CRT-AM analyses are reviewed next. The set of predictors displayed in Table 10 significantly predicted task performance, $F(2, 115) = 14.65, p < .00$. Entry of baseline performance and cognitive ability in Step 1 accounted for 57.0% of the variance

in task performance. The entry of the predictors and feedback factors in Step 2 did not reliably improve prediction of task performance ($\Delta R^2 = .02$, n.s.). The entry of the 2-way interactions in Step 3 also did not improve prediction of task performance ($\Delta R^2 = .04$, n.s.). An examination of the regression weights in Step 3 reveals that the interaction between the explicit and implicit achievement motivation measures predicted task performance (see Figure 4); however, once again, the lack of increase in R^2 indicates that this interaction is not adding to the prediction of task performance above and beyond the effects of baseline performance and cognitive ability. The interaction will be reviewed, but the again practical significance of the finding will be interpreted with caution.

Recall that task performance was measured in milliseconds, so shorter times indicated better performance. Participants with higher implicit achievement motivation performed better when they had lower explicit achievement motivation. Participants with lower implicit achievement motivation performed better when they had higher explicit achievement motivation.

Task Continuation. Hypothesis 6 was tested using a polynomial logistic regression for *task continuation*. First, all continuous variables were standardized (i.e. centered and divided by their respective standard deviations). Feedback factors were coded 1 for *positive* and -1 for *negative*. Task continuation was coded 1 for *continue* and -1 for *quit*.

In Step 1, the covariate (cognitive ability) was entered. In Step 2, both predictors (implicit and explicit AM) and both feedback factors (self-referenced and norm-referenced) were entered. In Step 3, all of the 2-way interactions were entered. This analysis was conducted for each of the implicit achievement motivation measures. No

significant results were found for any of the measures, so Hypothesis 6 was not supported. Further investigation revealed that 90% of the sample chose to continue with the test task, so there was not enough variance in task continuation to find any differences.

Joint Analysis of the Data Obtained From Studies 2a and 2b

Manipulation Checks. An independent means t-test was computed to check that the *task-focused* setting and *ego-focused* setting significantly differed on the affective state items (tense vs. relaxed), the college success item, and the career success item. It was expected that participants in the ego-focused setting would feel more tense and less relaxed, and that participants in the ego-focused setting would be more likely to endorse the statements that success on the task is predictive of success in college and in one's career.

There were no significant differences across task setting. Participants in the task-focused setting and the ego-focused setting both felt "a little tense," ($M_s = 2.38$ & 2.26 , $SD_s = 1.14$ & $.99$) and "somewhat relaxed," ($M_s = 2.73$ & 2.96 , $SD_s = 1.32$ & 1.25). They were also both between "neither agree nor disagree" and "agree" on the college success item ($M_s = 3.72$ for both groups, $SD_s = 1.01$ & $.88$), and closer to "neither agree nor disagree" on the career success item ($M_s = 3.30$ & 3.33 , $SD_s = 1.09$ & 1.05).

Despite the lack of differences on the manipulation check items, the findings in each study demonstrated the effects that are theoretically expected in task and ego-focused settings. It could be that the instructions were effective in providing the appropriate priming and affective state, but that the participants were not aware of it enough to demonstrate differences on the manipulation check items. It is also possible

that the instructions were not the cause of the differences, and that another variable is responsible for the differences across settings.

Moderation Analysis. To examine if significant effects obtained from one study reliably differ from corresponding effects obtained from the other, incentive setting was coded as a dichotomous variable (1 for *task-focused* and 0 for *ego-focused*). The logistic regression for task continuation was not conducted as it did not produce any significant effects. The hierarchical regressions for task performance were conducted using the combined dataset. In addition to the same three steps from the previous analyses, a fourth step was added for the incentive setting factor. This factor was treated as a potential moderator of the effects obtained from the two experiments. No significant moderation was found.

Although the moderation was not found to be significant, the individual findings in Study 2a and 2b are consistent with the theory on task and ego-focused settings. Instructional cues were the only variable that was manipulated across studies. Additional examination of the baseline performance scores showed that task performance was not significantly different by task setting, so both settings were similar prior to the instructional cues. Given these findings, the current research is still encouraged to conclude that the differing findings are a result of the setting type.

Discussion

Brunstein and Maier (2005) found that, in ego-focused settings, implicit and explicit motives interact with each other (and combine with social comparison information) to selectively predict performance. Spangler (1992) found that incentives are necessary to elicit achievement behavior, and that implicit measures predict behavior

in the presence of activity (task-focused) incentives, while *explicit* measures predict behavior in the presence of social (ego-focused) settings. In contrast, Bing and colleagues (2007) found that the CRT-AM failed to interact significantly with the explicit measure in an ego-focused setting, but both measures produced significant main effects.

The current research found that implicit achievement motives (as measured by the TAT) and norm-referenced feedback interacted to predict performance. Under negative norm-referenced feedback, participants with high implicit achievement motivation had better task performance than those with low implicit achievement motivation. Under positive norm-referenced feedback, participants with low implicit achievement motivation had better task performance than those with high implicit achievement motivation. Examination of Figure 3 reveals that those with low implicit achievement motivation were negatively impacted by feedback that told them they were performing poorly compared to others. Those with high implicit achievement motivation reacted to negative feedback by “stepping up their game” and improving their performance.

An additional interaction was observed. Explicit and implicit achievement motivation (as measured by the CRT-AM) interacted to predict task performance. The interaction was opposite that seen in the task-focused setting. In the ego-focused setting, participants with high achievement motivation performed better when they had low explicit achievement motivation. Participants with low implicit achievement motivation performed better when they had high explicit achievement motivation. Said another way, participants with incongruent personality prototypes (Hesitant AM and AM Pretender) demonstrated better task performance than those with congruent personality prototypes (Congruent AM and Congruent FF). Hesitant AMs are more careful in their approach of

challenging tasks and are more likely to withdraw when stress is encountered; however withdrawal was not a socially accepted option in this situation. As a result, feedback that indicated they were performing poorly compared to others seems to have resulted in these participants being motivated to perform better than all other prototypes (see Figure 4). At the same time, Congruent FFs reacted strongly in the opposite direction and performed the poorest when given negative feedback.

Combined Results of Study 2a & 2b

Put together, Studies 2a and 2b attempted to explain the role of incentives and feedback on the relationship between implicit and explicit achievement motivation and their influence on task performance. They also utilized three different implicit measures to examine whether the measurement method employed affected the aforementioned relationship.

Overall, self-referenced feedback affected performance in the task-focused setting, while norm-referenced feedback affected performance in the ego-focused setting. This is consistent with previous research that in a socially neutral condition, participants will focus on the task at hand and therefore value feedback on their own performance (Koestner & McClelland, 1990; Thrash & Elliot, 2002). In an ego-focused setting, participants should be focused on the competitive aspect of the situation and would therefore focus on information about how they are performing relative to others.

Overall, both types of feedback only interacted with implicit achievement motivation, not with explicit motivation. This is inconsistent with McClelland and colleagues' (1989) theory that implicit motives are more likely to be aroused by *activity*

incentives, whereas explicit motives are more likely to be aroused by explicit *social* incentives. In the ego-based setting, the interactions observed didn't provide any incremental prediction of task performance over that of previous performance and cognitive ability. It is possible that the instructional cues weren't strong enough to elicit a feeling of social incentives. Or an alternative explanation could be that the feedback manipulation wasn't strong enough to arouse explicit achievement motives.

Overall, implicit and explicit achievement motivation interacted to predict performance, but the direction of the interaction varied by task and ego setting. In the task-focused setting, the congruent personality prototypes showed higher performance than the incongruent prototypes. In the ego-focused setting, the incongruent prototypes showed higher performance. However, in the ego-focused setting the interactions also failed to add any incremental prediction in task performance above and beyond previous performance and cognitive ability, so the comparison of the two findings should keep that consideration in mind. One possible explanation is that the incongruent prototypes felt more achievement arousal in the ego-focused setting, as both types often experience approach-avoidance conflicts when faced with a difficult task (James & Mazerolle, 2002).

And finally, the type of implicit measure that exhibited significant findings varied across studies. In the task-focused setting only implicit *attitudes* interacted with feedback and the explicit measure to predict performance. In the ego-focused setting, implicit *motives* interacted with feedback, while implicit *reasoning* interacted with the explicit measure. This is the first study, to utilize these three measurement methods, so while not conclusive, it appears that there may be differences due to method. A recently published

study (Ziegler et al., 2010) examined the relationship among a different set of three implicit achievement motivation measures: an IAT, a picture-story exercise, and German latency-based measure called the Objective Achievement Motivation Test (OAMT; Schmidt-Atzert, 2004). That research also found that only one implicit measure (the picture-story exercise) predicted performance in a task-focused setting, while another implicit measure (the OAMT) predicted performance in an ego-focused setting. The picture-story exercise finding is not consistent with the current research, but the differences in measurement method by task setting are similar.

Taken together, those findings and the current research show it appears that type of measure used can have a different effect on research findings, despite the fact that they all purport to measure the same construct. In fact, a recent review article pointed out that there are more than 20 measurement procedures to which the label “implicit” is routinely applied (Nosek, Hawkins & Frazier, 2011). All of these measures share a common theme, in that they assess motives that are not consciously accessible. However, the measures engage a variety of psychological processes.

Limitations of the current research are that the participant group is comprised of college students; however they still demonstrated an adequate range for achievement motivation and cognitive ability. Also, the research was conducted in a controlled lab setting with a contrived measure of performance. At this early stage of research a controlled setting is necessary, but future research should examine achievement motivation in a “real-world” setting using performance measures that are salient to the participants.

General Discussion

The current research explored the relationship between implicit *motives* (as measured by the TAT), implicit *attitudes* (as measured by the BIAT) and conditional *reasoning* (as measured by the CRT-AM), as well as explicit motivation and cognitive ability.

Study 1 found that the implicit achievement measures did not overlap and in fact, may be separate measures despite that they all purport to measure implicit achievement motivation. A possible explanation is that they all measure some unique aspect of implicit achievement motivation and that explains their low correlations. To better understand what implicit measures assess it would help to have a taxonomy that specifies the components of the concept of 'implicit' cognitions. Bargh (1994) offered a taxonomy that defines automaticity as four parts: awareness, intention, controllability, and efficiency. Each implicit measurement method could be influenced by one or more of these components.

An alternative explanation is that some or all of the implicit measures are tapping a construct (or constructs) other than implicit achievement motivation. Previous research (Ziegler et al., 2011) examined the relationships between three implicit achievement motivation measures and the Big 5 personality variables. The picture-story exercise had a significant negative correlation with Openness ($r = -.18, p < .05$), while the OAMT (the latency-based measure) had a significant negative correlation with Agreeableness ($r = -.17, p < .05$). None of the implicit measures significantly correlated with Conscientiousness despite the fact that achievement motivation is a facet of the construct. Meanwhile the two explicit AM measures did significantly correlate with

Conscientiousness. Future research should examine the feasibility of looking for latent factors.

There could also be some situational factor or other personality variable that is acting as a moderator in the relationship between measures. The TAT and the CRT-AM were both shown to correlate with cognitive ability. The current research statistically controlled for this influence, but previous research by Zielger and colleagues (2011) has also found that Reasoning correlated with all three implicit measures. Differences in cognitive demand across implicit measures also call into question their construct validity.

Practical Implications and Future Research

One practical implication of the present research is that it calls for caution when using implicit measures of achievement motivation to draw conclusions about the prediction of performance, and to be especially cautious of generalizing the findings from a specific measure to other implicit measures.

Smith and Schneider (2004) argue that integration of implicit and explicit personality measures could represent one of the most promising future directions for personality psychology. While this research focuses on the domain of achievement motivation, other studies have pursued integrating implicit and explicit measures for affiliation (Winter et al., 1998), aggression (Bing & Burroughs, 1999), depression (Bing & LeBreton, 2004), adaptability (Ingerick et al, 2004), and psychopathy (LeBreton, Binning, & Adorno, 2006). The findings of the present study suggest that researchers might be better served by first examining the construct validity of their implicit measures before drawing too many conclusions about their interactions with explicit measures.

The area of implicit personality measurement could benefit from focusing on the construct—method distinction, which allows for the isolation of variance due to predictor constructs (the behavioral domain) from variance due to predictor methods (the process used to measure the behavior) (Campbell & Fiske, 1959). The Multitrait-Multimethod Matrix (MTMM) approach for assessing construct validity put forth by Campbell and Fiske (1959) is one approach that would allow future researchers to identify the effect that measurement method may be having on measuring implicit cognitions. Since Greenwald and Banaji's (1995) call for greater use of implicit measures to advance the theory, a number of procedures and effects have been referred to as implicit measures (for a review see De Houwer & Moors, 2010). Given this growing interest in assessing implicit personality variables, future researchers should be able to construct a study that utilizes several personality traits each measured using several of the implicit methods (i.e., TAT, IAT, conditional reasoning). The field of implicit social cognition is in transition from the creation of implicit measures to the next phase of discovery. As Nosek and colleagues state (2011), "Knowledge about what implicit measures assess is less mature than knowledge about what they do," (p. 156). However the field must redirect its attention to what is measured and how the measurement method affects what is measured. A solid theoretical foundation is required before research can truly inform when and how social cognitions influence behavior.

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Footnotes

¹ Each participant generates 100 latencies. Only 84 latencies over 10,000 milliseconds were observed. Of those, only 22 were during test trials (the rest were during practice trials). Those 22 long latencies were across 12 participants, and the most any one participant had was 3.

Table 1

Justification Mechanisms for Achievement Motivation

Personal responsibility inclination	Tendency to favor personal factors such as initiative, intensity, and persistence as the most important causes of performance on demanding tasks.
Opportunity inclination	Tendency to frame demanding tasks on which success is uncertain as challenges that offer opportunities to demonstrate present skill, to learn new skills, and to make a contribution.
Positive connotation of achievement striving	Tendency to associate effort (intensity, persistence) on demanding tasks to dedication, concentration, commitment, and involvement.
Malleability of skills	Tendency to assume that the skills necessary to master demanding tasks can, if necessary, be learned or developed via training, practice, and experience.
Efficacy of persistence	Tendency to assume that continued effort and commitment will overcome obstacles or any initial failures that might occur on a demanding task.
Identification with achievers	Tendency to empathize with the sense of enthusiasm, intensity, and striving that characterize those who succeed in demanding situations. Selectively focus on positive incentives that accrue from succeeding.

Note. Table reproduced from James & Mazerolle (2002).

Table 2

Justification Mechanisms for Fear of Failure

External attribution inclination	Tendency to favor external factors such as lack of resources, situational constraints, intractable material, or biased evaluations as the most important causes of performance on demanding tasks.
Liability inclination	Tendency to frame demanding tasks as personal liabilities or threats because one may fail and be seen as incompetent. Perceptions of threat are euphemistically expressed in terms such as risky, costly, or venturesome.
Negative connotation of achievement striving	Tendency to frame effort (intensity, persistence) on demanding tasks as overloading or stressful. Perseverance on demanding tasks after encountering setbacks or obstacles is associated with compulsiveness and lack of self-discipline.
Fixed skills	Tendency to assume that problem-solving skills are fixed and cannot be enhanced by experience, training, or dedication to learning. Thus, if one is deficient in a skill, then one should not attempt demanding tasks or should withdraw if one encounters initial failures.
Leveling	Tendency to discount a culturally valent but, for the reasoner, a psychologically hazardous event (e.g., approaching demanding situations) by associating that event with a dysfunctional and aversive outcome (e.g., cardiovascular disease).
Identification with failures	Tendency to empathize with the fear and anxiety of those who fail in demanding situations, selectively focus on negative outcomes that accrue from failures.
Indirect compensation	An attempt to increase the logical appeal of replacing a threatening situation with a compensatory (i.e., less-threatening) situation by imbuing the less-threatening situation with positive, socially desirable qualities.
Self-handicapping	An attempt to deflect explanations for failure away from incompetence in favor of self-induced impairments such as not really trying or not being prepared (e.g., defensive lack of effort).

Note. Table reproduced from James & Mazerolle (2002)

Table 3

Illustrative Conditional Reasoning Problem

Studies of the stress-related causes of heart attacks led to the identification of the Type A personality. Type A persons are motivated to achieve, involved in their jobs, competitive to the point of being aggressive, and eager, wanting things completed quickly. Interestingly, these same characteristics are often used to describe the successful person in this country. It would appear that people who wish to strive to be a success should consider that they will be increasing their risk for a heart attack.

Which one of the following would most *weaken* the prediction that striving for success increases the likelihood of having a heart attack?

- A. Recent research has shown that it is aggressiveness and impatience, rather than achievement motivation and job involvement, that are the primary causes of high stress and heart attacks.
- B. Studies of the Type A personality are usually based on information obtained from interviews and questionnaires.
- C. Studies have shown that some people fear being successful.
- D. A number of non-ambitious people have heart attacks.

Note. Table reproduced from James & Mazerolle (2002).

Table 4

Study 1: Descriptive Statistics and Correlation Matrix (Initial Sample)

	Mean	SD	1	2	3	4	5
BIAT	.50	.43	--				
TAT	.92	.58	.02	--			
CRT-AM	1.97	4.22	.00	.06	--		
PRF	10.99	3.02	.12*	.04	.19**	--	
Wonderlic	22.47	5.12	.08	.19**	.34**	.16**	--

Note. $N = 282$.

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

Table 5

Study 1: Descriptive Statistics and Correlation Matrix (Final Sample)

	Mean	SD	1	2	3	4	5
BIAT	.50	.44	--				
TAT	.97	.60	.00	--			
CRT-AM	2.32	4.31	-.03	.00	--		
PRF	11.27	3.03	.14*	.03	.07	--	
Wonderlic	23.01	5.13	.03	.15*	.30**	.11	--

Note. $N = 238$.

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

Table 6

Study 2a: Task Performance Descriptive Statistics

	Mean	<i>SD</i>
Baseline Performance	729.39	153.08
Test Performance	631.78	110.80

Note. $N = 122$.

Table 7

Study 2a: Summary of Regression Analyses Predicting Task Performance using BIAT

Predictor	Task Performance	
	<i>B</i>	<i>SE</i>
Baseline Performance	.606**	.039
Cognitive Ability	-5.076	6.344
Self-Referenced Feedback	3.977	5.682
Norm-Referenced Feedback	-.778	5.651
Explicit AM (PRF)	-1.664	5.704
Implicit AM (IAT)	.033	5.673
Self-Referenced × Norm-Referenced	3.642	5.738
Self-Referenced × PRF	7.863	5.762
Self-Referenced × BIAT	-13.258*	5.628
Norm-Referenced × PRF	-1.083	5.654
Norm-Referenced × BIAT	11.166	5.906
PRF × BIAT	-13.591*	5.409

Note. $N = 122$.* $p < .05$. ** $p < .01$.

Table 8

Study 2b: Task Performance Descriptive Statistics

	Mean	<i>SD</i>
Baseline Performance	732.68	139.29
Test Performance	629.16	99.02

Note. $N = 116$.

Table 9

Study 2b: Summary of Regression Analyses Predicting Task Performance using TAT

Predictor	Task Performance	
	<i>B</i>	<i>SE</i>
Baseline Performance	.466**	.047
Cognitive Ability	-17.517*	6.836
Self-Referenced Feedback	.054	6.438
Norm-Referenced Feedback	-6.367	6.381
Explicit AM (PRF)	-.044	6.367
Implicit AM (TAT)	-7.326	6.850
Self-Referenced × Norm-Referenced	.780	6.162
Self-Referenced × PRF	-8.614	6.231
Self-Referenced × TAT	5.289	6.647
Norm-Referenced × PRF	2.674	6.287
Norm-Referenced × TAT	15.683*	6.422
PRF × TAT	1.942	6.636

Note. $N = 116$.

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

Table 10

Study 2b: Summary of Regression Analyses Predicting Task Performance using CRT-AM

Predictor	Task Performance	
	<i>B</i>	<i>SE</i>
Baseline Performance	.452**	.047
Cognitive Ability	-12.315	6.878
Self-Referenced Feedback	-1.496	6.371
Norm-Referenced Feedback	-4.801	6.357
Explicit AM (PRF)	-1.390	6.077
Implicit AM (CRT-AM)	-7.897	7.103
Self-Referenced × Norm-Referenced	5.571	6.230
Self-Referenced × PRF	-5.217	6.205
Self-Referenced × CRT-AM	-2.447	6.753
Norm-Referenced × PRF	-3.436	6.787
Norm-Referenced × CRT-AM	2.145	6.030
PRF × CRT-AM	18.057*	6.803

Note. $N = 116$.

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

Figure 1. Study 2a: Effect of Self-Referenced Feedback and Implicit AM (BIAT) on Task Performance.

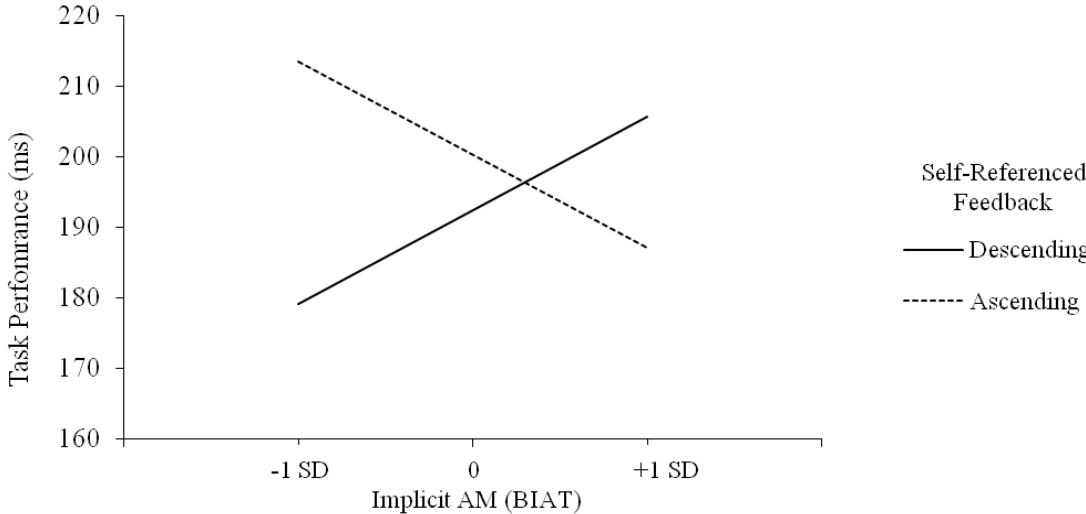
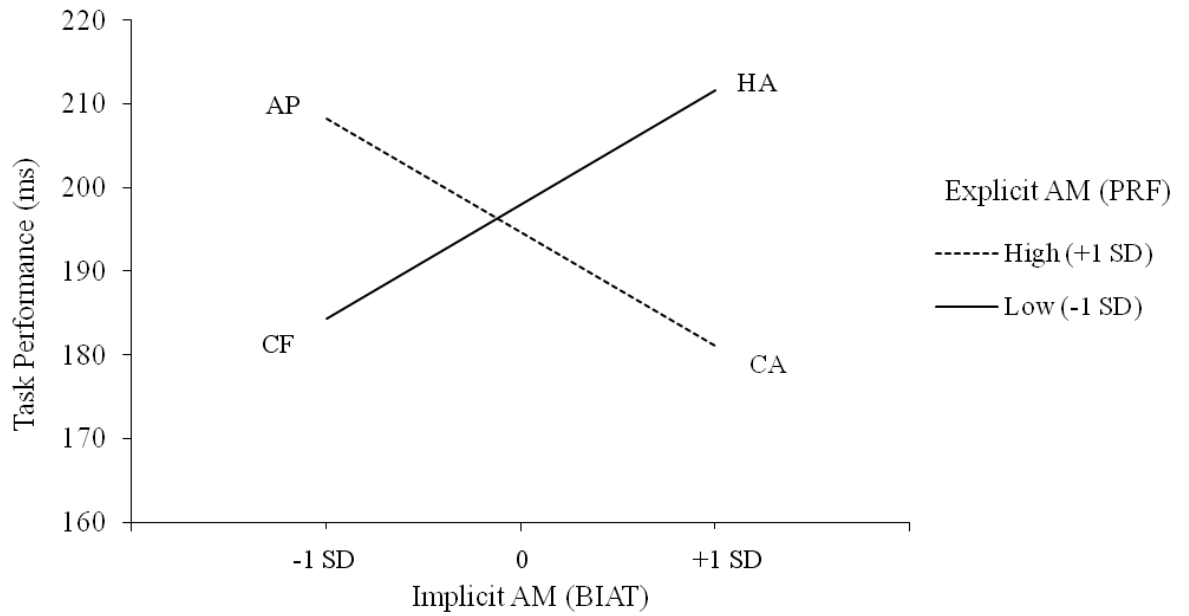


Figure 2. Study 2a: Effect of Explicit AM (PRF) and Implicit AM (BIAT) on Task Performance.



Note. The interaction is plotted using the B weights obtained from the final model of the regression equation. CA = Congruent AM; CF = Congruent FF; HA = Hesitant AM; AP = AM Pretender. These labels are provided for convenience of interpretation, as all variables were left as continuous for the analyses.

Figure 3. Study 2b: Effect of Norm-Referenced Feedback and Implicit AM (TAT) on Task Performance.

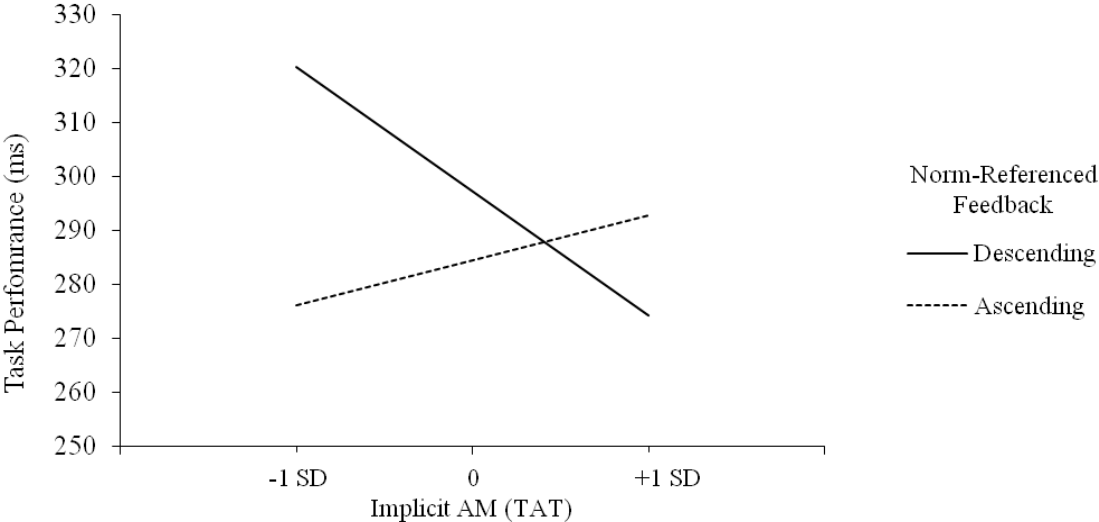
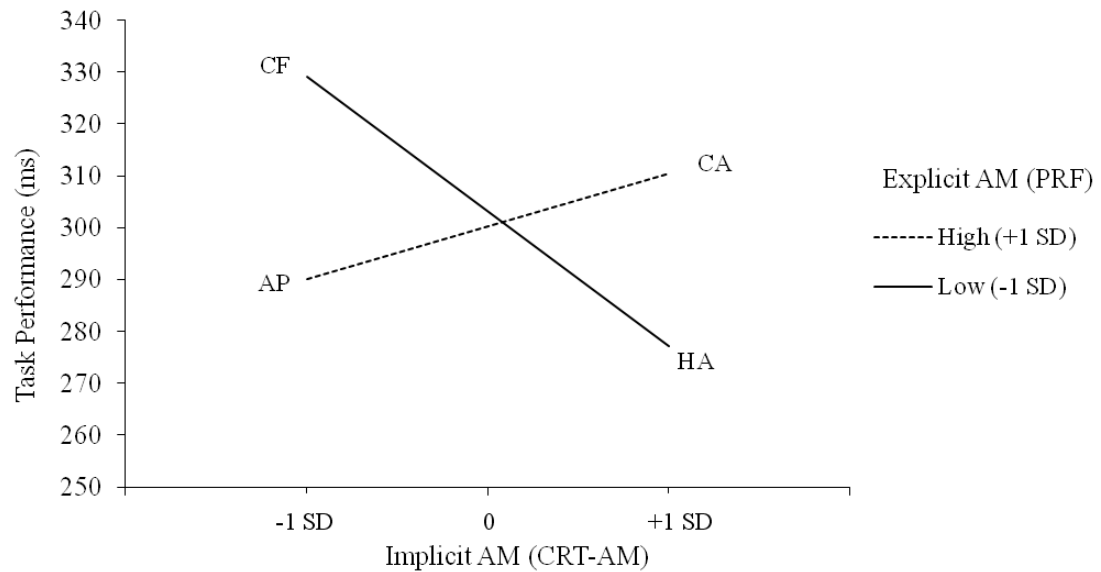


Figure 4. Study 2b: Effect of Explicit AM (PRF) and Implicit AM (CRT-AM) on Task Performance.



Note. The interaction is plotted using the B weights obtained from the final model of the regression equation. CA = Congruent AM; CF = Congruent FF; HA = Hesitant AM; AP = AM Pretender. These labels are provided for convenience of interpretation, as all variables were left as continuous for the analyses.

Appendix A

Adjectives used in Brief Implicit Association Test (BIAT) for Achievement Motivation

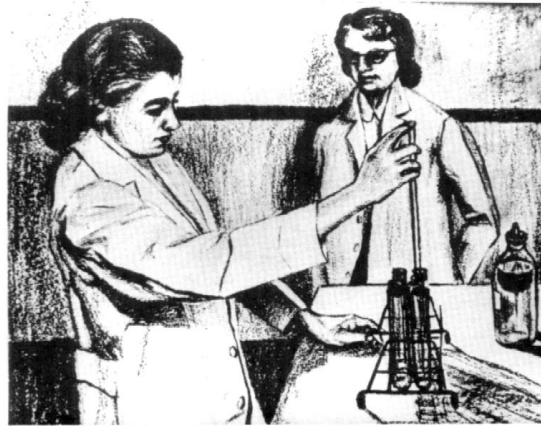
Me	Others	Successful	Not Successful
I	They	Ambitious	Idle
Me	Them	Curious	Uninterested
Myself	Their	Persistent	Sluggish
Mine	Theirs	Diligent	Distractible
		Inventive	Unimaginative
		Efficient	Inefficient
		Successful	Unsuccessful
		Competent	Incompetent

Appendix B

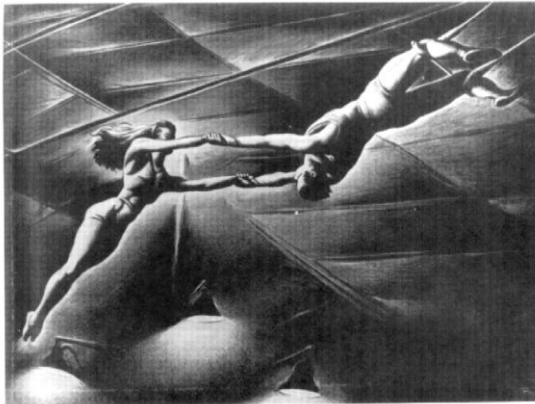
Images used in Picture Story Exercise.



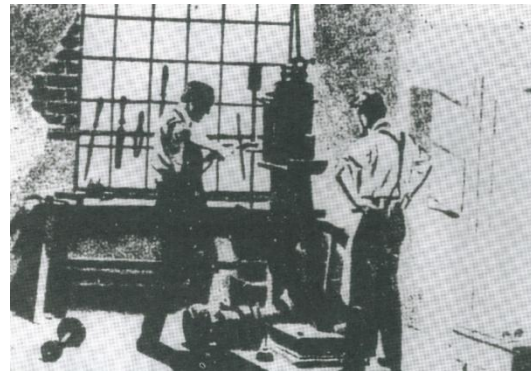
A boy in a checked shirt.



Two women in lab coats.



A woman and a man on a trapeze.



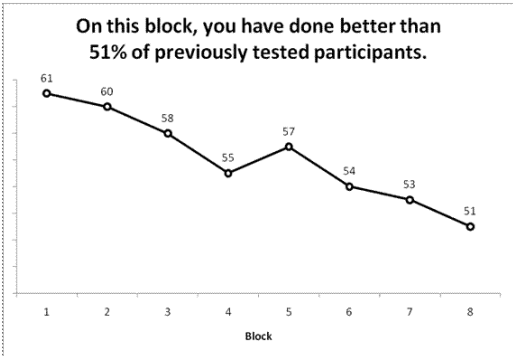
Two men in a workshop.



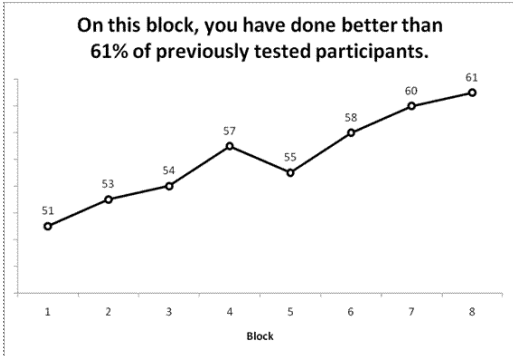
A young woman working on the balance beam.

Appendix C

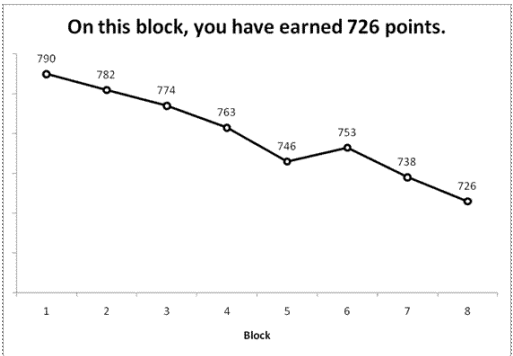
Feedback diagrams used in performance task.



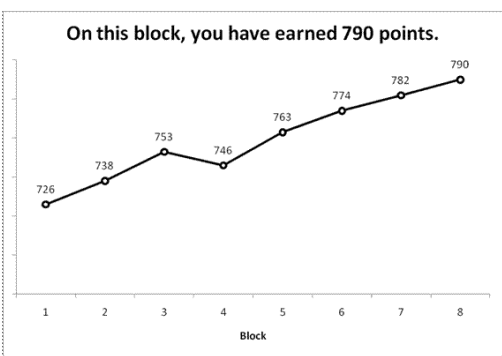
Descending norm-referenced feedback.



Ascending norm-referenced feedback.



Descending self-referenced feedback.



Ascending self-referenced feedback.