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Malingering Undetected Successfully: Does Extrinsic Motivation and Coaching Have a Significant Impact?

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MALINGERING UNDETECTED SUCCESSFULLY: DOES EXTRINSIC MOTIVATION

AND COACHING HAVE A SIGNIFICANT IMPACT?

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ABSTRACT

The present study examined the effectiveness of a Mild Traumatic Brain Injury (mTBI) coaching (i.e., providing information about mTBI symptoms) and motivational incentive (i.e., a $50 gift card lottery) on the Automated Neuropsychological Assessment Metrics (ANAM) test performance. The sample included a total of 162 undergraduate and graduate students enrolled in an introductory educational psychology course. Participants were randomly assigned to one of six conditions: coached plus warning instruction and motivation incentive, coached instruction and motivation incentive, uncoached instruction and motivation incentive, coached plus warning instruction and no motivation incentive, coached instruction and no motivation incentive, and uncoached instruction and no motivation incentive (control) *(n=27, per condition).*

Upon arrival for the study, all of the participants completed the ANAM and were told to do their best (pre-ANAM). Participants in the coached conditions were provided with a one-page document including several mTBI symptoms. In addition to the one-page document, participants in the coached plus warning conditions were informed that to be identified as faking the disorder, to not exaggerate the symptoms too much. Whereas, participants in the motivation conditions were informed they were eligible for an incentive for participation (i.e., a $50 gift card lottery) if they can feign mTBI and avoid being identified as faking the disorder. The participants in the coached and motivation conditions completed the ANAM a second time and were asked to feign mTBI. Participants in the control condition were not provided additional information and were asked to do their best on their second ANAM attempt.

The results suggest that providing both a coaching instruction and a motivational incentive (i.e. treatment groups) decreased the participants' performance on their overall ANAM total accuracy scores, in comparison to the participants not receiving the treatment (i.e. control).

Further, coaching instructions and motivational incentives aided in feigning mTBI symptoms on the ANAM by participants performing poorly on the ANAM total accuracy measure. However, even though participants feigned mTBI symptoms when provided a coaching instruction and a motivation incentive, the ANAM Effort Measure detected the participants feigning mTBI, which rendered their scores invalid for a clinical diagnosis.

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DEDICATION

"The ones that love us never really leave us. You can always find them...in here." -J.K. Rowling

"We are what they grow beyond. That is the true burden of all masters." -Rian Johnson

This dissertation is dedicated to the memory of the following individuals who I wish were here today to celebrate the completion of my doctoral degree:

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Nan, I promised I would finish my degree and I have finally fulfilled my promise. I hope I would have made you proud.

Grandma, for always showing me the lighter side of life, including the joys of Bingo.

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CHAPTER 1

INTRODUCTION

An assumption of psychological assessment is that the assessments are measuring subject characteristics. However, there is a significant percentage of psychological test subjects who present themselves in a manipulated, rather than forthcoming manner (Rogers, 2008). Psychological assessments should measure the actual test subject's characteristics. The manipulated presentation is often what is known as *malingering* (Anderson, 2008; Erdal, 2009; Resnick, 1994; Rogers, 2008; Rogers & Payne, 2006). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) defines malingering as "intentional production of false or grossly exaggerated physical or psychological symptoms, motivated by external incentives" (American Psychiatric Association, 2013, p. 726). These external incentives are sometimes referred to as secondary gain (Rogers & Payne, 2006). Malingering differs from factitious disorders such as psychosomatic illnesses or conversion disorders in that, with such factitious disorders, external incentives are absent.

Effectively evaluating malingering, the related responses, and their empirical bases, are critical to forensic evaluations (Rogers & Mitchell, 1991). The potential for malingering on nearly all psycholegal issues must be addressed by psychologists and other mental health professionals, considering the adversarial nature of forensic assessments (Rogers & Mitchell, 1991). Although the prevalence of malingering tends to differ depending on the forensic setting, malingering likely makes up one sixth of all forensic cases (Rogers, Salekin, Sewell, Goldstein, & Leonard, 1998; Rogers, Sewell, & Goldstein, 1994). More recently, the base rate of *probable* and *definite malingering* in a criminal forensic setting has been estimated at 54.3 percent (Ardolf, Denney, & Houston, 2007). In a civil setting, specifically for mild traumatic brain injury (mTBI)

cases, the base rate of *probable malingering* is estimated at 30 to 40 percent where an external incentive, such as, compensation, is to be gained (Larrabee, 2003; Larrabee, Millis, & Meyers, 2009).

Classifying malingering properly is invaluable in forensic evaluations. Genuine efforts to determine precise estimates of malingering are necessary to avoid tragic mistakes. Rogers and Cruise (1998) found that the effect of a party to litigation being falsely accused of malingering is devastating. At the same time, undetected malingering can be devastating for the survivors of a crime and increase insurance premiums (Rogers & Cruise, 1998). Fortunately, many psychological assessments have been created with *validity scales* embedded within them (Rogers & Payne, 2006). A validity scale helps those interpreting the assessment to determine whether the test subject is likely giving honest and consistent answers (Rogers & Payne, 2006). Some validity scales focus on a participant's effort while completing an assessment. Thus, a participant's effort is considered a part of malingering (Iverson, 2007). *Definite malingering* occurs when poor effort (i.e. below chance performance) that is *clear and convincing* is shown while testing (Iverson, 2007, p. 131).

However, another important aspect for practitioners in detecting malingering is to understand how the theoretical constructs within motivational theory, such as, expectancy x value, relate to why and how people malinger (Anderson, 2008; Constantinou & McCaffrey, 2003; Erdal, 2009; Nagle et al., 2006). Expectancy x value theory combines one's expectancy to succeed and the value placed on successfully achieving a given task (Atkinson, 1957; Eccles & Wigfield, 2002; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000). In relation to malingering, expectancy x value theory would predict that the motivation to malinger is a function not only of motivational incentives but also requires expectations that one can

malinger well and will not be caught doing so. A person may believe he or she can malinger well if he or she is coached or has knowledge on the specific disorder expected to be feigned. Specifically, if a participant is coached on mTBI, he or she will be more confident about feigning mTBI because he or she will have knowledge of the symptoms. One would therefore predict, if the participant is confident about completing the task (i.e. malingering well and without being caught) due to the effects of coaching and is provided a motivation incentive to malinger undetected, then he or she will put forth more effort to malinger undetected.

Various studies have found that people can be taught to malinger. In a meta-analytic review, studies showed there was a significant difference in the effects of coaching between identifying feigning of severe mental disorders as opposed to mood and anxiety disorders (Hawes & Boccaccini, 2009). In other studies, coached students achieved higher clinical elevations in simulating depression and PTSD (Hickling et al., 1999; Rogers et al., 1993). Erdal (2004) found motivation and coaching altered the performance of simulated malingering of a head injury (mild traumatic brain injury; mTBI) participants. Erdal (2004) used a 2 student group (introductory psychology, advanced neuroscience) x 3 motivations (none given, compensation, avoid blame) x 3 coaching levels (none given, coaching mTBI symptoms, coaching plus warning of malingering detection) factorial design. Participants were administered two assessments (Rey's 15-Item Test (FIT), Dot Counting Test (DCT)). Based on previous research, Erdal (2004) predicted the participants with less prior knowledge (introductory psychology undergraduates) receiving coaching of mTBI symptoms plus warning of malingering detection would not be detected as malingers while feigning mTBI on both assessments. Erdal (2004) found the participants with more prior knowledge (advanced neuroscience undergraduates) were detected as malingerers more often than the participants with less prior

knowledge (introductory psychology undergraduates) but only on the FIT. The advanced neuropsychology students added significantly more new items during recall while in the compensation group than did the introductory psychology students. There was no interaction between motivation and student group on the Dot Counting Test (DCT). Therefore, the advanced neuropsychology students malingered more conspicuously than the introductory psychology students suggesting that knowledge of neuropsychology may be a detriment to malingering. However, knowledge of neuropsychology was not a robust variable in her study possibly because of the limitations of a small sample size and confounding the variables of previous knowledge and knowledge from coaching.

Additionally, Erdal (2004) found participants receiving a simulated motivational incentive (i.e. compensation) to malinger and receiving coaching on the symptoms of the condition plus warned about malingering detection methods, were detected as malingerers more often than the participants in the other experimental conditions but only on the DCT. There was no interaction between motivation and coaching on FIT. There was a main effect for motivation and coaching on the DCT qualitative scores (ungrouped total time v. grouped total time). The participants in the compensation condition took significantly longer to complete the assessment than the control condition. In addition, the participants in both the coached and coached with warning about malingering detection conditions took significantly longer to complete the assessment than the control condition. It is possible there were no main effect for the accuracy measure on the DCT because of the limitations of this study.

To investigate motivation manipulation further, Erdal (2009) assigned participants to one of the four motivational conditions (no motivation, avoiding blame, compensation, and attention-seeking) and administered three neuropsychological assessments (DCT, California Verbal

Learning Test, Benton Visual Retention Test). Erdal (2009) found participants receiving a simulated motivational incentive (i.e. compensation or attention from friends and family) to malinger were detected as malingerers on all three assessments. That is, those motivated by compensation performed similarly to those who desired attention (Erdal, 2009). Thus, except for the avoid blame condition, motivation to malinger for compensation or attention-seeking, significantly impacted test performance negatively (Erdal, 2009).

Both studies found the participants assigned to the motivational condition of compensation were detected as malingerers (Erdal, 2004; Erdal, 2009). Additionally, Erdal (2004) found participants assigned to the motivational condition of compensation and receiving coaching were detected as malingerers but only on one specific assessment. These findings are important because the assessment used may be a critical factor in detecting malingering. Also, in a real-world scenario, compensation will likely be a secondary gain sought after. However, as previously stated, being falsely accused of malingering, as well as, not detecting malingering can be devastating (Rogers & Cruise, 1998).

Purpose of the Study

The purpose of this study was to apply expectancy x value theory to explain and replicate the finding that receiving a motivational incentive and coaching (i.e., providing information about mTBI symptoms) will significantly impact test performance. This study used a 2 x 3 x 2 repeated measures factorial design, with a coached condition (coached plus warning, coached, not coached) as one factor, a motivational (incentive) goal (versus no goal) as the second factor, and time as the third factor. The participants, consisted of undergraduates and graduates enrolled in different sections of an educational psychology course, were administered two assessments, the Automated Neuropsychological Assessment Metrics (ANAM) and the Mild Traumatic Brain

Injury Symptoms Checklist (mTBI Symptoms Checklist). The participants were instructed to put forth their best effort during the first administration of the assessments. Then, the participants were randomly assigned into six groups (coached plus warning instruction and motivation incentive, coached instruction and motivation incentive, uncoached instruction and motivation incentive, coached plus warning instruction and no motivation incentive, coached instruction and no motivation incentive, and uncoached instruction and no motivation incentive i.e. optimal performance group). Each group was instructed to put forth their best effort or put forth their best effort to feign mTBI. Once the instructions were read, the assessments were re-administered, respectively.

This study contributed to the research literature by providing additional information on the effects of providing a motivational incentive and coaching have on simulating mTBI symptoms. Additionally, the study examined the interaction between providing a motivational incentive and coaching in regards to simulating mTBI symptoms. Specifically, the study applied expectancy x value theory to explain the impact such variables have on test performance. However, different from previous research, the motivational incentive provided was a tangible incentive (compensation e.g. $50 gift card lottery) rather than the more common simulated one. The limitations of Erdal (2004, 2009) studies included using simulated rather than real-world incentives. It was possible participants would put forth greater effort to malinger undetected if they received a tangible incentive.

Also, this study included a larger sample size (27 participants per group) than previous studies, assessed baseline scores of all participants, and assessed knowledge as a covariate to control for the variable of previous knowledge of mTBI symptoms. For example, Erdal (2004) had a small sample size of 34 participants having knowledge of neuropsychology randomly

assigned to 10 groups (i.e. three to four participants per group) and was not able to determine

which knowledge (i.e. previous knowledge, as opposed to knowledge gained from the coaching

instructions) had an effect on the results. In regards to baseline scores, Erdal (2004, 2009) did

not include baseline scores assessed before the participants were presented with the intervention.

It was possible that participants would have scored the same on the assessment regardless of the

condition randomly assigned, meaning, the effect did not come from the treatment. The purpose

of baseline scores or pre-test scores was to test for the presence of selection effects, i.e., whether

there are significant initial differences between the groups. The baseline scores of all

participants were assessed by having the participants complete two administrations of the

assessments in the study. As a result, time (pre- and post- treatment) was considered as a factor

in this study.

Additionally, there is no research currently on the interaction between motivation and

coaching and their effects in simulating mTBI on the ANAM. Therefore, the results of this study

aided in determining whether there is a statistically significant interaction between coaching and

motivation in general and while using the ANAM.

Research Questions

The research questions addressed in this study are:

1) Is there a significant difference in performance between treatment and control

groups on the pre- and post- ANAM total accuracy scores?

2) Is there a significant difference in performance between treatment and control

groups on the post- ANAM total accuracy scores?

3) Do participants in the treatment groups (i.e. instructed to feign mTBI

symptoms) differ in their ANAM Effort Measure in comparison to control?

4) Are there positive interactions between the motivation and coached conditions?

Based on the literature, the following hypotheses were made:

1) There will be a significant difference in performance between treatment and control groups on the pre- and post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions will decrease the ANAM total accuracy scores (feigning clinical mTBI) between the pre- and post-. The degree to which the ANAM total accuracy scores will be differentially influenced by coaching and motivation is exploratory.

2) There will be a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions will have lower ANAM total accuracy scores (feigning clinical mTBI) than the other groups. The degree to which the ANAM total accuracy scores will be differentially influenced by coaching and motivation is exploratory.

3) The participants who are trained to malinger mTBI will differ in their ANAM Effort Measure in comparison to control.

4) There will be a positive interaction between the motivation and coached conditions.

CHAPTER 2

REVIEW OF RELATED LITURATURE

This section will discuss the following relevant literature: 1. Models of Malingering, 2. Assessing Malingering, 3. Motivation, Motivational Theory for Malingering, 4. Coaching Malingering, 5. Mild Traumatic Brain Injury, 6. Effort and Malingering, and 7. Study Focus and Research Questions.

Models of Malingering

There are many different models of malingering. Resnick (1995) defined *pure malingering* as feigning a disease when that disease is not present whatsoever in the individual. *Partial malingering* is the mere exaggeration of real symptoms or the contention that one suffers from symptoms that have been resolved (Resnick, 1995). *False imputation* is the fraudulent and conscious attribution of real symptoms to a known false cause (Resnick, 1995). In many malingering studies utilizing simulation designs (i.e., where participants feign malingering), the participants feign *pure* malingering (McGuire, 1999).

Rogers et al. (1998) and Rogers et al. (1994) presented empirical evidence that explanatory models (pathogenic, criminological, and adaptational) seek to uncover the underlying motivation. The pathogenic model, stating the conscious fabrication of symptoms eventually creates a genuine disorder, pertains to malingerers motivated by psychopathology (Rogers et al., 1998; Rogers et al., 1994). The criminological model of malingering asserts an "antisocial and oppositional" motivation (Rogers et al., 1998; Rogers et al., 1994). According to the criminological model, certain individuals, unconcerned with social or legal consequences, fabricate symptoms for perceived rewards that they have not earned and do not deserve (Rogers

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et al., 1998; Rogers et al., 1994). The adaptational model assumes that malingering is a strategic attempt to succeed in an adversarial system (Rogers et al., 1998; Rogers et al., 1994). According to the adaptational model, the malingerer engages in a cost-benefit analysis with respect to malingering and chooses to malinger as an alternative to other options (Rogers et al., 1998; Rogers et al., 1994).

Significantly, Rogers et al. (1998) found that explanatory models have utility in both forensic and nonforensic contexts. Significant differences were found in malingering cases based on the category of referral (i.e., forensic or nonforensic) and according to the type of feigning (i.e., mental disorders, cognitive impairment, and medical syndromes) (Rogers et al., 1998). According to Rogers et al. (1998), the feigning of medical conditions seemed to play a significant role in forensic and nonforensic cases and was influenced by the "adversarial context of the assessment."

In addition, understanding explanatory models is important for two reasons (Rogers et al., 1994). First, knowledge about malingerers' motivation may help psychologists develop more effective measures for discovering malingering by accounting for "trait and situational variables" (Rogers et al., 1994, p. 544). Second, researchers explain a psychologists' views regarding malingers' motivations may unduly influence their assessment and consequent recommendations (Rogers et al., 1994). For example, the DSM-III-R's endorses a criminological model, which emphasizes, antisocial backgrounds and forensic settings (Rogers et al., 1994).

Assessing Malingering

The DSM-V (American Psychiatric Association, 2013) provides that malingering should be "strongly suspected" if "any combination" of the following factors are present:

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1. A medicolegal context of presentation (e.g., a person is referred by an attorney to the clinician, or a person self-refers because of pending litigation or criminal charges);

2. A marked discrepancy between the person's claimed stress from the disability and the objective findings;

3. A lack of cooperation during the diagnostic evaluation and in complying with the prescribed treatment regimen;

4. The presence of antisocial Personality Disorder

(p. 726).

These criteria, however, are not particularly useful in identifying malingerers (Anderson, 2008). Additionally, Anderson (2008) argues there are not any established diagnostic criteria for malingering. However, there are several traditional assessments used for detecting malingering, such as, Minnesota Multiphasic Personality Disorder-2 (MMPI-2) (Butcher, Dahlstrom, Graham, Tellegen & Kaemmer; 1989), the Personality Assessment Inventory (PAI) (Morey, 1991), the Structured Interview of Reported Symptoms (SIRS) (Rogers, Bagby & Dickens, 1992) and the Structured Inventory of Malingered Symptomatology (SIMS) (Widows & Smith, 2005).

The MMPI-2 is one of the most frequently used personality tests in mental health, used to assist in identifying personality structure and psychopathology (Berry, Baer, & Harris, 1991; Butcher et al., 1989; Witt & Weitz, 2007). It is used in the context of detecting malingering in the context of psychological problems (Berry, Baer, & Harris, 1991). This test was not specifically designed to assess malingering (Witt & Weitz, 2007). However, the MMPI-2 has a relevant scale for the detection of malingering (Witt & Weitz, 2007). The MMPI is a series of 567 items designed to detect various psychological phenomena with an administration time

between 60-90 minutes (Butcher et al., 1989). The MMPI has an "F scale," or infrequency scale, which addresses symptoms that are associated with serious psychopathology but are rarely found in patients with serious disorders (Butcher et al., 1989). That is, most genuine psychiatric patients would report a subset of the items, but not all of them (Berry, Baer, & Harris, 1991). An endorsement of all items would indicate either "extreme psychosis," a "cry for help," random responding, or malingering (Berry et al., 1991, p. 586). Based on a meta-analysis of 28 studies, Berry et al. (1991) found that the MMPI scales accurately separate known or "suspected" malingerers from those completing the inventory honestly.

Baer, Wetter and Berry (1992) explore underreporting of psychopathology on the MMPI, employing meta-analytic techniques with respect to 25 studies. In these studies, researchers compared subjects giving honest responses to subjects underreporting psychopathology (Baer et al., 1992). The results suggested that those who underreport psychopathology differ from those who respond honestly (Baer et al., 1992).

The Personality Assessment Inventory (PAI) is a 344-item inventory that identifies overreporting of psychopathology with an administration time of about 50 minutes to complete (Morey, 1991). According to Rogers, Ornduff, and Sewell (1993), the PAI is a significant development in psychopathological assessment. Hawes and Boccaccini (2009) describe the PAI as a self-administered objective personality measure used to assess critical client variables. Hawes and Boccaccini (2009), report that support for the PAI in forensic and correctional contexts has increased rapidly.

The PAI includes the following three validity measures to identify overreporting of psychological problems: Negative Impression Scale (NIM), Malingering Index (MAL), and Rogers Discriminate Function (RDF) (Hawes & Boccaccini, 2009; Morey, 1996).

The NIM consists of PAI items that are not frequently endorsed in the community and clinical normative samples (Morey, 1996). The NIM is not, *per se*, a malingering scale, which may limit the use of NIM score as an indicator of psychopathology malingering (Morey, 2007, p. 29). Rogers et al. (1993) explored the efficacy of the NIM scale in detecting *naïve* (i.e., undergraduates with minimal preparation) and *sophisticated* (psychology graduate students with one week of preparation) subjects who were instructed to simulate specific psychological disorders. The researchers found that the NIM cutting score was effective, specifically for detecting the participants that were feigning schizophrenia and somewhat effective for detecting the participants that were feigning depression (Rogers et al., 1993). However, the NIM cutting score was not effective for detecting the participants that were feigning generalized anxiety disorder (Rogers et al., 1993). The more *sophisticated* students did not appear to be more effective feigners (Rogers et al., 1993). However, the more *sophisticated* students simulated depression at higher clinical elevations (Rogers et al., 1993). More importantly, this study obtained similar results of another study that indicated the PAI level of accuracy to detect feigning of an affectively based disorder, such as generalized anxiety disorder is low (Rogers et al., 1993).

Another study concerning the PAI investigated the association between the NIM scale and clinical scales in the normative standardization sample (Hopwood, Morey, Rogers & Sewell, 2007). Researchers tested Morey's (1999) method which contrasts predicted NIM scale scores against observed scores in order to interpret deliberately feigned disorders (Hopwood, et al., 2007). Hopwood, et al. (2007) found that this method was effective in identifying distortion for individuals who attempt to feign major depressive disorder, generalized anxiety disorder, and schizophrenia.

The second and third PAI measures used to detect over reporting of psychopathology, report Hawes and Boccaccini (2009), were developed specifically to identify malingering. The Malingering Index (MAL) is based on eight characteristics which are often correlated with feigned psychological problems (Hawes & Boccaccini, 2009; Morey, 1996). For instance, those with genuine depression problems tend to report that they want to be treated (Hawes & Boccaccini, 2009; Morey, 1996). Accordingly, on the MAL Index, those who report depression but do not want treatment are suspected malingerers (Hawes & Boccaccini, 2009; Morey, 1996). The Rogers Discriminant Function (RDF) was developed during a study by Rogers, Sewell, Morey and Ustad (1996) and proved to be an accurate screening measure. The RDF is based on a "weighted combination of 20 PAI scale scores and a constant value" (Hawes & Boccaccini, 2009, p. 112). Hawes and Boccaccini (2009) found that the PAI validity is comparable to the MMPI-2.

Similar to the MMPI-2 and PAI objective personality assessments, but developed specifically to detect malingering, is the Structured Interview of Reported Symptoms (SIRS) (Rogers et al., 1992: Witt & Weitz; 2007). The SIRS, currently SIRS-2, is a 172-item structured interview designed to detect malingering and other forms of feigning of psychiatric symptoms with an administration time between 45 and 60 minutes (Rogers et al., 1992; Rogers, Gillis, Dickens, and Bagby, 1991; Rogers, Sewell & Gillard, 2010). The SIRS was devised to evaluate strategies used to assess malingering (Rogers et al., 1991).

One of the first studies to test the validity of the SIRS used male inmates split into two groups (25 were asked to fake a mental illness and 26 were controls) (Rogers, Gillis, and Bagby, 1990). According to Rogers et al. (1990), six of the 13 SIRS scales differentiated between subjects that were simulating feigning and one that were not.

Rogers et al. (1991) conducted two studies to evaluate the SIRS discriminant and concurrent validity. In the first study, there were four groups (two groups were given the instruction to feign a serious mental illness and two groups were controls), and the researchers found that there was a high level of discriminability between simulators and controls (Rogers et al., 1991). In the second study 25 suspected malingerers were compared to 26 psychiatric inpatients and nine of the 13 SIRS scales discriminated between the two groups (Rogers et al., 1991). However, this indicates that not all the SIRS scales can effectively evaluate malingerers (Rogers et al., 1991).

Other researchers have sought to test the effectiveness of the SIRS in detecting specific malingering (i.e., as to schizophrenia, mood disorders, and PTSD) (Rogers, Kropp, Bagby, and Dickens, 1992). The researchers found that in the clinical samples the SIRS was effective in detecting malingering and suggested further research regarding the fabrication of specific mental disorders using other tests (Rogers et al., 1992).

The Structured Inventory of Malingered Symptomatology (SIMS) is a 75-item self-report screening tool that assesses for malingered symptoms (Rogers & Cruise, 1998; Smith, 1997; Smith & Burger, 1997; Widows & Smith, 2005). The SIMS contains five scale domains including psychosis, neurological impairment, amnestic disorders, low intelligence, and affective disorders (Smith, 1997; Smith & Burger, 1997; Rogers & Cruise, 1998; Widows & Smith, 2005). The SIMS contains cutoff scores that indicate the likelihood that malingering is occurring (Rogers and Cruise, 1998). Researchers found that the SIMS was an accurate screening tool for assessing malingering (Edens, Otto, & Dwyer, 1999; Rogers, Hinds, & Sewell, 1996; Smith & Burger, 1997). However, researchers found that the SIMS produces higher false positive rates,

meaning the results will indicate that a person is malingering when in fact his or her symptoms are genuine, when used in a clinical setting (Edens et al., 1999).

Although, the MMPI, SIRS, SIMS, and PAI (traditional non-computer-based assessments) are all used for detecting malingering, those assessments are time consuming to take, with a range of 75 to 567 items and a minimum of 45 to 60 minutes to administer (Butcher et al., 1989; Morey, 1991; Rogers & Cruise, 1998; Rogers et al., 2010; Rogers et al., 1992; Rogers et al., 1991; Smith, 1997; Smith & Burger, 1997; Widows & Smith, 2005). However, there is another assessment, the Automated Neuropsychological Assessment Metrics (ANAM), which is a computer-based battery of tests designed to assess various cognitive skills (Kabat, Kane, Jefferson, & DiPino, 2001; Reeves, Winter, Bleiberg, & Kane, 2007). The time required to administer the four ANAM scales is between 15 and 20 minutes, making it an attractive tool diagnosis, as well as for research purposes. Using a computerized neurological assessment, such as the ANAM, may affect the outcome scores because the administration time is less and the measurement of the response time may be more accurate, detecting subtle changes in cognition (Jones, Loe, Krach, Rager, & Jones, 2008; Roebuck-Spencer, Vincent, Gilliland, Johnson, & Cooper, 2013).

Presumably, the ANAM would discriminate whether an individual is malingering and will be sensitive to the specific behaviors of underperformance or poor effort (Reeves et al., 2007; Roebuck-Spencer et al., 2013). The ANAM's throughput measure "has proven to be one of the most sensitive metrics for detecting change in performance" (Reeves et al., 2007, p. S17). The ANAM is frequently used for a baseline assessment (e.g., before military personnel are deployed overseas) and detecting Mild Traumatic Brain Injury (mTBI) in the military (Johnson, Gilliland, K., & Vincent, 2009; Roebuck-Spencer, Vincent, Twillie, Logan, Lopez, Friedl, &

Gilliland, 2012; Vincent, Roebuck-Spencer, Gilliland, & Schlegel, 2012) and for sport concussions (Cernich, Reeves, Sun, & Bleiberg, 2007).

The Assistant Secretary of Defense for Health Affairs chose the ANAM as the pre- and post-deployment assessment as a response to Congress requiring all U.S. Military Service Members to be assessed and because research has shown it is sensitive to early effects of a concussion (Roebuck-Spencer et al., 2013; United States House of Representatives H.R. 4986, 2008).

Motivation, Motivational Theory, and Malingering

Motivation is what drives people to engage in specific behaviors. There are two types of motivation: intrinsic and extrinsic. Intrinsic motivation is defined as a person's motivation to be involved in an activity for its own sake (Eggen & Kauchak, 2010). Extrinsic motivation is when a person is motivated to perform a behavior or engage in an activity to earn a reward or avoid a punishment (stimulus-response) and physiological drives (Csikszentmihalyi & Nakamura, 1989). Some examples of extrinsic motivation include money, tangible rewards, coercion, and/or threats of punishment.

As stated above, a person can have various motivations to malinger; many researchers first identified malingering in the context of avoiding military service (e.g., Anderson, 2008; Collie, 1917; Mendelson & Mendelson, 2004; Resnick, 1994). Collie (1917) explains that malingering detection was used during World War I because men wanted to escape the war. However, in the modern clinical setting, the incentive to malinger is often based upon avoidance of legal liability or the desire to obtain financial compensation or some other anticipated reward (Anderson, 2008; Erdal, 2009; Resnick, 1994).

For example, an accused criminal may attempt malingering to avoid liability, by feigning incompetence to stand trial (i.e., that the criminal cannot understand the nature of the charges against him or aid in his defense) or by feigning insanity at the time of the criminal act (Adelman & Howard, 1984; Mendelson & Mendelson, 2004; Resnick, 1994). A criminal defendant may also feign mental disability or diminished mental capacity which, while not rising to the level of a technical "defense," may be relevant to the mitigation of the criminal act (Adelman & Howard, 1984; Resnick, 1994).

In addition, malingering is often suspected when an individual has a personal injury claim and is eligible to receive compensation, specifically once a lawsuit is filed (Anderson, 2008). In addition to financial rewards and other obvious benefits described by Anderson (2008), some researchers suggest that individuals may falsely report or exaggerate an illness to seek the attention naturally paid to someone who is sick (Rogers & Payne, 2006). Furthermore, convicted criminals may malinger to obtain psychiatric drugs or to be transferred from a prison to a psychiatric hospital (Resnick, 1994).

Youngjohn, Davis, and Wolf (1997) studied the effects of financial compensation on malingering. The participants consisted of 60 patients consisting of mild and severe head injured patients (Youngjohn et al., 1997). The participants were split into three groups: 1. Nonlitigating severely head injured patients, 2. Litigating severely head injured patients, and 3. Litigating mildly head injured patients (Youngjohn et al., 1997). The Minnesota Multiphasic Personality Disorder-2 (MMPI-2) was administered to all participants (Youngjohn et al., 1997). Youngjohn et al. (1997) found significant differences on the basic scales of the MMPI-2, such as the Schizophrenia (Sc) scale. Litigating, both mild and severe head injured patients had greater elevations on the Sc scale than the nonlitigating severely head injured patients (Youngjohn et al.,

1997). This finding demonstrates a difference in reported pathology between participants having the opportunity to receive financial compensation and those who do not (Youngjohn et al., 1997).

In addition, Greve, Bianchini, Mathias, Houston, and Crouch (2003) studied the effects of financial compensation on malingering. The participants consisted of 65 patients referred for a neuropsychological evaluation for mild traumatic brain injury (MTBI) (Greve et al., 2003). Twenty-eight of the participants met the Slick, Sherman, and Iverson (1999) criteria for "malingering of neurocognitive dysfunction" (MND) (Greve et al., 2003, p. 248). Slick et al. (1999) defines MND as the "volitional exaggeration or fabrication of cognitive dysfunction for the purpose of material gain, or avoiding, or escaping formal duty or responsibility" (p. 552; Greve et al., 2003, p. 248). Thirty-seven of the patients did not meet the Slick et al. (1999) criteria and were considered the control group because they did not have the opportunity to receive external incentives (Greve et al., 2003). All participants completed the Wechsler Memory Scale (WMS) and the Wechsler Adult Intelligence Scale (WAIS) (Greve et al., 2003). The probable MND group performed significantly worse than the control group on both the WMS and WAIS (Greve et al., 2003). However, the control group sustained more severe injuries overall in comparison to the probable MND group (Greve et al., 2003). Therefore, the participants receiving external incentives were more likely to malinger neurocognitive dysfunction and performed more poorly on the neuropsychological assessments than participants who did not receive an external incentive (Greve et al., 2003).

Erdal (2009) explored various types of motivational influences in relation to malingering. In her study, the participants were given different types of motivational incentives and administered neuropsychological assessments (Erdal, 2009). Participants were assigned to one

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of the four motivational conditions (no motivation, avoiding blame, compensation, and attention-seeking) and were instructed with additional instructions accordingly (Erdal, 2009). All participants were instructed to assume the role of a person who was in a car accident which caused minor brain damage but after a few months start to "feel normal again" while they are completing the assessments (Erdal, 2009, p. 48). The no motivation group received no additional instructions (Erdal, 2009). The avoid blame group was instructed to pretend they were still suffering from brain damage in order to reduce financial liability and criminal repercussions because a jury would be "more lenient on a disabled or suffering defendant" (Erdal, 2009, p. 48). The compensation group was instructed to feign cognitive impairment in order to receive a large settlement (Erdal, 2009). The attention seeking group were instructed to pretend they were still suffering from brain damage in order to continue to receive attention from friends and family (Erdal, 2009).   All groups completed (a) the Dot Counting Test (a participant's responses and errors are assessed with task difficulty; DCT), and (b) California Verbal Learning Test (immediate memory span, inference, short-term and long-term retention, and recognition are assessed), Benton Visual Retention Test (assesses visual recall) (Erdal, 2009).

Erdal (2009) found participants assigned to the compensation (were instructed the accident was another person's fault) and attention-seeking (were instructed that the accident was their own fault) motivational conditions were associated with the lowest performance on all three assessments in comparison to participants provided instructions to avoid blame (instruction to avoid blame for an accident) or no motivational instructions. The effect was similar between compensation-seekers and attention-seekers (Erdal, 2009). That is, those motivated by financial reward performed similarly to those who desired attention (Erdal, 2009). Thus, except for the

avoid blame condition, motivation to malinger for compensation or attention-seeking, significantly impacted test performance negatively (Erdal, 2009).

In a similar study, Erdal (2004) found motivation and coaching altered the performance of simulated malingering of head injury participants. Erdal (2004) assigned participants, 91 introductory psychology and 34 advanced neuroscience undergraduates, to one of the three motivational conditions (no motivation, avoiding blame, and compensation) and one of three coaching conditions (no coaching, coaching post-concussive symptoms, and coaching symptoms plus warning malingering detection) and received additional instructions based upon group placement. The no motivation and no coaching groups received no additional instructions. The avoid blame group was instructed to pretend they were still suffering from brain damage to reduce financial liability and criminal repercussions because a jury would be "more lenient on a disabled or suffering defendant" (Erdal, 2004, p. 85). The compensation group was instructed to feign cognitive impairment to receive a large settlement (Erdal, 2004). The coaching post-concussive symptoms group was instructed to feign post-concussive symptoms, such as, poor concentration (difficulty paying attention) and memory (remembering things, learning new material, and "think slower than they used to") (Erdal, 2004, p. 85). The coaching symptoms plus warning malingering detection ("coaching plus warning") group received the same instruction as coaching post-concussive symptoms group and a warning that extreme exaggeration of symptoms are easy to detect (Erdal, 2004). The coaching plus warning and compensation motivation group received the same instruction as each individual group with the additional instruction, if you are caught malingering, you will lose your lawsuit (Erdal, 2004). The coaching plus warning and avoid blame motivation group received the same instruction as each individual group with the additional instruction, if you are caught malingering, you will be

financially and criminally liable for the accident (Erdal, 2004). The coaching post-concussive symptoms and avoid blame motivation group received the same instruction as each individual group. The coaching post-concussive symptoms and compensation motivation group received the same instruction as each individual group. All groups completed the Dot Counting Test (DCT), which matches each participant's responses and errors with task difficulty evaluating whether there is a discrepancy.

Erdal (2004) found the motivation an individual has for malingering impacts the extent of his feigning, specifically for the motivational condition of gaining compensation. Erdal (2004) theorizes people are more likely to malinger to receive a financial benefit than other benefits, such as, not being blamed for an accident. Previous research indicates the explanation for this finding is a person becomes more of a risk-taker (i.e. malingerer) when provided the opportunity to gain a tangible reward (i.e. financial benefit) (Erdal, 2004). However, a person being faced with avoiding a potential threat (i.e. not being blamed for an accident) is more likely to be more risk-averse (Erdal, 2004).

The coaching plus warning and compensation group performed as poorly on the DCT as the participants in the other coaching groups (Erdal, 2004). The possible explanation for this finding was that the motivation of a financial benefit was so vast, the warning not to overly exaggerate symptoms was negated (Erdal, 2004). In addition, the coaching plus warning neutralized malingering on memory tasks but not timed tasks because the warning instruction only mentioned severe memory deficits as an indication of malingering (Erdal, 2004). Therefore, motivation can significantly affect one's ability to successfully malinger.

Importantly, Erdal (2004) found a significant interaction between motivation and coaching on the accuracy measure only, meaning the coaching plus warning and compensation

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group were more accurate in sequencing their time pattern on the DCT. The limitation of this study was the small sample size of 34 participants having knowledge of neuropsychology randomly assigned to 10 groups (i.e. three to four participants per group).

However, regardless of motivation, malingering is often suspected in cases where the symptoms of a claimed illness or injury are subjective and not accompanied by objective, physical indicators (Anderson, 2008). For example, extreme anxiety may be based mostly on subjective symptoms. A discrepancy between subjective symptoms and objective indicators does not always indicate malingering (Rogers & Payne, 2006). Because it requires intentional feigning or exaggeration of symptoms, malingering necessarily does not include chronic disorders that involve maladaptation. (Rogers & Payne, 2006). The essential question is whether the subject's poor adjustment is the result of authentic but ineffective coping or a dishonest effort to lengthen the chronic disorder (Rogers & Payne, 2006).

Individuals may adopt certain "adjustment styles" which are not conducive to improvement of chronic disorders, but which are nevertheless distinct from malingering (Radley & Green, 1987). In particular, pursuant to the adjustment style known as *accommodation*, individuals allow their illness to define their sense of self, becoming an ever present part of their identity (Rogers & Payne, 2006). Another maladaptive adjustment style is known as *resignation*, which occurs when the individual losses his or her belief in recovery and becomes completely overwhelmed by the illness (Rogers & Payne, 2006). Implicit in the distinction between malingering and the aforementioned maladaptive adjustments to chronic disorders is the idea that individuals experiencing the latter are not consciously or intentionally adopting these poor adjustment styles in order to feign or exaggerate their symptoms (Rogers & Payne, 2006).

Thus, within the concept of malingering are imbedded various constructs of motivational theory (Rogers & Payne, 2006). The consideration of these constructs is important in both understanding malingering and assessing malingering (i.e., distinguishing malingering from other responses to chronic illness, which might be quite impossible without reference to internal mental processes) (Anderson, 2008; Constantinou & McCaffrey, 2003; Erdal, 2009; Nagle, Everhart, Durham, McCammon, & Walker, 2006). In other words, because malingering is an intentional, motivated behavior, it is not easily understood without reference to the ideas of mind and consciousness, which behaviorism had cast aside as superfluous and metaphysical (Anderson, 2008; Constantinou & McCaffrey, 2003; Erdal, 2009; Nagle et al., 2006).

Even though there are various implications of malingering, many professionals do not have more than just a general understanding of what malingering is, why people malinger, and how malingering can best be detected (Constantinou & McCaffrey, 2003; Nagle et al., 2006). For practitioners to understand malingering, they must understand how the theoretical constructs within motivational theory, such as, expectancy x value theory, relate to why and how people malinger (Anderson, 2008; Constantinou & McCaffrey, 2003; Erdal, 2009; Nagle et al., 2006).

Expectancy x value theory combines one's expectancy to succeed and the value placed on successfully achieving a given task (Atkinson, 1957; Eccles & Wigfield, 2002; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000). The original expectancy x value theory included the interaction of three variables: expectancy, incentive, and motive (Atkinson, 1957; Eccles et al., 1998). An expectancy is defined as one's belief or probability of success of future performance on a specific ask (Atkinson, 1957; Eccles et al., 1998). An incentive represents one's relative attractiveness of succeeding on a specific task, such as receiving a

reward or avoiding punishment (Atkinson, 1957; Eccles et al., 1998). A motive is one's capacity for satisfaction of acquiring a specific incentive (Atkinson, 1957).

Modern expectancy x value theory is more complex and related to a broader variety of principles (Eccles & Wigfield, 2002; Eccles et al., 1998; Wigfield, 1994; Wigfield & Eccles, 1992, 2000). An individual's perception of his own previous experiences, goals, perceived difficulty of a task, ability beliefs, and other social psychological influences, such as choice and persistence, affect an individual's expectancies and values (Eccles et al., 1998; Wigfield & Eccles, 1992, 2000). Ability beliefs differ from expectancy probability because they are defined as an individual's perception about her competence on a specific task (Wigfield & Eccles, 2000). In relation to education, Eccles et al. (1998) explained their expectancy x value model with three simple questions children ask themselves: "Can I do this task?" "Do I want to do this task and why?" and "What do I have to do succeed on this task?" (Wigfield, Eccles, Fredricks, Simpkins, Roeser, & Schiefele, 2015, p. 659). If children answer "yes" to the question "Can I do this task?" they will put forth more effort, persist longer, achieve higher expectations, and choose more challenging tasks (Eggen and Kauchak, 2010, Wigfield et al., 2015). The second question "Do I want to do this task?" is important because even if a person believes she can complete a task, it does not mean the person is motivated to do so (Wigfield et al., 2015). The question "What do I have to do succeed on this task?" is related to an individual's ability to regulate their behavior (Wigfield et al., 2015).

In relation to malingering, expectancy x value theory would predict that the motivation to malinger is a function not only of financial incentives but also requires expectations that one can malinger well and will not be caught doing so. A person may believe he or she can malinger well if he or she is coached or has knowledge on the specific disorder expected to be feigned.

Specifically, if a participant is coached on mTBI, he or she will be more confident about feigning mTBI because he or she will have knowledge of the symptoms. One would therefore predict, if the participant is confident about completing the task (i.e. malingering well and without being caught) due to the effects of coaching and is provided a motivation incentive to malinger undetected, then he or she will put forth more effort to malinger undetected. If this happens, the ANAM total accuracy scores for the coached plus motivational condition group will be significantly greater than chance. Individuals without impairment typically perform in the 80th percentage range on many ANAM subscales (Roebuck-Spencer et al., 2013; Vincent et al., 2012). Further, individuals with known cognitive impairment typically perform significantly above the 50th percentage range (Roebuck-Spencer et al., 2013; Woodhouse, J., Heyanka, D. J., Scott, J., Vincent, A. S.,Roebuck-Spencer,T. M.,Domboski, K., et al., 2013). Therefore, if a person received significantly low—atypical—scores in total items correct, the person will be caught exhibiting poor effort (Roebuck-Spencer et al., 2013). Additionally, the ANAM-PVI scores (i.e. indicates a participant's effort) will differ between the treatment groups and the control group, as the control group will be instructed to perform their best. The reasoning for this prediction is outlined below.

Coaching Malingering

Coaching can complicate the detection of malingering. Coaching a participant can affect the outcome of particular measures (Hawes & Boccaccini, 2009; Hickling, Taylor, Blanchard & Devineni, 1999; Rogers, Gillis, Bagby, & Monteiro; 1991). In a previous study, there was a significant difference in the effects of coaching between identifying feigning of severe mental disorders as opposed to mood and anxiety disorders (Hawes & Boccaccini, 2009). In another study, coached students achieved higher clinical elevations in simulating depression (Rogers et al., 1993).

Rogers at al. (1991) investigated whether coaching had an effect on a person's ability to fake a serious mental disorder. The participants consisted of 90 undergraduate students split into three groups: 1. Uncoached, 2. Coached, and 3. Control (Rogers et al., 1991). The uncoached group was instructed to feign mental illness and given several minutes to prepare before SIRS was administered. The coached group was instructed to feign mental illness, given a two-page description on feigning mental illness, and given several minutes to prepare before SIRS was administered. The control group were instructed to be honest in their responses and given several minutes to prepare before SIRS was administered. All participants were administered the SIRS. Rogers at al. (1991) found the participants modified their responses by decreasing their scores on the SIRS when they were coached regarding the disorder they were trying to fake.

Hickling et al. (1999) sought to determine whether participants could replicate answers associated with certain psychological disorders by coaching some participants regarding the diagnostic criteria for those disorders. The participants consisted of 130 community-dwelling adults and students randomly assigned to one of two groups (trained or naïve) (Hickling et al., 1999). The trained group was coached using the DSM-IV criteria for Major Mood Disorder (MMD) and Posttraumatic Stress Disorder (PTSD) (Hickling et al., 1999). The naïve (untrained) group were instructed to feign a psychological disorder caused by a motor vehicle accident (Hickling et al., 1999). All participants were instructed to complete the questionnaires as a victim of a motor vehicle accident would (Hickling et al., 1999). The participants coached in the diagnostic criteria could simulate the symptoms of PTSD (Hickling et al., 1999). The authors suggested additional studies exploring the possible effects of varying incentives to mimic symptoms (Hickling et al., 1999).

In the legal field, attorneys may coach their clients to prepare them for litigation. However, if an attorney, in order to strengthen a client's case, coaches a client to change his behavior in an examination for a more favorable outcome, then the attorney would be engaged in *diagnosing coaching* (Gutheil, 2003). *Diagnosing coaching* is a serious ethical violation on behalf of the attorney (Gutheil, 2003). Under the Nevada Rules of Professional Conduct, Rule 1.2(d), "a lawyer shall not counsel a client to engage, or assist a client, in conduct that the lawyer knows is criminal or fraudulent." Improperly coaching a client can arguably be considered fraud and an attorney may be disciplined. However, coaching may be unconscious, with the attorney's guidance "inadvertently slipping over the line" (Gutheil, 2003, p. 9). In this case, the attorney would not be intentionally coaching the client to change his behavior, and would therefore not be committing fraud. In some circumstances, it may be difficult to determine whether an attorney intentionally coaches a client to change his behavior.

Because of the prevalence of coaching and the significance coaching can have upon successful malingering, more research could be used in this subject area, with respect to the interaction, if any, between motivational condition and coaching.

Mild Traumatic Brain Injury

In 2012, traumatic brain injury (TBI) was estimated to occur in approximately 1.7 million individuals in the United States yearly (The CDC, NIH, DoD, and VA Leadership Panel, 2013). Approximately 80% of these injuries were diagnosed as mild TBI (mTBI) (The CDC, NIH, DoD, and VA Leadership Panel, 2013). The most widely used tests to assess the degree (mild, moderate, or severe) of TBI are the Glasgow Coma Scale (GCS) and computed tomography (CT) (Centers for Disease Control and Prevention, 2015). The GCS uses the following criteria to classify the severity of a TBI as mild: 1. Loss of consciousness less than 30 minutes, 2. Zero to

one day of post-traumatic amnesia, 3. Glasgow Coma Scale score of 13 to 15, 4. Normal

Structural Imaging, and 5. Abbreviated Injury Scale score: Head of one to two (Centers for

Disease Control and Prevention, 2015). Adults with mTBI perform more poorly on measures of

memory, processing speed, and poor concentration (Sours, C., Rosenberg, J., Kane, R., Roys, S.,

Zhuo, J., Shanmuganathan, K., & Gullapalli, R. P., 2015). Previous research has indicated

probable malingering is estimated in 30 to 40 percent of mTBI cases where an external incentive

(compensation) is to be gained (Larrabee, 2003; Larrabee, Millis, & Meyers, 2009).

Effort and Malingering

Effort is a part of malingering (Iverson, 2007). *Definite Malingering* occurs when poor

effort (i.e. below chance performance) that is *clear and convincing* is shown while testing

(Iverson, 2007, p. 131). Green, Rohling, Lees-Haley, and Allen (2001) determined lack of effort

explained approximately 50% of the variance in all test scores. The ANAM Performance

Validity Indicator (ANAM-PVI) was designed to detect poor effort while completing the

assessment (Roebuck-Spencer et al., 2013). The two measures used to calculate the ANAM-PVI

score are accuracy in response and response time (Roebuck-Spencer et al., 2013). The ANAM

subscales use a two-choice response task (Cognitive Science Research Center, 2014; Roebuck-

Spencer et al., 2013). The test taker can either left or right click the mouse when deciding

between one of the two answers (Cognitive Science Research Center, 2014). Thus, a range of

scores around 50 percent correct reflects chance responding (Roebuck-Spencer et al., 2013). As

previously stated, it is predicted that a participant intentionally exhibiting poor effort will

respond significantly below 50 percent (i.e. significantly below chance responding) in total items

correct (i.e. accuracy) on the subscales (Roebuck-Spencer et al., 2013). In regards to response

time, studies have shown participants attempting to feign cognitive impairment will typically

slow their response time (Bolan, Foster, Schmand, & Bolan, 2002; Roebuck-Spencer et al., 2013; Tan, Slick, Strauss, & Hultsch, 2002). It is theorized that people who are intentionally faking cognitive impairment will respond much slower than a person with a clinical diagnosis of cognitive impairment (Van Gorp et al., 1999). Another theory is that people who are intentionally faking cognitive impairment need more time to change their decision about responding to a test item (Bolan et al., 2002). For example, if a non-impaired adult is asked the answer to the problem 2 plus 2, he or she will automatically think 4. If the non-impaired adult is asked to answer the same a math problem as a person with a brain injury, he or she will take more time to answer because the correct answer will be thought of first and then he or she must choose the incorrect answer. In comparing the response time and accuracy scores to a reference group, the ANAM-PVI calculates the test-taker's effort while testing (Cognitive Science Research Center, 2014; Roebuck-Spencer et al., 2013). If a person scores within the outpatient reference group threshold (scores equal to or less than 14), he or she will be inside the range of a person putting forth optimal effort (Cognitive Science Research Center, 2014).

Roebuck-Spencer et al. (2013) studied the ANAM-PVI to validate measure and to create cut-points to minimize potential false-positive errors. One group of participants included 60 patients (93% men) diagnosed with an acquired brain injury ("patients")(Roebuck-Spencer et al., 2013). Other participant data were taken from the control and simulator groups in the initial simulation study (Johnson et al., 2009; Roebuck-Spencer et al., 2013). Participants in these groups did not have a clinical diagnosis of TBI. The simulator group was told to feign a brain injury (Johnson et al., 2009); the control group was not. Roebuck-Spencer et al. (2013) found the ANAM-PVI scores differed among the three groups. The simulator group scored significantly higher (i.e. worse) on the ANAM-PVI than both the control and patient groups

(Roebuck-Spencer et al., 2013). Roebuck-Spencer et al. (2013) also found ANAM-PVI cut off scores should be greater than or equal to five to be appropriate for healthy participants. However, it is recommended that the ANAM-PVI cut off scores should be greater than or equal to 10 for patients with known cognitive impairment to reduce false positive errors (Roebuck-Spencer et al., 2013).

The limitations of this study included (a) the use of simulated rather than real-world incentives, (b) the participants were primarily male, (c) no baseline scores were used to assess changes in a participant's cognitive performance (Roebuck-Spencer et al., 2013). The use of simulated incentives may not provide the external motivation needed for college students to feign poor performance (Roebuck-Spencer et al., 2013). Therefore, the current study used real-world incentives to motivate the college student participants with a secondary gain for feigning poor performance. Additionally, baseline scores were assessed to observe changes in a participant's cognitive performance.

Study Focus and Research Questions

Despite increased understanding of malingering, there are still a variety of areas in which more research is needed. Many studies about malingering address the issue of motivation (Erdal, 2009; Erdal, 2004; Greve et al., 2003; Larrabee, 2003; Youngjohn et al., 1997). People who are motivated to feign a disorder would go to great lengths to learn about the particular disorder they are trying to emulate (Erdal, 2009). Within the construct of motivation, such studies try to explain why people would want to malinger, as well as whether motivation is correlated with successful malingering. Other studies look at how well people malinger depending on whether or not they have been coached in the diagnostic criteria for various mental disorders (Bagby et al., 2002; Bowen & Brant, 2006; Guriel-Tennant & Fremouw, 2006; Rogers et al., 1993; Rogers

et al., 1991; Rogers, Jackson, Sewell, & Salekin, 2005). These studies found coaching can modify the participant's response to the measure (Bagby, et al., 2002; Bowen & Brant, 2006; Guriel-Tennant & Fremouw, 2006; Rogers, et al., 1993; Rogers et al., 1991; Rogers, et al., 2005). One would expect coaching to be more effective when the individual is motivated, and motivational rewards to be more effective when an individual has the knowledge and skills to malinger. Expectancy x value theory in fact posits such an interaction. As previously stated, expectancy x value theory combines one's expectancy to succeed and the value placed on successfully achieving a given task (Atkinson, 1957; Eccles & Wigfield, 2002; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000). Therefore, if an individual is motivated to successfully malinger on an assessment (or places value on successfully completing the task) and is provided with the knowledge to successfully malinger to increase an individual's expectancy to succeed, then it is predicted the individual will put forth more effort (Eggen & Kauchak, 2010, Wigfield et al., 2015).

Both motivation and knowledge of disorders should be considered when trying to detect malingering. It would seem that people who are the most motivated to feign a disorder would go to great lengths to learn about the particular disorder they are trying to emulate. For example, someone who has the potential of getting a jury settlement of one million dollars by convincing his doctor, and ultimately a jury, that he has suffered from extreme pain after a car accident is probably going to try to learn as much as he could about the pain disorder he is trying to manifest. He is also likely to seek coaching from someone who knows about this disorder, and he may seek coaching from his attorney.

The current study sought to apply expectancy x value theory to explain and replicate the finding that receiving a motivational incentive and coaching (i.e., providing information about

mTBI symptoms) will significantly impact test performance. However, different from previous research, the motivation incentive provided was a tangible incentive (compensation, e.g. $50 gift card lottery) rather than the more common simulated one. The limitations of Erdal (2004, 2009) studies included using simulated rather than real-world incentives. It is possible participants would put forth greater effort to malinger undetected if they received a tangible incentive.

Additionally, Erdal (2004) had a small sample size of 34 participants having knowledge of neuropsychology randomly assigned to 10 groups (i.e. three to four participants per group) and was not able to determine which knowledge (i.e. previous knowledge versus knowledge gained from the coaching instructions) had an effect on the results. Erdal (2004, 2009) did not include baseline scores assessed before the participants were presented with the intervention. It is possible that participants would have scored the same on the assessment regardless of the condition randomly assigned, meaning, the effect did not come from the treatment. Also, the purpose of baseline scores or pre-test scores is to test for the presence of selection effects, i.e., whether there are significant initial differences between the groups. Therefore, the study included a larger sample size (27 participants per group), assessed baseline scores of all participants, and assessed knowledge as a covariate. The baseline scores of all participants were assessed by having the participants complete two administrations of the assessments in the study. As a result, time (pre- and post- treatment) was considered as a factor in this study.

The research questions addressed in this study are:

5) Is there a significant difference in performance between treatment and control groups on the pre- and post- ANAM total accuracy scores?

6) Is there a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores?

7) Do participants in the treatment groups (i.e. instructed to feign mTBI symptoms) differ in their ANAM Effort Measure in comparison to control?

8) Are there positive interactions between the motivation and coached conditions?

Based on the literature, the following hypotheses were made:

5) There will be a significant difference in performance between treatment and control groups on the pre- and post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions will decrease the ANAM total accuracy scores (feigning clinical mTBI) between the pre- and post-. The degree to which the ANAM total accuracy scores will be differentially influenced by coaching and motivation is exploratory.

6) There will be a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions will have lower ANAM total accuracy scores (feigning clinical mTBI) than the other groups. The degree to which the ANAM total accuracy scores will be differentially influenced by coaching and motivation is exploratory.

7) The participants who are trained to malinger mTBI will differ in their ANAM Effort Measure in comparison to control.

8) There will be a positive interaction between the motivation and coached conditions.

This study contributed to the research literature by providing additional information on the interaction between motivation and coaching in regards to simulating mTBI symptoms. In addition, currently, there is no research on the interaction between motivation and coaching and their effects in simulating mTBI on the ANAM. Therefore, the results of this study aid in determining whether there is a statistically significant interaction between coaching and motivation in general and while using the ANAM.

CHAPTER 3

METHODOLOGY

Participants

Participants consisted of 162 undergraduates and graduates enrolled in different sections of an educational psychology course. The participants were drawn from a large university in the southwest; they were drawn from a subject pool and participated to satisfy a course requirement (participation was graded credit/no-credit).

The characteristics of the final sample were as follows: The participants were primarily graduate students (53%), but 22% were juniors, 14% were sophomores, 8% were seniors, 2% were freshman. Of the participants, 65% were women and 46% were Caucasian; the remainder were Hispanic/Latino (22%), Asian American (12%), African American (12%), and multiple race (7%). Ages ranged from 18 to 60 (mean age was 27.63). GPA ranged from 2.2 to 4.0 (mean GPA was 3.48). Most of the participants were in an education graduate program (40%) or majoring in education (37%).

Materials

Automated Neuropsychological Assessment Metrics. The Automated Neuropsychological Assessment Metrics (ANAM) is a computer-based battery of tests designed to assess various cognitive skills but is not a clinical diagnostic tool (Kabat, Kane, Jefferson, & DiPino, 2001). Rather, it should be thought of as a screening tool to identify individuals for additional testing and diagnosis. It should be noted that these other tools and procedures are also susceptible to feigning. The ANAM battery used for this investigation consisted of four scales which are required to produce the performance validity index score. Each scale yields four

scores: accuracy (percentage of correct responses given by the participant), response time (mean response time for correct responses given), efficiency/throughput (combination of accuracy and speed) and the ANAM Performance Validity Indicator (ANAM-PVI) score. The scale descriptions are as follows:

1. Simple Reaction Time: This classic reaction time task requires participants to respond immediately, by clicking the left mouse button, to the presence of a stimulus (*) on the computer screen. There is a total of 25 stimuli presented on the screen with a maximum of 9000 milliseconds allowed for response.

2. Matching to Sample: This task is designed to assess the participant's ability to quickly and accurately choose a test stimulus, by clicking the left or right mouse button, which is identical to the stimulus presented 5 seconds previously (checkerboard matrix) on the computer screen. There is a total of 15 stimuli presented on the screen with a maximum of 8600 milliseconds allowed for response. The test taps short-term spatial memory and pattern recognition skills.

3. Procedural Reaction Time: This task presents stimuli (numbers 2,3,4, and 5) on the computer screen, one at a time. The participant is requested to respond by clicking the left mouse button if the stimulus is "low" (2 or 3), and the right mouse button if the stimulus is "high: (4 or 5). There is a total of 37 stimuli presented on the screen for up to 8000 milliseconds with a maximum of 9000 milliseconds allowed for response.

4. Code Substitution-Learning: This task presents stimuli (codes consisting of nine symbols paired with nine digits) on the computer screen. The participant is requested to review the code and decide if a pairing presented below the code is consistent with the code above and click the left mouse button for a correct pairing and right mouse

button for incorrect pairing. There is a total of 36 stimuli presented on the screen with a maximum of 9000 milliseconds allowed for response.

Please see Appendix II for examples of each subscale. Generally, a lower score on Matching-to Sample and Code Substitution-Learning is evidence of brain injury, as would longer simple and procedural reaction times. Short reaction times in conjunction with low performance is evidence of feigning.

The ANAM was designed to be immediately repeated (Kabat et al., 2001). Each time the ANAM is administered, the items are randomized, thus preventing a practice effect causing participants to have an advantage during the second administration of the ANAM (Jones, Loe, Krach, Rager, & Jones, 2008; Kabat et al., 2001). The ANAM was administered by computer in a classroom setting as per the instructions published in its manual. There are several studies supporting the construct validity of ANAM which indicate strong concordance between the ANAM and traditional neuropsychological measures (Bleiberg, Kane, Reeves, Garmoe, & Halpern, 2000; Vincent et al., 2012; Roebuck-Spencer et al., 2013).

Demographics Questionnaire. The Demographics questionnaire consisted of seven items, including demographic information (e.g. age, gender, major, etc.) and knowing someone with a diagnosis of Mild Traumatic Brain Injury (mTBI). Please see Appendix III.

Mild Traumatic Brain Injury Symptoms Checklist. The mTBI Symptoms Checklist is a self-report questionnaire designed to measure Mild Traumatic Brain Injury (mTBI) symptoms a person would exhibit as a result of a head injury. The mTBI Symptoms Checklist consists of 21 symptoms on a scale from 0 (Not Present) to 6 (Severe). Subsumed within these 21 symptoms are 12 symptoms that make up the Concussion Symptom Inventory (Randolph, C., Millis, S., Barr, W., McCreae, M., Guskiewicz, K., Hammeke, T., et al., 2009). For example,

one question asks participants, if the symptom is present now, please rate the severity of the symptom "Easily distracted." Please see Appendix IV for the additional questions.

Design and Procedure

University students from the Department of Educational Psychology and Higher Education's subject pool volunteered for this study to fulfill a general research requirement in their classes. Participants were made aware that they can withdraw from participation at any time without penalty. Students received credit for participating regardless of their performance in this study. Testing was completed in one phase. The on-campus session took between 45 and 60 minutes.

At the beginning of the in-person session, all participants were asked to review and complete consent forms. Once completed, all participants completed a short demographic survey. Then, all participants were instructed to pretend they were exhibiting mTBI symptoms while completing the mTBI Symptoms Checklist.

All participants completed four Automated Neuropsychological Assessment Metrics (ANAM) scales which were as follows: 1. Simple Reaction Time, 2. Matching to the Sample, 3. Procedural Reaction Time, and 4. Code Substitution-Learning. These served as a baseline. All participants were told to give their best effort during the first administration of the assessments.

Then, the participants were randomly assigned into six groups. Group 1 was assigned the coached plus warning instruction and informed if they can "successfully" feign mTBI during the second administration of the assessments, they would receive the incentive. Group 2 was assigned the coached instruction and informed if they can "successfully" feign mTBI during the second administration of the assessments, they would receive the incentive. Group 3 was

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assigned the uncoached instruction and told if they can "successfully" feign mTBI during the

second administration of the assessments, they would receive the incentive. Group 4 was

assigned the coached plus warning instruction and told to feign mTBI symptoms with no

incentive during the second administration of the assessments. Group 5 was assigned the

coached instruction and told to feign mTBI symptoms with no incentive during the second

administration of the assessments. Group 6 (optimal performance group/control) was told to

give their best effort during the second administration of the assessments.

Group 1 (Coached + Warning/Incentive) will be as follows:

> For the following task, using the attachment provided, I want you to alter your performance to appear as though you should be diagnosed with Mild Traumatic Brain Injury (mTBI).

> I want you to pretend about a month ago you were in a car accident, and you hit your head. You were knocked out. When you woke up, the doctors told you that you had suffered a brain injury from the accident. You were hospitalized overnight for observation and then released.

> You will be eligible for participation in a $50 gift card lottery **if you can**:

>> (1) be identified, based on your symptoms, as a person having mTBI, and

>> (2) avoid being identified as faking the disorder.

> To avoid being identified as faking, do not exaggerate your symptoms too much. For example, if you incorrectly answer all the questions or answer the questions too slowly, the assessment will detect you as a faking a brain injury. Please put forth your best effort to pretend you have mTBI.

Group 2 (Coached/Incentive) will be as follows:

> For the following task, using the attachment provided, I want you to alter your performance to appear as though you should be diagnosed with Mild Traumatic Brain Injury (mTBI).

> I want you to pretend about a month ago you were in a car accident, and you hit your head. You were knocked out. When you woke up, the doctors told you that you had suffered a brain injury from the accident. You were hospitalized overnight for observation and then released.

You will be eligible for participation in a $50 gift card lottery **if you can:**

(1) be identified, based on your symptoms, as a person having mTBI, and

(2) avoid being identified as faking the disorder.

Please put forth your best effort to pretend you have mTBI.

Group 3 (Uncoached/Incentive) will be as follows:

For the following task, I want you to alter your performance to appear as though you should be diagnosed with Mild Traumatic Brain Injury (mTBI).

I want you to pretend about a month ago you were in a car accident, and you hit your head. You were knocked out. When you woke up, the doctors told you that you had suffered a brain injury from the accident. You were hospitalized overnight for observation and then released.

You will be eligible for participation in a $50 gift card lottery **if you can:**

(1) be identified, based on your symptoms, as a person having mTBI, and

(2) avoid being identified as faking the disorder.

Please put forth your best effort to pretend you have mTBI.

Group 4 (Coached +Warning /No incentive) will be as follows:

For the following task, using the attachment provided, I want you to alter your performance to appear as though you should be diagnosed with Mild Traumatic Brain Injury (mTBI).

I want you to pretend about a month ago you were in a car accident, and you hit your head. You were knocked out. When you woke up, the doctors told you that you had suffered a brain injury from the accident. You were hospitalized overnight for observation and then released.

To avoid being identified as faking, do not exaggerate your symptoms too much. For example, if you incorrectly answer all the questions or answer the questions too slowly, the assessment will detect you as a faking a brain injury.

Please put forth your best effort to pretend you have mTBI.

Group 5 (Coached/No incentive) will be as follows:

For the following tasks, using the attachment provided, I want you to alter your performance to appear as though you should be diagnosed with Mild Traumatic Brain Injury (mTBI).

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I want you to pretend about a month ago you were in a car accident, and you hit your head. You were knocked out. When you woke up, the doctors told you that you had suffered a brain injury from the accident. You were hospitalized overnight for observation and then released.

Please put forth your best effort to pretend you have mTBI.

Group 6 (Optimal Performance) will be as follows:

For the following tasks, I want you to give your best effort.

Groups 1, 2, 4 and 5 received a one-page document including several mTBI symptoms listed in the DSM-V (American Psychiatric Association, 2013). Please see Appendix V.

Similar to Nagle et al. (2006) and Erdal (2004), Groups 1, 2, and 3 instructions emphasized to participants, the simulated incentive they could receive is directly related to their efforts at feigning mTBI. In addition, the participants were eligible for an actual incentive for participation (i.e a $50 gift card lottery). To comply with the Institutional Review Board (IRB) requirements, all participants were eligible for the incentive after completion of the study. Thus, a small amount of deception was used.

Once the instructions were read, the mTBI Symptoms Checklist and the four ANAM scales were re-administered, respectively.

The experiment used a 2 x 3 x 2 mixed factorial repeated measures design, with a coached condition (coached plus warning, coached, not coached) as one factor, a motivational incentive) goal (versus no goal) as the second factor, and time as the third factor (see Table 1). The independent variables were whether the participant received the coached plus warning, coached, or uncoached instruction, whether the participant received the motivational (incentive) goal instruction, and time (pre- post- administration). The dependent variables included the total accuracy (i.e. total percentage correct) scores of the four ANAM subscales and the ANAM Performance Validity Indicator (ANAM-PVI) score (Effort Measure). Although the ANAM

does not have an embedded malingering scale, the ANAM Effort Measure scores were used for

evaluating the validity of scores. Any values rated as poor effort (i.e. scores 14 and above) on

the ANAM Effort Measure were considered a detection of malingering due to lack of effort

while completing the assessment.

Table 1

Study Design (2 x 3 x 2 Mixed Factorial)

	Motivational Goal (Incentive)	No Motivational Goal (No incentive)
Coached + Warning condition	Pre- v. Post-treatment	Pre- v. Post-treatment
Coached condition	Pre- v. Post-treatment	Pre- v. Post-treatment
Not coached condition	Pre- v. Post-treatment	(Control Group) Pre- v. Post- (no treatment)

Note. Time (pre- v. post-treatment) is the third factor.

As previously stated, both motivation and coaching should be considered when trying to

detect malingering since a participant can modify their responses to an assessment based on

those factors. Unlike previous research, this study used a tangible incentive (compensation, e.g.

$50 gift card lottery) rather than the more common simulated one, in combination with a

coaching instruction (i.e., providing information about mTBI symptoms) plus warning (i.e.,

instructed to not exaggerate the symptoms too much) to determine if there was an impact on test

performance.

Analysis

Analysis of group performance on the ANAM were completed with separate analyses, as follows:

Research Question 1: Is there a significant difference in performance between treatment and control groups on the pre- and post- ANAM total accuracy scores?

A 2 motivational goal (incentive v. no incentive) x 3 coached condition (coached plus warning, coached, not coached) x 2 time (pre- versus post- ANAM total accuracy scores) Mixed Factorial Repeated Measures ANOVA was conducted to compare pre- and post-ANAM total scores.

Research Question 2: Is there a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores?

A 2 motivational goal (incentive v. no incentive) x 3 coached condition (coached plus warning, coached, not coached) Mixed Factorial ANOVA was conducted to compare post-ANAM total scores.

Research Question 3: Do participants in the treatment groups (i.e. instructed to feign mTBI symptoms) differ in their ANAM Effort Measure in comparison to control?

Although the ANAM reports continuous scores for the Effort Measure, the ANAM rates values as poor effort (i.e. lack of effort while completing the assessment) as scores 14 and above. Lack of effort is used to identify possible feigning. If the ANAM Effort Measure score is 14 and above, the ANAM marks the scores as questionable and invalid. Therefore, the ANAM continuous scores were converted to dichotomous scores (i.e. optimal effort v. sub-optimal effort). For this reason, a logistic regression was conducted to verify which factors help predict

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whether a participant will put forth effort during ANAM administration using coaching and motivation as predictors.

Research Question 4: Are there positive interactions between the motivation and coached conditions on the ANAM total accuracy scores?

4a. Are there positive interactions between the motivation and coached conditions between treatment and control groups on the pre- and post- ANAM total accuracy scores?

A 2 motivational goal (incentive v. no incentive) x 3 coached condition (coached plus warning, coached, not coached) x 2 time (pre- versus post- ANAM total accuracy scores) Mixed Factorial Repeated Measures ANOVA was conducted to compare pre- and post-ANAM total scores.

4b. Are there positive interactions between the motivation and coached conditions between treatment and control groups on the post- ANAM total accuracy scores?

A 2 motivational goal (incentive v. no incentive) x 3 coached condition (coached plus warning, coached, not coached) Mixed Factorial ANOVA was conducted to compare post-ANAM total scores.

CHAPTER 4

RESULTS

Examination of Data

Preliminary Analysis. Table 2 presents the means and standard deviations of participants overall and by group. One-way ANOVAs revealed no significant differences among groups (all ps > 0.05) in respect to age ($F(5,155) = 1.24$, $p = 0.294$) or GPA ($F(5,156) = 1.21$, $p = 0.306$). In addition, participants did not differ among groups for ethnicity ($\chi^2(10) = 18.07$, $p = 0.054$), grade level ($\chi^2(5) = 2.88$, $p = 0.719$), and gender ($\chi^2(5) = 10.70$, $p = 0.058$). For categorical variables, Table 3 presents the frequency counts and percentages of participants overall and by group. Participants did not differ between Motivation ($\chi^2(7) = 12.20$, $p = 0.094$) or Coached ($\chi^2(14) = 11.88$, $p = 0.616$) conditions by ethnicity. The participants did not differ between Motivation ($\chi^2(4) = 7.32$, $p = 0.120$) and Coached ($\chi^2(8) = 7.74$, $p = 0.459$) conditions by grade level. Lastly, the participants did not differ between Coached conditions ($\chi^2(2) = 1.04$, $p = 0.595$) by gender. The participants did differ between Motivation and No Motivation groups ($\chi^2(1) = 6.99$, $p = 0.008$) for gender. The proportion of women

who were in the motivation condition (75.31%) was greater than the proportion of women in the no motivation condition (55.56%). In addition, the proportion of men in the no motivation condition (44.44%) was greater than the proportion of men in the motivation condition (24.69%). A follow-up test using a Bonferroni correction indicated that the proportion of women in the motivation condition differed significantly from the proportion of women in the no motivation condition ($\chi^2(2) = -6.97$, $p = 0.008$). Similarly, the proportion of men in the motivation condition differed significantly from the proportion of men in the no motivation condition ($\chi^2(2) = -6.97$, $p = 0.008$). Overall, these results suggest that more women are represented in the motivation

condition when coaching is not considered. This poses a small threat to internal validity, an issue that will be taken up in the Discussion. However, as stated above, when examining the individual six groups, the participants did not differ for gender. In addition, follow-up analyses indicated that gender did not have an effect on ANAM performance, $F(1, 160) = 0.14$, p = .708.

Table 2
Means (SDs) of Demographic Characteristics Overall and by Group

	Overall n = 162	Control n = 27	Group 1 n = 27	Group 2 n = 27	Group 3 n = 27	Group 4 n = 27	Group 5 n = 27
Age	27.63 (9.21)	25.26 (8.96)	28.89 (10.62)	25.07 (5.24)	28.19 (8.16)	29.04 (10.14)	29.33 (10.80)
Cumulative GPA	3.48 (0.45)	3.42 (0.46)	3.65 (0.38)	3.48 (0.43)	3.47 (0.47)	3.48 (0.52)	3.35 (0.46)

Note. Group 1 = coached plus warning instruction and motivation incentive, Group 2 = coached instruction and motivation incentive, Group 3 = uncoached instruction and motivation incentive, Group 4 = coached plus warning instruction and no motivation incentive, Group 5 = coached instruction and no motivation incentive, and Control = uncoached instruction and no motivation incentive or control.

Finally, a one-way ANOVA revealed no significant differences groups on the pre-test overall (total) accuracy scores ($p > .05$). This is evidence against differential selection as a threat to internal validity.

Table 3

Frequency Counts (Percentages) of Demographic Characteristics Overall and by Group

	Overall n = 162	Control n = 27	Group 1 n = 27	Group 2 n = 27	Group 3 n = 27	Group 4 n = 27	Group 5 n = 27
Gender							
Male	56 (34.6%)	11 (40.7%)	5 (18.5%)	5 (18.5%)	10 (37.0%)	11 (40.7%)	14 (51.9%)
Female	106 (65.4%)	16 (59.3%)	22 (81.5%)	22 (81.5%)	17 (63.0%)	16 (59.3%)	13 (48.1%)
Ethnicity							
Caucasian	72 (44.4%)	8 (29.6%)	13 (48.1%)	10 (37.7%)	16 (59.3%)	11 (40.7%)	14 (51.9%)
Hispanic	35 (21.6%)	12 (44.4%)	8 (29.6%)	4 (14.8%)	3 (11.1%)	5 (18.5%)	3 (11.1%)
Other	55 (34.0%)	6 (10.9%)	13 (23.6%)	8 (14.5%)	11 (20.0%)	10 (18.2%)	7 (12.7%)
Education Level							
Undergraduate	76 (46.9%)	13 (17.1%)	13 (17.1%)	16 (21.1%)	12 (15.8%)	10 (13.2%)	12 (15.8%)
Graduate	86 (53.1%)	14 (51.9%)	14 (51.9%)	11 (40.7%)	15 (55.6%)	17 (63.0%)	15 (55.6%)

Note. Group 1 = coached plus warning instruction and motivation incentive, Group 2 = coached instruction and motivation incentive, Group 3 = uncoached instruction and motivation incentive, Group 4 = coached plus warning instruction and no motivation incentive, Group 5 = coached instruction and no motivation incentive, and Control = uncoached instruction and no motivation incentive or control.

Normality. A Shapiro-Wilk test of normality was performed for each dependent measure. The following variables were significant, suggesting the data for these measures did not follow a normal distribution: The overall (total) accuracy scores at both pretest (W = .88, $p <$ 0.001) and posttest (W = .96, $p <$ 0.001). To further examine the normality, skewness and kurtosis was evaluated for each dependent measure. As can be seen in Table 4 (below), the overall (total) accuracy scores were within acceptable limits for normality, with range of skewness being between -1.5 and 1.5 (range of skewness = -1.23 to -0.54; Field, 2013; Tabachnick & Fidell, 2007). The overall (total) accuracy scores were within acceptable limits for normality, with range of kurtosis being between -1.5 and 1.5 (range of kurtosis = -0.21 to 0.94;

Field, 2013; Tabachnick & Fidell, 2007). In addition, histograms were used to assess normality (Cohen et al., 2003). As seen in Figure 1, there is no significant departure from normality. Therefore, the assumption of normality has been met. Furthermore, based on the central limit theorem, the assumption of normality is usually met if the sample size is large enough (i.e. $n >$ 30).

Table 4.
Skewness and Kurtosis for ANAM Total Accuracy Scores by Time

	Pretest		Posttest	
	Skewness	*Kurtosis*	*Skewness*	*Kurtosis*
Overall (Total) Accuracy	-1.23	0.94	-0.54	-0.21

Note. Total Accuracy, total percentage of correct responses on the CDS, M2S, and PRO.
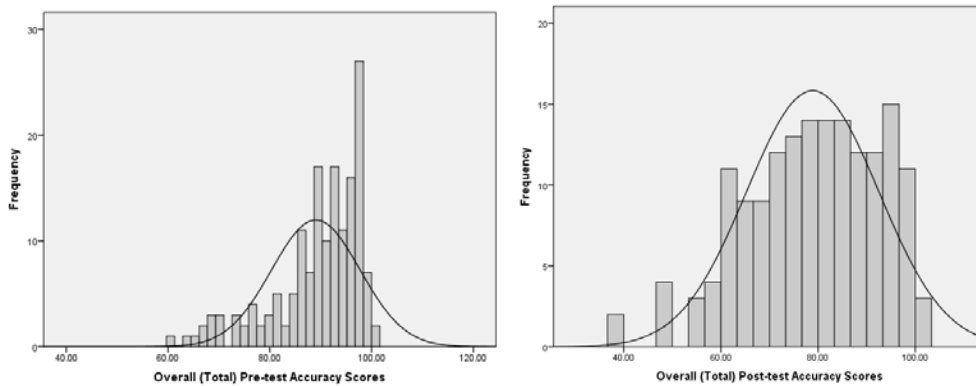

Figure 1. *Histograms of Overall (Total) Pre- and Post- Accuracy Scores*

Outliers. Univariate outliers were assessed by examining boxplots. The boxplots detected no extreme cases found in the pre- and post-tests for total accuracy scores.

Descriptive Statistics

All means and standard deviations for all DVs (pre-post total accuracy scores) are presented in Table 5. As can be seen in the table, the ANAM total accuracy scores decreased from pre- ($M = 89.04$, $SD = 8.70$) to post-test ($M = 78.88$, $SD = 13.60$). As mentioned above, the SRT subscale accuracy scores were removed from total accuracy scores data analysis based on the high means (99% correct out of 100%) for both pre- and post-test, indicating the subscale was too easy for participants to complete and would be an inaccurate measure to determine the effects on motivation and coaching in this study.

Table 5.
Means and Standard Deviations for Accuracy on ANAM Overall by Time

	Pre-test		Post-test	
	M	*SD*	*M*	*SD*
Overall (Total) Accuracy	89.04	8.70	78.88	13.60

Note. Total Accuracy, total percentage of correct responses on the CDS, M2S, and PRO ANAM Subscales.

Research Question 1: Is there a significant difference in performance between treatment and control groups on the pre- and post- ANAM total accuracy scores?

To explore whether coaching and motivational incentive influenced participants ANAM total accuracy scores over time, a 2 (Motivation) x 3 (Coached) x 2 (Time) Mixed Factorial Repeated Measures ANOVA was conducted to compare pre- and post- ANAM total accuracy scores. Based on Levene's *F* tests, the homogeneity of variance assumption was satisfied for Time 1 ($F(5, 156) = 1.00$, $p = 0.420$) and Time 2 $F(5, 156)= 1.33$, $p = 0.255$). The results revealed a significant three-way interaction between the Motivation and Coached groups on the

ANAM total accuracy measure from Pre to Post, Wilk's $\Lambda = 0.905$, $F(2, 156) = 8.12$, $p < .001$, η_p^2

$= 0.095$, indicating a moderate effect (Cohen, 1988; Tabachnick & Fidell, 2007).

Pairwise comparisons revealed the No Motivation x Coached performance significantly

decreased from pre-ANAM ($M = 90.32$, $SD = 8.18$) to post-ANAM ($M = 72.83$, $SD = 11.14$)

total accuracy scores. The No Motivation x Coached plus Warning condition also significantly

decreased from pre-ANAM ($M = 89.73$, $SD = 8.59$) to post-ANAM ($M = 80.70$, $SD = 14.83$)

total accuracy scores. The No Motivation x Uncoached (Control) condition did not differ

significantly from pre- ($M = 88.77$, $SD = 8.48$) to post- ($M = 90.08$, $SD = 8.81$) on the ANAM

total accuracy scores.

For the Motivation conditions, the Motivation x Uncoached performance significantly

decreased from pre-ANAM ($M = 87.90$, $SD = 8.36$) to post-ANAM ($M = 72.19$, $SD = 13.32$)

total accuracy scores. The Motivation x Coached performance significantly decreased from pre-

ANAM ($M = 90.05$, $SD = 8.50$) to post-ANAM ($M = 75.12$, $SD = 13.57$) total accuracy scores.

Finally, the Motivation x Coached plus Warning condition performance significantly decreased

from pre-ANAM ($M = 87.45$, $SD = 10.34$) to post-ANAM ($M = 80.35$, $SD = 12.30$) total

accuracy scores. See Table 6 for Means and Standard Deviations of Pre- and Post-test ANAM

total accuracy scores.

In summary, there were significant decreases in all conditions except the control

condition (No Motivation and Uncoached), thus explaining the three-way interaction.

Table 6.

Means and Standard Deviations of ANAM Pre- and Post-test Total Accuracy Scores

	Pretest		Posttest	
	M	*SD*	*M*	*SD*
Uncoached (C1) x No Motivation (M1) (Control)	88.77	8.48	90.08	8.81
Coached (C2) x M1	90.32	8.18	72.83	11.14
Coached plus Warning (C3) x M1	89.73	8.59	80.70	14.83
C1 x Motivation (M2)	87.90	8.36	72.19	13.32
C2 x M2	90.05	8.50	75.12	13.57
C3 x M2	87.45	10.34	80.35	12.30

Note: M1 = No Motivation Incentive, M2 = Motivation Incentive, C1 = Uncoached Instruction
C2 = Coached Instruction, C3 = Coached plus Warning Instruction

Although main effects and two-way interactions should generally not be interpreted (or interpreted cautiously) in the presence of a higher order interaction, the results are presented here for completeness. The results from the two-way interactions revealed significant differences between the Coaching x Time on the ANAM total score measure from Pre to Post, Wilk's Λ = 0.893, $F(2, 156) = 9.34$, $p < .001$, $\eta p^2 = 0.107$, indicating a moderate effect (Cohen, 1988; Tabachnick & Fidell, 2007). However, the interaction of Motivation x Time on the ANAM total score measure from Pre to Post ANAM was nonsignificant, Wilk's Λ = 0.981, $F(2, 156) = 3.07$, $p = 0.082$, $\eta p^2 = 0.019$.

The main effect of time was significant, Wilk's Λ = .605, $F(1, 156) = 102.04$, $p < .001$, $\eta p^2 = 0.395$, indicating a large effect (Cohen, 1988; Tabachnick & Fidell, 2007). Specifically, participants' performance was significantly higher at pre-ANAM ($M = 89.04$, $SD = 8.70$) in comparison to post-ANAM ($M = 78.88$, $SD = 13.61$).

The main effect of the Motivation conditions was also significant, $F(1, 156) = 4.51$, $p < .05$, $\eta p^2 = 0.028$, indicating a small effect (Cohen, 1988; Tabachnick & Fidell, 2007). That is, Motivation conditions ($M = 82.51$, $SD = 8.82$) significantly decreased performance on the

ANAM total score measure from Pre to Post, in comparison to the No Motivation conditions (M = 85.41, SD = 9.00).

The main effect of the Coached conditions was not significant $F(2, 156) = 1.97$, $p = .143$, $\eta p^2 = 0.025$. That is, Coached plus Warning ($M = 84.56$, $SD = 8.75$), Coached ($M = 82.09$, $SD = 8.29$), and No Coached ($M = 85.24$, $SD = 9.75$) did not differ between groups, $ps > .05$. See Table 7 for the Pre- to Post- ANAM total accuracy scores ANOVA source table.

Table 7

Pre-to Post- ANAM Total Accuracy Scores ANOVA Source Table

	df	F	Partial η^2	p
Motivation (M) x Coached (C) x Time (T)	2	8.12**	0.095	0.00
M x T	2	3.07	0.019	0.08
C x T	2	9.34**	0.107	0.00
M	1	4.51*	0.028	0.04
C	2	1.97	0.025	0.14
T	1	102.04**	0.395	0.00

Note. $N = 162$, *df,* degrees of freedom; *M*, motivation incentive; *C*, coached condition; *T*, time
** $p < .01$ * $p < .05$

Research Question 2: Is there a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores?

To explore whether coaching and motivational incentive influenced participants' ANAM total accuracy scores, a 2 (Motivation) x 3 (Coached) Mixed Factorial ANOVA was conducted to compare post-ANAM total accuracy scores. Based on Levene's F tests, the homogeneity of variance assumption was satisfied, $F(5, 156) = 1.33$, $p = .255$). The results revealed a significant two-way interaction between the Motivation and Coached groups on the ANAM total accuracy

measure, $F(2, 156) = 8.35$, $p < .001$, $\eta p^2 = 0.097$, indicating a moderate effect (Cohen, 1988; Tabachnick & Fidell, 2007). See Table 8 for Means Post-test ANAM total accuracy scores.

Table 8.
Means of ANAM Total Accuracy Scores

	Posttest
	M
Uncoached (C1) x No Motivation (M1) (Control)	90.08
Coached (C2) x M1	72.85
Coached plus Warning (C3) x M1	80.70
C1 x Motivation (M2)	74.19
C2 x M2	75.12
C3 x M2	80.35

Note: M1 = No Motivation Incentive, M2 = Motivation Incentive, C1 = Uncoached Instruction, C2 = Coached Instruction, C3 = Coached plus Warning Instruction

The main effect of the Motivation groups was significant, $F(1, 156) = 5.64$, $p < .05$, $\eta p^2 = 0.035$, indicating a small effect (Cohen, 1988; Tabachnick & Fidell, 2007). That is, receiving a motivational incentive ($M = 76.56$, $SD = 13.20$) significantly decreased performance on the post ANAM total score measure, in comparison to the groups that did not receive a motivational incentive ($M = 81.21$, $SD = 13.69$). In addition, the main effect of coaching was also significant, $F(2, 156) = 6.46$, $p < .05$, $\eta p^2 = 0.077$, indicating a moderate effect. Specifically, receiving a coaching instruction ($M = 73.98$, $SD = 12.35$) significantly decreased performance on the post ANAM total score measure, in comparison to the groups that did not receive a coaching instruction ($M = 82.14$, $SD = 13.76$), $p < .05$. In addition, receiving a coaching instruction ($M = 73.98$, $SD = 12.35$) significantly decreased performance on the post ANAM total score measure, in comparison to the groups that received a coaching plus warning instruction ($M = 80.53$, $SD = 13.50$), $p < .05$. The coached plus warning instruction and no coaching instruction conditions did

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not differ significantly on the post ANAM total score measure. See Table 9 for the Post-ANAM

total accuracy scores ANOVA source table.

Table 9

Post-ANAM Total Accuracy Scores ANOVA Source

	df	F	Partial η^2	p
Motivation (M) x Coached (C)	2	8.35**	0.097	0.00
M	1	5.64*	0.035	0.02
C	2	6.46**	0.077	0.00

Note. $N = 162$, d*f,* degrees of freedom; *M*, motivation incentive; *C*, coached condition; *T*, time
** $p < .01$ * $p < .05$

**Research Question 3: Do participants in the treatment groups (i.e. instructed to feign mTBI
symptoms) differ in their ANAM Effort Measure in comparison to control?**

To explore whether participants in the treatment groups (i.e. instructed to feign mTBI

symptoms) differ in their ANAM Effort Measure in comparison to control, a logistic regression

analysis was conducted to verify which factors help predict whether a participant will put forth

effort during ANAM administration using coaching and motivation as predictors. Although the

ANAM does not have an embedded malingering scale, the ANAM Effort Measure scores were

used for evaluating the validity of scores. Any values rated as poor effort (i.e. scores 14 and

above) on the ANAM Effort Measure were considered a detection of malingering due to lack of

effort while completing the assessment. The Wald Chi-Square demonstrated there is a difference

between the control and treatment groups ($\chi^2 = 8.92$, $p = .003$). The results indicated that when

participants were in the control group, the odds ratio was 0.05 and therefore participants in the

control group have 95.0% decreased odds as compared to treatment groups to put forth sub-optimal effort (Table 10).

Table 10

Coefficients for Motivation, Coached, and Control Groups

	B	SE	Exp(B)	p
No Motivation (M1)	0.56	0.46	0.57	0.007
Uncoached (C1)	0.50	0.71	1.64	0.486
Coached (C2)	0.23	0.68	1.26	0.736
M1 x C1 (Control)	2.94	0.98	0.05	0.003
M1 x C2	1.16	1.00	3.19	0.247

Note: * $p < .01$; The motivation (M2) and the coached plus warning (C2) conditions were used as reference groups.

The differences in the proportion of putting forth effort was analyzed by using pairwise comparisons with a Bonferroni correction which found a statistically significant difference in mean effort between the participants in the Coached ($M = 0.86$, $SE = 0.107$) and the Uncoached ($M = 0.50$, $SE = 0.107$) conditions, $p < .05$. However, there was not a significant difference between the Coached ($M = 0.86$, $SE = 0.078$) and the Coached plus warning ($M = 0.73$, $SE = 0.078$) conditions, $p = .291$ and the Uncoached ($M = 0.50$, $SE = 0.114$) and the Coached plus warning ($M = 0.73$, $SE = 0.114$) conditions, $p = .142$). Additionally, there was a statistically significant difference in mean effort between the participants in the Motivation ($M = 0.82$, $SE = 0.086$) and No Motivation ($M = 0.58$, $SE = 0.086$) conditions, $p < .05$). Overall, there was a statistically significant difference in mean effort between the participants in the treatment and control groups, $p < .001$.

As shown in Figure 2, the estimated mean effort for those participants in the control group is 0.15, while it is 0.89 for those in the coached condition, 0.85 for those in the motivation

condition, 0.81 for those in the coached and motivation condition, 0.78 for those in the coached

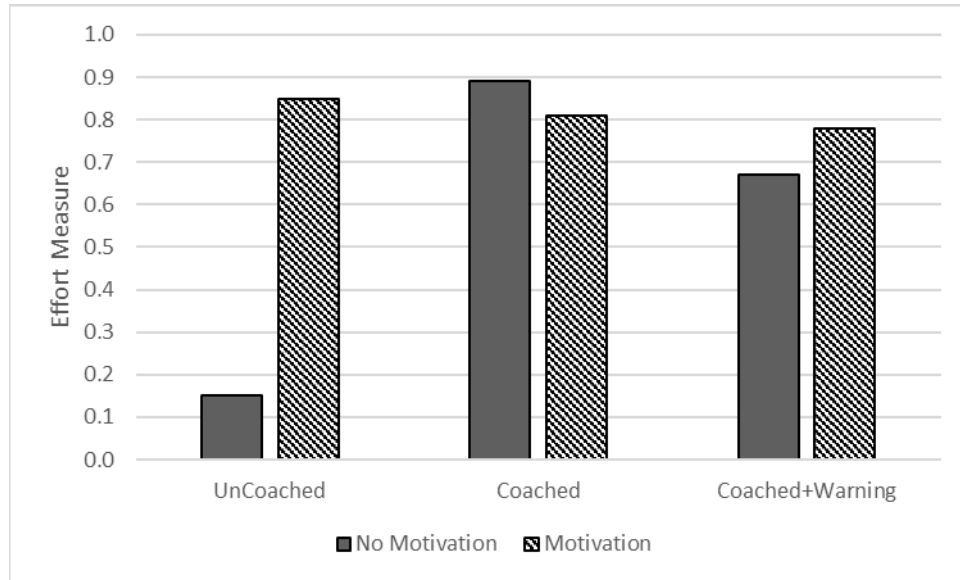plus warning and motivation condition, and 0.67 for those in coached plus warning condition.

Figure 2. *Effort Measure Mean Scores*, optimal effort = 0, sub-optimal = 1

Research Question 4: Are there positive interactions between the motivation and coached conditions?

4a. Are there positive interactions between the motivation and coached conditions between treatment and control groups on the pre- and post- ANAM total accuracy scores?

To explore whether coaching and motivational incentive influenced participants ANAM total accuracy scores over time, a 2 (Motivation) x 3 (Coached) x 2 (Time) Mixed Factorial Repeated Measures ANOVA was conducted to compare pre- and post- ANAM total accuracy scores. Based on Levene's *F* tests, the homogeneity of variance assumption was satisfied for Time 1 ($F(5, 156) = 1.00$, $p = 0.420$) and Time 2 $F(5, 156) = 1.33$, $p = 0.255$). As previously

stated, the results revealed a significant three-way interaction between the Motivation and

Coached groups on the ANAM total accuracy measure from Pre to Post, Wilk's $\Lambda = 0.905$, $F(2,$

$156) = 8.12$, $p < .001$, $\eta_p^2 = 0.095$, indicating a moderate effect (Cohen, 1988; Tabachnick &

Fidell, 2007).

Pairwise comparisons revealed the No Motivation x Coached performance significantly

decreased from pre-ANAM ($M = 90.32$, $SD = 8.18$) to post-ANAM ($M = 72.83$, $SD = 11.14$)

total accuracy scores. The No Motivation x Coached plus Warning condition also significantly

decreased from pre-ANAM ($M = 89.73$, $SD = 8.59$) to post-ANAM ($M = 80.70$, $SD = 14.83$)

total accuracy scores. The No Motivation x Uncoached (Control) condition did not differ

significantly from pre- ($M = 88.77$, $SD = 8.48$) to post- ($M = 90.08$, $SD = 8.81$) on the ANAM

total accuracy scores.

For the Motivation conditions, the Motivation x Uncoached performance significantly

decreased from pre-ANAM ($M = 87.90$, $SD = 8.36$) to post-ANAM ($M = 72.19$, $SD = 13.32$)

total accuracy scores. The Motivation x Coached performance significantly decreased from pre-

ANAM ($M = 90.05$, $SD = 8.50$) to post-ANAM ($M = 75.12$, $SD = 13.57$) total accuracy scores.

Finally, the Motivation x Coached plus Warning condition performance significantly decreased

from pre-ANAM ($M = 87.45$, $SD = 10.34$) to post-ANAM ($M = 80.35$, $SD = 12.30$) total

accuracy scores. See Table 11 for Means and Standard Deviations of Pre- and Post-test ANAM

total accuracy scores.

In summary, there were significant decreases in all conditions except the control

condition (No Motivation and Uncoached), thus explaining the three-way interaction.

Table 11.

Means and Standard Deviations of ANAM Pre- and Post-test Total Accuracy Scores

	Pretest		Posttest	
	M	*SD*	*M*	*SD*
Uncoached (C1) x No Motivation (M1) (Control)	88.77	8.48	90.08	8.81
Coached (C2) x M1	90.32	8.18	72.83	11.14
Coached plus Warning (C3) x M1	89.73	8.59	80.70	14.83
C1 x Motivation (M2)	87.90	8.36	72.19	13.32
C2 x M2	90.05	8.50	75.12	13.57
C3 x M2	87.45	10.34	80.35	12.30

Note: M1 = No Motivation Incentive, M2 = Motivation Incentive, C1 = Uncoached Instruction
C2 = Coached Instruction, C3 = Coached plus Warning Instruction

4b. Are there positive interactions between the motivation and coached conditions between treatment and control groups on the post- ANAM total accuracy scores?

To explore whether coaching and motivational incentive influenced participants' ANAM total accuracy scores, a 2 (Motivation) x 3 (Coached) Mixed Factorial ANOVA was conducted to compare post-ANAM total accuracy scores. Based on Levene's *F* tests, the homogeneity of variance assumption was satisfied, $F(5, 156) = 1.33, p = .255$). As previously stated, the results revealed a significant two-way interaction between the Motivation and Coached groups on the ANAM total accuracy measure, $F(2, 156) = 8.35, p < .001, \eta p^2 = 0.097$, indicating a moderate effect (Cohen, 1988; Tabachnick & Fidell, 2007). See Table 12 for Means Post-test ANAM total accuracy scores.

Table 12.

Means of ANAM Total Accuracy Scores

	Posttest
	M
Uncoached (C1) x No Motivation (M1) (Control)	90.08
Coached (C2) x M1	72.85
Coached plus Warning (C3) x M1	80.70
C1 x Motivation (M2)	74.19
C2 x M2	75.12
C3 x M2	80.35

Note: M1 = No Motivation Incentive, M2 = Motivation Incentive, C1 = Uncoached Instruction
C2 = Coached Instruction, C3 = Coached plus Warning Instruction

CHAPTER 5

SUMMARY, DISCUSSION, AND CONCLUSION

The purpose of the current study was to examine whether coaching individuals how to feign mild traumatic brain injury (mTBI) and providing a motivational incentive (i.e., a $50 gift card lottery) influenced performance and effort on the Automated Neuropsychological Assessment Metrics (ANAM). The main goal of this work was to apply expectancy x value theory to explain and replicate the finding that receiving a motivational incentive and coaching (i.e., providing information about mTBI symptoms) will significantly impact test performance.

The theoretical constructs within motivational theory, such as, expectancy x value, relate to why and how people malinger (Anderson, 2008; Constantinou & McCaffrey, 2003; Erdal, 2009; Nagle et al., 2006). Expectancy x value theory combines one's expectancy to succeed and the value placed on successfully achieving a given task (Atkinson, 1957; Eccles & Wigfield, 2002; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000). In relation to malingering, expectancy x value theory would predict that the motivation to malinger is a function not only of motivational incentives but also requires expectations that one can malinger well and will not be caught doing so. A person may believe he or she can malinger well if he or she is coached (i.e. has knowledge on the specific disorder expected to be feigned). Specifically, if a participant is coached on mTBI, he or she may be more confident about feigning mTBI because he or she will have knowledge of the symptoms. One would therefore predict, if the participant is confident about completing the task (i.e. malingering well and without being caught) due to the effects of coaching and is provided a motivation incentive to malinger undetected, then he or she will put forth more effort to malinger undetected. If this happens, the ANAM total accuracy scores for the coached plus motivational condition group will be

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significantly lower, indicating mTBI. That is, individuals without impairment typically perform in the 80th percentage range on many ANAM subscales (Roebuck-Spencer et al., 2013; Vincent et al., 2012). Whereas individuals with known cognitive impairment typically perform significantly below the 80th but above the 50th percentage range (Roebuck-Spencer et al., 2013; Woodhouse et al., 2013). Thus, if an individual scores significantly below the 50th percentile— indicating an atypical score in total items correct—the individual will be caught malingering or exhibiting "poor effort" (Roebuck-Spencer et al., 2013). In the present study, the ANAM-PVI scores (i.e. a participant's effort) were expected to differ between the treatment groups and the control group given the control group will be instructed to perform their best. The present research is the first to evaluate malingering in the context of expectancy x value theory.

Summary of Findings

The findings of the present study suggest that providing both a coaching instruction and a motivational incentive (i.e. treatment groups) decreased the participants' performance on their overall ANAM total accuracy scores, in comparison to the participants not receiving the treatment (i.e. control). Further, the ANAM Effort Measure was found to be a robust measure for detecting participants who feigned mTBI, which would render scores invalid for a clinical diagnosis.

The main goal of this study was to evaluate two conditions designed to impact performance on an assessment. The participants in the coached conditions were provided with a one-page document including several mTBI symptoms listed in the DSM-V (American Psychiatric Association, 2013). In addition to the one-page document, participants in the coached plus warning conditions were informed that to be identified as faking the disorder, to not exaggerate the symptoms too much. Whereas, participants in the motivation conditions were

informed they were eligible for an incentive for participation (i.e., a $50 gift card lottery) if they can feign mTBI and avoid being identified as faking the disorder.

Preliminary Analysis. In previous studies, baseline scores were not assessed before the participants were presented with the intervention (Erdal 2004, 2009). I addressed this gap by including a pre-ANAM measure. On the pre-ANAM or baseline assessment scores, there were no significant differences between groups in respect to age, GPA, ethnicity, grade level, and gender. That is, the presence of selection effects, i.e., whether there are significant initial differences between the groups were not found.

Further, there were no significant differences in Coached conditions in respect to ethnicity, grade level, and gender and Motivational conditions in respect to ethnicity and grade level. However, there were significant differences in Motivational conditions in respect to gender. The proportion of women who were in the motivation condition (75.31%) was greater than the proportion of women in the no motivation condition (55.56%). In addition, the proportion of men in the no motivation condition (44.44%) was greater than the proportion of men in the motivation condition (24.69%). This poses a small threat to internal validity given that the present study implemented a true-experimental design with randomization to each condition.

In addition, there were no significant differences between groups on the pre-ANAM overall (total) accuracy scores. The study design (i.e., randomization) and similarity of ANAM scores between groups prior to coaching is evidence against differential selection as a threat to internal validity. Therefore, based on the preliminary analysis as a whole, the significant effects found in this study were a direct result of the two conditions (i.e. motivational incentive and coaching).

Hypothesis One. The first hypothesis predicted a significant difference in between treatment and control groups on the pre- and post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions was expected to decrease the ANAM total accuracy scores (feigning clinical mTBI) between the pre- and post-. The degree to which the ANAM total accuracy scores were differentially influenced by coaching and motivation was exploratory.

Participants assigned to the motivational and coaching conditions scored differently on the ANAM between pre- and post- administration. Specifically, participants who did not receive the treatment conditions (i.e. control) performed similarly on both the pre- and post- ANAM administration. As hypothesized, receiving coaching and a motivational incentive influenced the way in which participants performed in comparison to not receiving coaching and a motivational incentive. For the post-ANAM treatment administration, the control group obtained the highest ANAM total accuracy scores in comparison to all the treatment groups. The coached plus warning instruction either with or without a motivational incentive performed better on the post-ANAM in comparison to the coached instruction with and without the motivational condition and uncoached instruction with the motivational condition. In contrast, the coached instruction with and without the motivational condition and uncoached instruction with the motivational condition obtained lower post-ANAM total accuracy scores in comparison to the other groups. These results are in line with previous research findings which indicate a participant can modify his or her response to a measure with the use of a motivational incentive or coaching in the diagnostic criteria for a mental disorder (Bagby, et al., 2002; Bowen & Brant, 2006; Erdal, 2009; Erdal, 2004; Greve et al., 2003; Guriel-Tennant & Fremouw, 2006; Larrabee, 2003; Rogers, et al., 1993; Rogers et al., 1991; Rogers, et al., 2005; Youngjohn et al., 1997). Further, these results

are not surprising given the prior research on the coached plus warning instruction has been shown to neutralize malingering (Erdal, 2004). Regardless of receiving the motivational incentive, the groups receiving the coached plus warning instruction, performed similarly, receiving the second highest ANAM total accuracy scores in comparison to the control group and the other treatment groups. That is, the coached plus warning instruction groups did not feign mTBI symptoms as much as the other treatment groups. As stated above, these results are in line with previous research related to the coached plus warning instruction (Erdal, 2004).

Hypothesis Two. The second hypothesis predicted a significant difference in performance between treatment and control groups on the post- ANAM total accuracy scores. Specifically, the coaching plus motivational incentive and coaching conditions was expected to have lower ANAM total accuracy scores (feigning clinical mTBI) than the other groups. The degree to which the ANAM total accuracy scores was differentially influenced by coaching and motivation was exploratory.

Participants assigned to the motivational and coaching conditions scored differently on the post-ANAM between treatment and control groups. As hypothesized, receiving the coached condition and motivational incentive changed the way the participants performed in comparison to not receiving the coached condition and motivational incentive. In line with the findings above, the control group performed significantly higher on the post-ANAM total accuracy measure in comparison to all the treatment groups. The coached plus warning instruction either with or without a motivational incentive performed significantly higher on the post-ANAM total accuracy measure in comparison to the coached instruction with and without the motivational condition and uncoached instruction with the motivational condition. Finally, the coached

instruction with and without the motivational condition and uncoached instruction with the motivational condition received significantly lower scores in comparison to the other groups.

In addition, the motivational incentive alone decreased the participants' performance on their overall post-ANAM total accuracy scores, in comparison to the participants that did not receive a motivational incentive. These findings are in line with prior research suggesting that participants who are motivated to feign a disorder are able to modify their response to an assessment (Erdal, 2009; Erdal, 2004; Greve et al., 2003; Larrabee, 2003; Youngjohn et al., 1997).

Furthermore, the participants who received the coaching instructions decreased their performance on their overall ANAM total accuracy scores, in comparison to the groups that did not receive a coaching instruction. That is, as with prior research, participants who are coached in the diagnostic criteria for a mental disorder are able to more accurately simulate the symptoms of the disorder on the psychological assessment (Bagby, et al., 2002; Bowen & Brant, 2006; Guriel-Tennant & Fremouw, 2006; Rogers, et al., 1993; Rogers et al., 1991; Rogers, et al., 2005). Specifically, the participants receiving the coaching instruction feigned mTBI by decreasing their performance on the ANAM significantly in comparison to the participants that received the coaching plus warning instruction or no coaching instruction. However, the participants receiving the coaching plus warning instruction did not differ significantly in their performance on the ANAM in comparison to those who received the no coaching instruction.

Hypothesis Three. The third hypothesis predicted the participants who are trained to malinger mTBI will differ in their ANAM Effort Measure scores in comparison to control. Although the ANAM does not have an embedded malingering scale, the ANAM Effort Measure score was used for evaluating the validity of mTBI scores. Any values rated as poor effort (i.e.

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scores 14 and above) on the ANAM Effort Measure are considered a detection of malingering due to lack of effort while completing the assessment. In this study, participants in the control group demonstrated a difference in their ANAM Effort Measure scores in comparison to all the treatment groups. Specifically, all the treatment groups (coached plus warning instruction and motivation incentive, coached instruction and motivation incentive, uncoached instruction and motivation incentive, coached plus warning instruction and no motivation incentive, coached instruction and no motivation incentive) were detected by the ANAM Effort Measure as putting forth sub-optimal or poor effort (i.e., malingering). The ANAM Effort Measure indicated that the control group put forth optimal effort (i.e., did not malinger mTBI). These results are in line with previous research findings that participants' ANAM Effort Measure scores would differ among treatment and control groups (Roebuck-Spencer et al., 2013). These findings speak to the importance of the validity of ANAM assessment as it was robust against participants' malingering. Specifically, results demonstrated the ANAM Effort Measure successfully differentiated between the participants that were simulating (or feigning) mTBI and those who were not.

Hypothesis Four. The fourth hypothesis predicted a positive interaction between the motivation and coached conditions on the ANAM total accuracy scores. There were significant differences between the coached instruction with and without the motivation condition and uncoached instruction with the motivation condition in comparison to the control group. However, there were not significant differences between the group that received both the motivation and coaching from all other groups suggesting that there was not a positive interaction between these two conditions providing an additional effect above and beyond the other conditions. The results suggest that providing either coached or motivation instructions will

decrease participants' scores in comparison to not providing the instructions. In addition, combining the two instructions will not significantly decrease participants' scores in comparison to receiving either coached or motivation instructions. Suggesting that there was not a positive interaction between motivation and coached conditions. In other words, there is no added benefit in combining the two conditions in respect to aiding the participant in feigning a disorder.

This result was in line with previous research finding no interaction between motivation and coaching (Erdal, 2004). It is possible one can decrease performance without the coached instruction based on the participant's previous knowledge on the topic being asked to feign. For example, the participants may have been aware, in general, of some of the symptoms a person with mild traumatic brain injury may exhibit, such as, memory deficits. If this were the case, the participant would be able to decrease their score on the ANAM. These findings speak to the importance of assessing a participant's knowledge of the topic being asked to feign.

Overall there was no significant change in performance by combining both motivational and coaching conditions.

Theoretical Implications

The present study provides theoretical implications on the effects of coaching and motivational incentives have on simulating mTBI symptoms on a validated, psychological measurement in the context of expectancy x value theory. Expectancy x value theory views motivation as personal views related to the likelihood of achieving a goal and the desire to complete that goal (as cited in Graham & Weiner, 2012). Within the construct of motivation, the present study supports the finding that people can alter their performance if they receive a motivational incentive (Erdal, 2009; Erdal, 2004; Greve et al., 2003; Larrabee, 2003; Youngjohn

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et al., 1997). In the present study, the participants receiving a motivational incentive significantly decreased their performance on the ANAM in order to feign mTBI. However, although the motivational incentive significantly decreased performance indicating mTBI, these individuals were detected as malingering by the psychological assessment which is in line with the previous research that people receiving a motivational incentive, such as, compensation, will be detected by an assessment as a malingerer (Erdal, 2004; Erdal, 2009).

Within the construct of coaching, the present study supports the finding that people can be taught to malinger (Bagby, et al., 2002; Bowen & Brant, 2006; Guriel-Tennant & Fremouw, 2006; Rogers, et al., 1993; Rogers et al., 1991; Rogers, et al., 2005). The participants receiving a coaching instruction were found to decrease their performance on the ANAM which indicated symptoms of mTBI. However, individuals who were coached to feign mTBI were detected by the psychological assessment as malingering (Erdal, 2004; Rogers et al., 1990). Thus, coaching alone was not sufficient to train individuals to feign mTBI undetected.

By combining the effects of coaching and motivation on ANAM performance, the present study attempted to apply expectancy x value theory, one's expectancy to succeed and the value placed on successfully achieving a given task, to evaluate the multiplicative effects of providing a motivational incentive and coaching on simulating mTBI symptoms (Atkinson, 1957; Eccles & Wigfield, 2002; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000).

The findings of this study were not consistent with my expectation because no multiplicative effects were identified (except that there was a three-way interaction indicating that warnings had an effect). It appears that providing coaching or an incentive are both about equally effective in reducing performance and effort. This finding does not support Value x

Expectancy theory, but it could be due to a methodological artifact. Given a motivational incentive, it might be easy enough to reduce performance and effort without coaching. Given coaching, participants might be sufficiently (intrinsically) motivated to try to feign symptoms, when instructed. All the treatment conditions instructed participants to feign TBI. The control condition, at posttest, did not instruct participants to feign symptoms, but to "do their best." A better test of Value x Expectancy Theory would have been to include another control condition that instructed participants to feign symptoms, but without coaching or an incentive.

Contributions of this Study and Practical Implications

This study makes important contributions to research on the influence of motivational incentives and coaching instructions on feigning a mental disorder. First, the present study provides new empirical evidence to the limited research that exists in this area. Currently, there is a limited amount of research that explores feigning mTBI with the combinational use of motivational incentives and coaching instructions (Erdal, 2004). This research provides additional information on the effects of providing a motivational incentive and coaching have on simulating mTBI symptoms, including the interaction between the two. Second, it provides new and valuable information about ANAM Effort Measure and its ability to detect a person who is malingering mTBI. This study helps fill the gap that exists in the research about the interactions between motivation and coaching on an assessment, specifically, the ANAM. In addition, the present results have important implications for practitioners in determining the validly of ANAM results before making a clinical diagnosis of mTBI.

Overall, motivational incentives and coaching instructions aided in feigning mTBI symptoms on the ANAM by participants performing poorly on the ANAM total accuracy measure. Even though participants could feign mTBI symptoms when provided with coaching

and motivation, the ANAM Effort Measure detected the participants feigning mTBI which rendered their scores invalid for a clinical diagnosis. This result is important to note because the ANAM was chosen by the Assistant Secretary of Defense for Health Affairs as the pre- and post-deployment assessment for all U.S. Military Service Members to be assessed (Roebuck-Spencer et al., 2013; United States House of Representatives H.R. 4986, 2008). Specifically, the ANAM is frequently used for a baseline assessment (e.g., before military personnel are deployed overseas) and detecting Mild Traumatic Brain Injury (mTBI) in the military (Johnson, Gilliland, K., & Vincent, 2009; Roebuck-Spencer, Vincent, Twillie, Logan, Lopez, Friedl, & Gilliland, 2012; Vincent, Roebuck-Spencer, Gilliland, & Schlegel, 2012) and for sport concussions (Cernich, Reeves, Sun, & Bleiberg, 2007). Therefore, the ANAM's Effort Measure and its ability to detect a person who is malingering mTBI is important to ensure practitioners have obtained a valid and reliable psychological assessment result before making or not making a clinical diagnosis of mTBI.

Limitations and Suggestion for Future Research

This study has several methodological strengths. First, the study is ecologically valid because it was conducted in a quiet environment setting and the ANAM was administered as instructed by the ANAM Manual. Second, it is a true experimental design with randomization controlling for threats to internal validity such as differential selection. Third, the study used a larger sample size per group (27 participants) than previous studies.

The study also had some limitations that could be addressed in future research. First, instructions to feign were confounded with the treatment conditions, so future research should explore the effect of the treatments against just instructions to feign (without coaching and incentives). Second, the pairwise comparisons between the Coach + Warning Conditions and the

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other conditions were in the expected direction but not significant; a larger sample with more statistical power, would have been desirable. Third, the study's participants were students enrolled in courses in education at a university which may affect external validity. Future research should include a more diverse population, including participants from the general public to enhance external validity. Fourth, although a real-world incentive (i.e. $50 gift card lottery) as opposed to a simulated one (i.e. pretending participant will receive a large settlement) was used in this study, the motivational incentive could have been more valuable to the participants. During the pilot study, students mentioned a more valuable incentive would be an additional research credit. Thus, evaluating participants value of the incentive may provide additional information about their motivation to malinger in future research. Fifth, the mTBI symptoms checklist was not used to assess pre-knowledge of mTBI because all participants checked most of the symptoms. Future research should include a pre-knowledge assessment where participants list mTBI symptoms in an open-ended manner instead of rather than checking off symptoms from a list. Finally, there were less males than females in each group. Future research should include an equal distribution of males and females per group to enhance internal validity.

Conclusions

The present study examined the effectiveness of Mild Traumatic Brain Injury (mTBI) coaching (i.e., providing information about mTBI symptoms) and providing a motivational incentive (i.e., lottery to win a $50 gift card) on the Automated Neuropsychological Assessment Metrics (ANAM) test performance. As a result, the primary goal of the present research was to investigate the finding that receiving a motivational incentive and coaching (i.e., providing information about mTBI symptoms) will significantly impact test performance. The overall findings of the study suggest that providing either a coaching instruction or a motivational

incentive (i.e. treatment groups) decreased the participants' performance on their overall ANAM total accuracy scores, in comparison to the participants not receiving the treatment (i.e. control). In addition, the ANAM detected when participants were putting forth poor effort or feigning mTBI.

UNLV

INFORMED CONSENT

Department of Educational Psychology and Higher Education

TITLE OF STUDY: MALINGERING UNDETECTED

INVESTIGATOR(S): E. Michael Nussbaum, Ph.D.; Jennifer Golanics, J.D., M.S.

For questions or concerns about the study, you may contact Dr. Michael Nussbaum at nussbaum@unlv.nevada.edu or Jennifer Golanics at golanics@unlv.nevada.edu.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794 or via email at IRB@unlv.edu.**

Purpose of the Study
You are invited to participate in a research study. The purpose of this study is to understand whether coaching and motivation are able to affect a participant's test performance.

Participants
You are being asked to participate in the study because you fit this criteria: you are over 18 and enrolled in either EPY 303, EPY 451, or EPY 702. You **do not** have a previous diagnosis of Traumatic Brain Injury.

Procedures
If you volunteer to participate in this study, you will be asked to do the following:

1. Participate in a single session that will last approximately 60 minutes.
2. You will be asked to complete a demographic survey, mild Traumatic Brain Injury Symptoms Checklist, and an assessment for mild Traumatic Brain Injury.

Benefits of Participation
There will not be direct benefits to you as a participant in this study. However, we hope to learn valuable information about how students complete assessments.

Risks of Participation
There are risks involved in all research studies. This study may include only minimal risks. You may feel bored or tired when completing the questionnaires or assessment.

Cost /Compensation
There will be no financial cost to you to participate in this study. The study will take one (1) hour of your time. You will be compensated by receiving one (1) credit hour of the research requirement for your EPY 303/451/702 course for every one (1) hour of participation.

Confidentiality
All information gathered in this study will be kept as confidential as possible. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Voluntary Participation
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw yourself and your data at any time without prejudice to your relations with UNLV. You are encouraged to ask questions about this study at the beginning or any time during the research study. If you choose to withdraw after only partial completion of the study, you will receive partial credit.

Incomplete Disclosure
Research designs sometimes require that the full intent of a study not be explained prior to participation. Although we have described the general nature of the tasks that you will be asked to perform, the full intent of the study will not be explained to you until after the completion of the study. At that time, we will provide you with a full debriefing which will include an explanation of the purpose of the study and other relevant background information pertaining to the study. You will also be given an opportunity to ask any questions you might have about the study and the procedures used in the study.

Participant Consent:
I have read the above information and agree to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age. A copy of this form has been given to me.

_____   _____
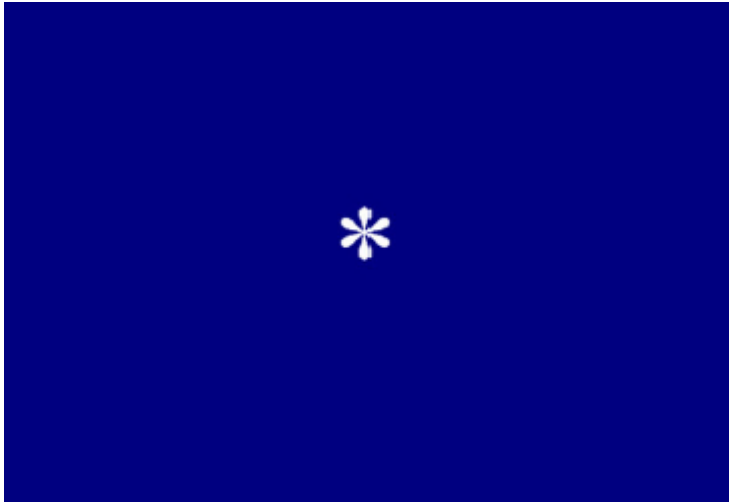Signature of Participant   Date

_____
Participant Name (Please Print)
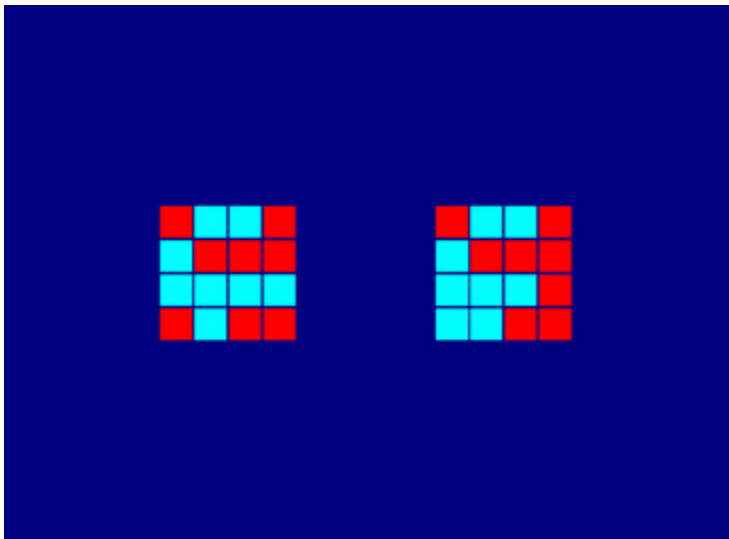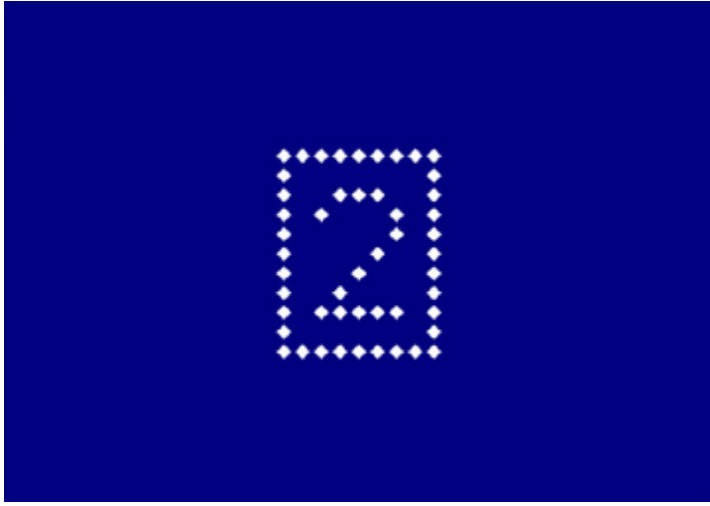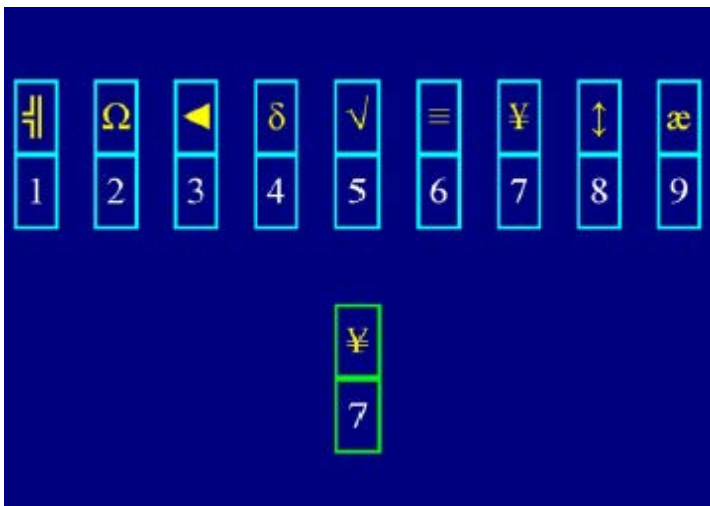
ANAM SUBSCALES

Simple Reaction Time

Matching to the Sample

Procedural Reaction Time

Code Substitution-Learning

APPENDIX III

DEMOGRAPHICS QUESTIONNAIRE

Please answer the following questions.

Age (in years) _____

Gender (F or M)   _____

Major   _____

GPA   _____

Grade (1=freshman,2==sophomore, 3=junior, 4=senior, 5=graduate)   _____

Ethnicity (1=American Indian/Alaskan Native, 2=African American, 3=Asian American, 4=Caucasian/white, 5=Hispanic/Latino, 6=other)   _____

Have you been diagnosed with Traumatic Brain Injury (TBI)? (1=yes, 2=no)   _____

Do you currently receive government benefits for your Traumatic Brain Injury (TBI) diagnosis? (1=yes, 2=no)   _____

Do you know someone that has been diagnosed with Traumatic Brain Injury (TBI)? (1=yes, 2=no)   _____

Do you know someone that is currently receive government benefits for your Traumatic Brain Injury (TBI) diagnosis?   _____

APPENDIX IV

mTBI SYMPTOMS CHECKLIST

For the following items, answer as if you had a head injury.

Symptoms Checklist

Symptoms Checklist

Consider how you are feeling right now. If this symptom is present now, please rate the severity.

	Not Present	Mild		Moderate		Severe	
Feeling like in a fog	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Fatigue	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Easily distracted	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Headache	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Numbness/tingling	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Nausea	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6

NEXT

APPENDIX V

LIST OF MILD TBI SYMPTOMS

You may experience one or more of the following symptoms if you have a diagnosis of mTBI:

- Irritability

- Anxiety

- Fatigue

- Headache

- Sleep disorders

- Dizziness

- Memory loss

- Poor attention/concentration

- Speed of information processing slowed

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