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Dispositional Optimism Effects on Stress and Police Task Performance

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Walden University
2018

Abstract

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MS, Calumet College of St. Joseph, 2008

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The study of stress on police task performance is important as this relationship can positively or negatively impact encounters with the public. This study focused on protective factors of positive psychology within the measured construct of dispositional optimism as a possible mediator of stress effects on physical task performance. The cognitive processing models used were the performance efficiency theory and attentional control theory as they apply in perceptual motor skill. Using a mediation model, the research question asked whether dispositional optimism mediated the relationship between stress and a pistol performance accuracy task. This study used a limited data set collected by a law enforcement training center ($N = 80$). The survey instruments used to measure stress and dispositional optimism were the Perceived Stress Scale and the Life Orientation Test –Revised, respectively. Correlation and multiple regression were used to analyze the significance of the mediation model. Ultimately, the results were unable to detect significance between dispositional optimism ($p > .05$) and stress ($p > .05$) on pistol accuracy outcomes. However, a significant relationship was found between dispositional optimism and stress ($p < .05$). Future research recommendations include an intervention protocol with several levels of pistol shooting difficulty and biological stress measurements. Implications for social change include further understanding of how to better manage stress for increased accuracy in pistol performance tasks along with increased mental processing and increased positive outcomes. Overall, better education and training for the officer will contribute to more positive encounters with the public.

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Dedication

This is dedicated to all those who have served in the Military and Law Enforcement. Also, those in the first responder and rescue apparatus. For all those who seek the performance edge of their strengths and limitations with the understanding that humility comes before honor.

Acknowledgments

Firstly, I would like to express my gratitude to Dr. James Herndon for the concise and penetrating comments during the entire program process. These insights have led me to think in new ways, which added many new dimensions to how I process information. This dissertation could not have been completed without your guidance. Also, thank you to Dr. David Kriska for lending your sharp acumen to my research design and analysis and aiding my further understanding of statistical analysis.

Also, my deepest appreciation to my Family and close friends who have witnessed the tumultuous up and downs that the dissertation process can offer and the support they have graciously given me. For this I am and always will be indebted.

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Chapter 1: Introduction to the Study

Introduction

Critical decision making in certain occupations can be the difference between serious personal physical injury, death, or a casualty of a third person (Colin, Nieuwenhuys, Visser, & Oudejans, 2014). Personnel in emergency service response, military operations, and law enforcement fall into this category of occupations (Colin et al., 2014; Matthews, 2009). Police officers can be required to make time-critical decisions under the stress of life-threatening circumstances, specifically when confronted with an armed and dangerous individual (Colin et al., 2014). The public and the agency in which the officer is employed expect the officer to perform well under stressful events with the assistance of training programs that the officer must complete while in recruit training (Nieuwenhuys & Oudejans, 2010; Regehr, LeBlanc, Jelley, & Barath, 2008). However, several studies have shown anxiety still impacts the police officers' performance during these events, and realistic outcomes can be deleterious for both the officer, the suspect, and the community (Colin et al., 2014; Niewenhuys & Oudejans, 2010; Regehr et al., 2008; Renden et al., 2014; Vaez Mousavi, Naji, & Hassanzadeh, 2011). In this study, I intended to link the management of stress to the possible enhancing effect of dispositional optimism as a mitigating variable to improve performance outcomes. I explored the background of stress and performance, the psychological and physiological dynamics, the perceptual-motor connections, and the potential for dispositional optimism as a realistic training modality for future use. I

emphasized the outcomes of previous studies observing their strengths and limitations, with a discussion of the implications for social change.

Background

Several studies contain positive psychological cognitive readiness protocols designed to increase adaptation and performance in exceptional circumstances (Davis & Asliturk, 2011; Emich, 2012). Stress and performance publications using police personnel are limited; however, positive imagery has been cited in an increasing number of performance outcomes (Colin et al., 2014). Dispositional optimism as a variable on stress in goal-oriented performance tasks was the focus of my study. The understanding of the mediating effects of dispositional optimism on performance under stress can lead to the effective management of anxiety cues mitigating negative shooting behaviors (Kleider, Parrott, & King, 2009). Implications from the study could be better training protocols to manage shooting behavior and maladaptive decision making due to negative emotionality elicited by perceived deadly threats to life (Kleider et al., 2009). Moreover, positive imagery, positive emotionality, and well-being can lead to better management of stress for the officer after the trauma of a deadly force incident (Bramsen, 2012; Colin et al., 2014). I hope that this study may also shed light on the relationships between stress perception and performance curves, which have a confounding effect on information-processing models (Barnard, Broman-Fulks, Michael, Webb, & Zawilinski, 2011).

In the performance of policing duties, extreme pressure events can induce high anxiety (Nieuwenhuys, Cañal-Bruland, & Oudejans, 2012; Nieuwenhuys, Savelsbergh, & Oudejans, 2012). Oftentimes, anxiety can cause stress reactions that greatly influence

cognitive and perceptual-motor performance, and under this distress, physical task performance may suffer, leading to negative outcomes (Nieuwenhuys, Savelsbergh al., 2012). Stress under perceived high-performance cues such as fear of death during a high-risk criminal event that may involve a dangerous criminal with a weapon can exacerbate the fear of threat stimuli based on possible anticipated events, such as the person's own death (Nieuwenhuys, Cañal-Bruland et al., 2012; Taverniers, Smeet, Van Ruysseveldt, Syroit, & Von Grumbkow, 2011). Unfortunately, under-reaction can lead to the death of the officer, compromising the communities overall physical and psychological safety (Nieuwenhuys,3 Cañal-Bruland et al., 2012; Renden et al., 2014). Nevertheless, the same stressor can lead to an over- reaction in the split-second timeframes required for decision making in these situations (Kleider et al., 2009). Studies have been conducted into mediating variables that can help officers deal with stress such as the mediating effect dispositional optimism may have on the stress-performance relationship in order to provide insights. Future use in training protocols may help with managing stress in critical decision-making circumstances.

Purpose of the Study

The purpose of my research was to examine the possible mediating effects of dispositional optimism on stress and performance accuracy outcomes in a pistol-shooting task. Following Field (2013), mediation required regression parameters in power analysis to assess the strength of the relationship between the predictor variable (stress) and outcome variable (accuracy) being reduced when the mediator variable (dispositional optimism) is included. I chose the mediation model (Figure 2) to explore potential

mitigating effects of dispositional optimism (mediating variable) on the stress (predictor

variable) in accuracy outcomes in a pistol-shooting task (outcome variable). I used this

model to explain the potential impact dispositional optimism may have on a goal-oriented

performance task such as pistol shooting for accuracy that carries an assumption of

inherent stress (Kleider et al., 2009; Nieuwehuys, Cañal-Bruland et al., 2012;

Nieuwenhuys, Savelsbergh et al., 2012). Stress in a performance task such as shooting is

investigated in depth in Chapter 2. This construct allowed me to investigate possible

correlations and mediating effects that were initially predicted to be present in the model.

The outcome variable of shooting performance was designated by the number of

shots into a designated score area, initiated by an audible start cue such as buzzer, under a

standardized time frame. My role was to collect the secondary data set containing

shooting scores, dispositional optimism, and perceived stress survey scores. From this, I

used quantitative data regression analysis to evaluate the mediating effect of dispositional

optimism on stress-pistol performance relationship. My study used secondary data from a

limited data set provided by a large Midwestern multijurisdictional firearms training

center. More detailed information involving survey instrument specifics and statistical

method is discussed in Chapter 3.

C

Figure 1. Simple relationship model.
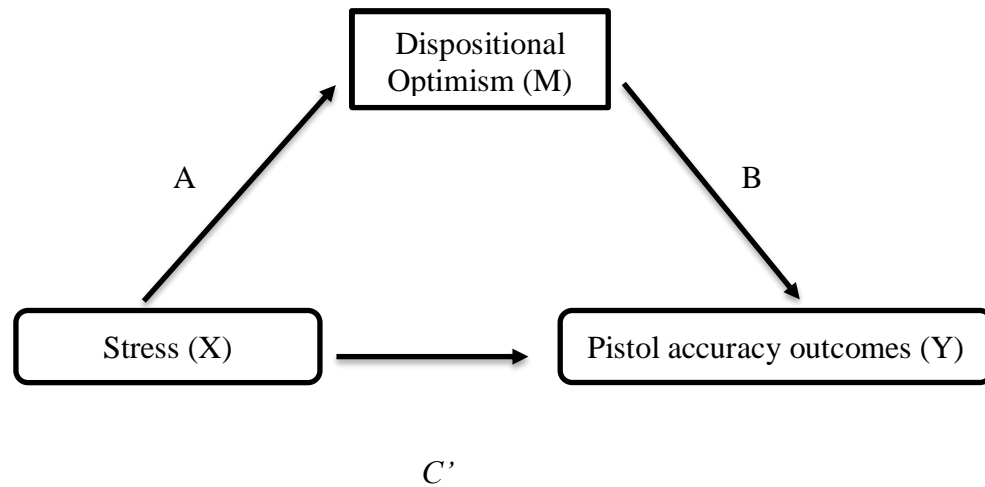
Figure 2. Framework for research question (mediated relationship).

Research Question and Hypotheses

RQ1: What mediating relationships exist between dispositional optimism and the

stress and performance relationship in pistol accuracy outcomes?

I hypothesized that dispositional optimism can mediate stress and that individuals

with higher optimism scores and will have higher accuracy scores in performance events

involving perceptual motor skills using a firearm. In order for mediation to occur using

this model four requirements must be met. According to Field (2013) they are: (a) the

predictor variable X (in this case, stress) must significantly predict outcome variable Y

(in this case, pistol accuracy outcomes); (b) the predictor variable X (stress) must

significantly predict the mediator variable M (in this case, dispositional optimism) in

Figure 2; (c) the mediator variable M (dispositional optimism) must significantly predict

the outcome variable Y (pistol accuracy outcomes); and (d) predictor variable X (stress)

must predict the outcome variable Y (pistol accuracy outcomes) less strongly in Figure 2

than in Figure 1. Consequently, the regression coefficient for pathway C in Figure 1 will

be greater than pathway *C'* in Figure 2 for mediation to have occurred (Field, 2013).

Hypotheses:

$H_0$1: In the prediction of accuracy outcomes using stress as the predictor, the

coefficient for stress equals zero (Regression of Y on X, coefficient X = 0).

$H_0$2: In the prediction of dispositional optimism using stress as the predictor,

the coefficient for stress equals zero (regression of M on X, coefficient for X

= 0).

$H_0$3: In the prediction of accuracy outcomes using dispositional optimism as

the predictor, the coefficient for dispositional optimism equals zero

(regression of Y on M, coefficient for M = 0).

$H_0$4: In the prediction of accuracy outcomes, using both stress and

dispositional optimism, the coefficient for stress and the coefficient for

dispositional optimism is equal to zero. (regression of pathway AB,

coefficient for pathway AB = 0).

In terms of regression models described in $H_0$1–$H_0$4, the key to identifying

mediation is a comparison of regression coefficients for stress in the univariate model

(Figure 1), and in the mediator model (Figure 2) pathway AB. Following Field (2013),

the presence of mediation would be said to have occurred if the strength of pistol

shooting accuracy predicted by stress is less in the mediator model than it is in univariate

model. Similarly, in line with Field, the regression coefficient for *C'* in Figure 2 is

smaller than the regression coefficient for C in Figure 1. As a result, also following Field,

the test for mediation can also be approached by defining the indirect effect (pathway AB) of stress on pistol accuracy through dispositional optimism in Figure 2. Consequently, mediation analysis was used to help determine whether dispositional optimism has an enhancing performance effect on pistol shooting outcomes in this stress and performance study.

Theoretical Foundation

The theoretical framework accounting for the mechanisms governing anxiety and performance relationships was the attentional control theory (ACT), developed in conjunction with the processing efficiency theory (PET), where the anxiety draws cognitive resources away from task-related information toward dominant threat-related stimuli such as weapon focus and mortality issues, which leaves less attention available to perform the most relevant task at hand (Nieuwenhuys & Oudejans, 2010). For both the PET and ACT model, the authors have codified stress and anxiety as synonymous (Causer, Holmes, Smith, & Williams, 2011; Cooke, Kavussanu, McIntyre, Boardley, & Ring, 2011; Nieuwenhuys & Oudejans, 2010). PET is the precursor to ACT and focuses on the aspects of working memory (WM) responsible for active information processing and self-control in that worry compromises WM processing (Causer et al., 2011; Cooke et al., 2011). Also, PET states anxiety can increase motivation leading to increased performance through enhanced effort through ancillary use of processing avenues and strategies (Causer et al., 2011). Overall, the central assumption of PET states anxiety impairs efficiency versus performance. This assumption has been shown to be limited in the power to explain anxiety and the overall affect, and therefore ACT was developed to

address these issues (Causer et al., 2011). Anxiety elicited by pressure on WM and attentional capacity can induce changes in performance (Cooke et al., 2011). In a time-critical, rapidly unfolding threat environment, the number of variables can be many and with lack of processing efficiency, training, and confidence, anxiety can spike, bringing the operator into a maladaptive response continuum that can lead to under or overreaction (Causer et al., 2011; Cooke et al., 2011). Nevertheless, ACT theory finds anxiety can have a motivational function in which the end user compensates for the deleterious effects that activation can cause, lending to an increase in mental effort aiding focus toward task relevant information (Nieuwenhuys & Oudejans, 2010). Investigation into how dispositional optimism plays a part in managing stress and future police training implications are relevant to my study. My study layers the dispositional optimism construct along with PET and ACT towards developing an understanding of a person's abilities, strengths, and weaknesses in the context of the environment leading to positive self-perceptions that can lead to positive task performance.

Nature of the Study

My study used the quantitative method with a correlation design to determine if a mediating relationship exists between the mediating variable of dispositional optimism, predicator variable of stress perception, and the outcome variable of the pistol performance task accuracy. The study used two quantitative instruments, the Life Oriented Test-Revised (LOT-R) and the Perceived Stress Scale (PSS), to measure dispositional optimism and stress, respectively. The outcome variable of shot accuracy was measured using a pistol shooting task in which the participant was moving forward

while shooting the pistol (moving test [MT]), where accuracy in measured by pistol shots into the designated scoring zone on the paper target. For this study, I acquired secondary data from a limited data set which was collected by a research participant. Further information regarding the methodology, instrumentation, and analysis is addressed in Chapter 3.

Definitions of Terms

Anxiety: Feelings of worry giving away to nervousness and unease regarding an imminent event with an uncertain outcome (Nieuwenhuys & Oudejans, 2010).

Dispositional optimism: A stable personality trait that anticipates positive future consequences lending itself to higher sense of well-being, perceived growth under stressful life events, finding benefit in potentially negative situations, and adaptation-seeking behavior against mortality as an overall protective factor (Thomas, Britt, Odle-Dusseau, & Bliese, 2011).

Distress: Negative psychological bias from painful or unpleasant experiences leading to maladaptive thinking and/or affect arising from an anticipated event (Matthews, 2009).

Optimism: Proactive coping using a person's understanding of their inherent strengths and weaknesses to determine a realistic outcome of events in the future (Davis & Asliturk, 2011; Seligman & Csikzentmihalyi, 2000).

Positive psychology: A humanistic branch of psychological science concerned with the understanding and development of well-being, virtue, and resilience (Davis & Asliturk, 2011; Matthews, 2009; Seligman & Csikzentmihalyi, 2000).

Resilience: An individual's ability to positively adapt to changing circumstances usually marked by stress and adversity (Davis & Asliturk, 2011; Matthews, 2009).

Shot accuracy: Counting the number of hits on the designated target area (Colin et al., 2014).

Stress: A multidimensional phenomenon comprised of diverse reactions toward real or perceived threat stimuli (Taverniers et al., 2011).

Virtue: Development and conformity to positive conduct and ethical mores based on a person's life experiences (Seligman & Csikzentmihalyi, 2000).

Subjective well-being: How individuals experience quality of life through emotional reactions and cognitive judgments that can include life satisfaction along with positive and negative emotions (Davis & Asliturk, 2011).

Assumptions

The assumptions for this study required an understanding that each officer had the standard firearms skillset to complete the shooting task. Also, inferential validity of the survey responses depended on the officer's honest answers to the questionnaires. Instruments used in the study have assumptions of validity in that they measure the constructs they are intended to measure for both dispositional optimism and perceived stress (Creswell, 2014).

Scope and Delimitations

I chose a mediation design model to determine relationships between predictor, mediator, and outcome variables. This design allows the researcher to look for significant correlations between variables and avoids the internal validity threat of other

experimental designs such as diffusion of treatment requiring a control group and intervention (Field, 2013). Furthermore, individual training outside of the officers' agency mandate was not controlled, which can lead to lower or higher shooting proficiency. Minimal instructions of how to conduct the pistol task and fill out the survey questionnaire was necessary for the firearm instructors who gathered participant data on site. Since, the dataset came from a large Midwestern training facility, officers from all over the Midwest can lend generalizability of the findings to the overall police population. I chose the survey instruments that were used (PSS, LOT-R) in the study for their high construct validity and reliability (Scheier, Carver, & Bridges, 1994; Taylor, 2015).

Limitations

Possible limitations to the study can be inaccurate or untruthful answers to the survey questionnaires in order to limit perceived weaknesses, especially for the PSS scale. In order to mitigate this outcome, anonymity for all participants was made clear. Following Field (2013), data was secured and transferred to numbers; no names of officers or agencies to which they belong to will be known (Field, 2013). Also, because the population for the study was collected from outside agencies, the participants were unknown to myself, so participation was based on the individuals' motivation to participate and not a personal obligation. This study used a controlled pistol shooting exercise that lacks fidelity to circumstances involving aggressive behaviors from subjects in real world. Police use of force is variable and these variables will dictate officer

response whether verbal, hands on, and shoot or do not shoot responses (Nieuwenhuys,

Cañal-Bruland et al., 2012).

Significance

This study may address a gap in the research on performance under stress as it

focuses on applications that can mitigate negative performance outcomes in pistol

shooting tasks using positive psychology as a platform and dispositional optimism as a

quantitative construct. Stress and performance literature focuses largely on the negative

effects of anxiety and arousal that can lead to maladaptive responses in tactical situations

such as use of force encounters where deadly force is used but unnecessary (Stanley &

Jha, 2009). Psychology literature related to stress-based events usually focuses on the

negative aspects of the encounter and the individuals' failure to perform based on WM

and past orientations toward high stress events (Kleider et al., 2009; Nieuwenhuys &

Oudejans, 2010). The change of focus from distress to the optimistic aspects (eustress) of

these encounters uses positive psychology and self-efficacy principles to mediate the

effects of adaptation and performance when exposed to dangerous life-threatening

situations (Matthews, 2009). According to Matthews (2009) positive psychology training

lends itself to understanding individual strengths, abilities, and weaknesses, thus

potentially mediating anxiety-induced decreases in police pistol performance.

Character strengths and virtues imbued in positive personality traits can be

exploited to impact cognitive behaviors to best influence task-based performance, which

can lead to future adaptation and resilience outcomes through finding meaning and

achievement through participation in high-risk endeavors (Cooke et al., 2011; Matthews,

2009). Dispositional optimism and self-efficacy principles have been recognized in ameliorating and managing traumatic disorders with those who have experienced high stress events in hostile environments (Chopko, 2010; Davis & Asliturk, 2011). There are many physiological and cognitive factors that induce anxiety/arousal and activation in dangerous life-threatening circumstances but, attentional capacity and WM considerations managed by positive psychology resilience training can allow for improved and increased performance that can last over time and reduce post trauma distress as well (Kleider et al., 2009). Possible future applications of positive psychology using the dispositional optimism construct can be strategies that mitigate negative mindset, allowing for better management of negative emotionality in high stress situations making for better decision-making (Kleider et al., 2009). Overall, positive social change through results of this study may yield better training protocols to mediate post-traumatic stress disorder for law enforcement personnel and military populations, as well as better manage decision making during high stress perceived life-threatening events where target discrimination and the correct use-of-force application is critical for the officer and the suspect (Barnard et al., 2011).

Summary

Cognitive behavior training can be significant in managing stress and anxiety, allowing better mental processes to work efficiently and effectively to make better congruent decisions. Positive psychology is the study of well-being and resilience, and dispositional optimism is a quantitative construct with congruent and protective factors such as adaptation and positive goal oriented behaviors during traumatic events (Cooke et

al., 2011; Matthews, 2009; Seligman & Csikszentmihalyi, 2000). Research into how stress impacts performance in police shooting tasks is important because officers can find themselves in a deadly force situation that can be accurately or inaccurately perceived, due in part by how the information is processed and/or influenced by negative stress effects and biases (Nieuwenhuys & Oudejans, 2012). Finding correlations toward performance management in stress inducing pistol shooting task, and dispositional optimism levels can lead to future training models involving stress management in all levels of use of force, not just the use of lethal force. This may mitigate the use of lethal force in circumstances where other force options can be achieved but require a higher level of stress management training.

Chapter 2 presents examinations into the stress effects on motor performance, focusing on constructs that impact stress such as precise performance accuracy with minimal time constraints. Cognitive processing efficiency and task performance outcomes based on environmental variables are understood through the theoretical basis of human performance and execution in the PET and the ACT. Ancillary theories relevant to firearms control and accurate deployment are quiet eye (QE) theory and reinvestment theory. Also investigated was the gap in dispositional optimism as a mitigating factor in stress and performance research.

Chapter 2: Literature Review

Introduction

Perceptual motor performance outcomes in the field of policing are important for events to end peacefully and advantageously for both the officer and the public in many circumstances. The literature review for this study includes the theories of stress and anxiety and the impact on physical performance. This includes the cognitive impact of stress and anxiety on mental performance and decision making as it relates to performance outcomes, such as in high-anxiety events involving athletes, military, and police personnel. This review sheds light on the use of force model in a deadly force incident. In this review I discuss theories related to optimal performance enhancement and mitigation representative of possible future training models to increase officer awareness and decision-making proficiency. Researchers have studied police officer pistol shooting performance with induced anxiety measures and investigated the effects of positive imagery in WM in anxiety reduction, but the options for training instruction designed to mitigate pressure induced performance issues are relatively nonexistent (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010; Regehr et al., 2008; Vaez Mousavi et al., 2011). Positive mental awareness strategies were reviewed along with measurement tools used to analyze positive thinking and stress mitigation.

Literature Search Strategy

The literature used for this study was obtained through peer-reviewed research articles and textbooks. Electronic peer-reviewed databases were used such as ProQuest, criminal justice, PsycArticles, PsycINfo, Academic Search Complete, ProQuest health

and medical complete. Database search terms used were *anxiety, performance, positive psychology, dispositional optimism, police officers, police training, military training, resilience, attentional control theory, processing efficiency theory, working memory, mortality salience, eustress, terror management, pistol shooting,* and *aggression*. The research literature used was primarily from the last 5 years; some articles were older, but they contained in-depth theoretical origins relevant to the study. In terms of training models using positive psychology and resilience, I found very little research in this field, except in military texts on combat psychology and stress inoculation relevant to mediating anxiety and stress during critical performance events. This review includes sections on Stress and Performance, Processing Efficiency Theory, Attentional Control Theory, working memory system, the central executive functions, kinematics and reinvestment theory, Personality Dimension N and Emotionality, and Stress Effects and Mitigation. It concludes with perspectives on positive psychology and a summary.

Theoretical Foundation

Research has found stress and anxiety can significantly impact performance, oftentimes decreasing desirable outcomes (Cooke et al., 2011; Murray & Janelle, 2003; Nieuwenhuys & Oudejans, 2010; Oudejans, Kuijpers, Kooijman, & Bakker, 2011). In critical incidents involving police and lethal force in which the safety of the public can rest on pistol accuracy outcomes, it is this relationship that was investigated (Cooke et al., 2011; Murray & Janelle, 2003; Nieuwenhuys & Oudejans, 2010; Oudejans et al., 2011). First responders can be faced with highly demanding situations just as the highly trained athlete finds ultracompetitive events stress inducing; therefore, researching stress and

performance curves in sport was implemented (Murray & Janelle, 2003; Nieuwenhuys & Oudejans, 2010). Based on the criticality of outcomes, this can lead to heightened arousal and increased anxiety (Nieuwenhuys & Oudejans, 2010; Oudejans et al., 2011). Theories found in sports performance are commensurate with mechanisms that can be found in police officers' successful shooting performance (Murray & Janelle, 2003; Nieuwenhuys & Oudejans, 2010).

Stress effects on performance are not always detrimental, but are based on an individuals' perception of stress (Cooke et al., 2011; Murray & Janelle, 2003). Moreover, specific training protocols used in performing under stress conditions can facilitate determinable outcomes that can aid performance (Cooke et al., 2011; Murray & Janelle, 2003; Nieuwenhuys & Oudejans, 2010; Oudejans et al., 2011). This environment can lead to rewards for success or rejection for failure, but only in terms of social evaluation and comparison to other athletes (Cooke et al., 2011). However, police officers can experience high levels of stress when arresting violent suspects or when a sudden confrontation arises with an armed and dangerous suspect (Nieuwenhuys & Oudejans, 2010). Evidently, the stakes are high for both the officer and society if outcomes are perceived too late or even too early (Nieuwenhuys & Oudejans, 2010). The PET is a psychological description designed to account for the effects of pressure (stress) on motor performance (Nieuwenhuys & Oudejans, 2010).

Processing Efficiency Theory

PET originated through evidence that threat-related material causes stress/anxiety levels to rise, and preferential processing of negative thoughts was the dominant mental

focus, although irrelevant (Derakshan, Ansari, Hansard, Shoker, & Eysenck, 2009).

Moreover, stress/anxiety levels generally interfered with processing capabilities in WM

(Derakshan et al., 2009, Derakshan & Eyswenck, 2009). PET used Baddeley's working

memory (WM) model, which consists of three parts, a central executive and two

dependent systems (phonological loop, visuospatial sketchpad) (Burnham, Sabia, &

Langan, 2014). The central executive of WM is responsible for active processing and

self-regulation, controlling for incoming information in a modality free system tasked

with attentional control, planning, and strategy selection (Cooke et al., 2011; Derakshan

et al., 2009, Derakshan & Eysenck, 2009). WM is theorized to have a limited capacity,

and when stress/anxiety puts pressure on the central executive, the attentional system is

burdened in two ways: (a) attentional capacity is compromised by the dynamic cognitive

state of worry, and (b) effort on task attention is increased (Cooke et al., 2011).

When attentional capacity in the central executive system of WM is consumed to

a level where no auxiliary resources are present to retain task relevant information,

performance is considered to be impaired (Cooke et al., 2011; Nieuwenhuys & Oudejans,

2010). However, the second aspect of stress/anxiety induced performance cues shows

that increased effort can manage auxiliary resources initially compromised by anxiety

and mobilize these resources toward task relevant goals (Cooke et al., 2011; Derakshan et

al., 2009; Derakshan & Eysenck, 2009; Nieuwenhuys & Oudejans, 2010). Derakshan et

al. (2009) cited an important distinction between performance effectiveness and

processing efficiency, where effectiveness places the importance on performance quality,

and efficiency focuses on a balance between resource allocation and effectiveness.

Consequently, stress/anxiety can lead to increased use of resources managed by the central executive, thereby impacting processing efficiency more than performance effectiveness (Derakshan et al., 2009).

Derakshan and Eysenck (2009) theorize the phonological loop of the WM system compromises motor performance by cognitive interference (verbal rehearsal) through stress/anxiety (worry). This worry can include task irrelevant information as well as the number of tasks needed toward successful goal accomplishment (Derakshan & Eysenck, 2009). The visuo-spatial sketchpad in the WM involves processing and storing visual information used by the central executive in planning, strategy, and attentional control (Derakshan & Eysenck, 2009). This slave system can be compromised during the initial gathering of visual information, causing disorientation of the officer if the event is novel and dangerous, causing anxiety levels to rise quickly taking the sympathetic nervous system with it (Nieuwenhuys & Oudejans, 2010; Regehr et al., 2008; Vaez Mousavi, Naji, & Hassanzadeh, 2011). Consequently, further investigation into the PET stress/anxiety mechanisms on the central executive gave rise to the ACT, which states that stress/anxiety affects performance through pressure on the attentional control system of the central executive (Derakshan & Eysenck, 2009).

Attentional Control Theory

ACT furthers the investigation into the central executive finding additional functions of this system to include task switching, selective attention and inhibition, encoding representations of time and place in WM, and updating contents of WM using the two dependent WM systems (phonological loop and visuo-spatial sketchpad;

Eysenck, Payne, &Derakshan, 2005; Eysenck, Derakshan, Santos, & Calvo, 2007). ACT states the attentional control system in the central executive can be further separated into two systems, the stimulus-response system and the goal-driven system (Derakshan & Eysenck, 2009).

According to Derakshan and Eysenck (2009), there are two attentional systems at the heart of the ACT: one influenced by top down goal oriented schemas such as the individual's immediate goals based on prior knowledge leading to probable expectations; and the stimulus-driven system that is recruited by the individual during the detection of behaviorally relevant stimulus, though salient and unattended. The stimulus-driven attentional system considered bottom up is theorized to interact with the top down goal oriented system (Derakshan & Eysenck, 2009). Consequently, stress/anxiety is theorized to tip the balance toward the inefficient stimulus-driven process versus the efficient goal-oriented processing system (Derakshan et al., 2009).

The ACT puts the emphasis on the impact of anxiety associated with attentional bias for threat related stimulus, and the individual's increased focus on this distracting stimulus, which is dominant but task irrelevant (Derakshan & Eysenck, 2009). This enhanced distractibility can lead the actor from adequately disengaging from processing the goal-irrelevant threat-related stimulus (Derakshan & Eysenck, 2009). Furthermore, bottom up stimulus induced distractibility can lead to processing inefficiency that can unbalance performance effectiveness in time critical events, leading to maladaptive use of force decision making in high stress events (Derakshan & Eysenck, 2009; Nieuwenhuys et al., 2012). Consequently, police firearm encounters that have occurred may have been

avoided if proper time to process all relevant goal-oriented information had taken place, versus stress-fueled stimulus response reactions (Nieuwenhuys et al., 2012).

Working Memory

Literature shows the ACT theory engaging stress/anxiety as it mediates attentional control in the WM, revealing the relationship between attention and WM (Burham et al., 2014; Derakshan & Eysenck, 2009). According to Derakshan and Eysenck (2009) the attentional control mechanisms in WM are managed by the central executive; they go on to identify several specific functions: (a) the inhibition function is considered negative attentional control where the individual does not resist disruption of interference from task irrelevant information; (b) the shifting function is considered positive attentional control, shifting attention towards task-relevant stimulus of immediate importance to augment performance; and (c) the updating function, which involves the processing and storage of WM representations in short-term memory. Consequently, the updating function is believed to be primarily concerned with transient storage of information and therefore is considered an aspect of short term memory over attention control mechanisms (Derakshan & Eysenck, 2009). As a result, ACT can be found to impact efficient processing in inhibition and shifting functions, leading to studies in which the updating function can play a role in aiding the shifting function and mitigate the inhibition function (Burnham et al., 2014; Derakshan et al., 2009; Derakshan & Eysenck, 2009).

Derakshan et al. (2009) studied the effects of stress/anxiety on performance effectiveness and processing efficiency and found the inhibition function to be negatively

dynamic in managing performance effectiveness during times of high stress/anxiety.

Effects of the inhibition function used an emotional Stroop task, whereby the individuals

are to rapidly name the color of the threat-related word; highly anxious individuals

performed the task slower that those with low anxiety, indicating stress/anxiety can

negatively impact the ability to inhibit processing threat dominant stimuli over goal-

oriented information (Derakshan et al., 2009).

The Central Executive

The central executive functions of inhibition and shifting are important

foundations; together with threat-related stimuli stress/anxiety levels can be directly

impacted (Burnham et al., 2014). Since, most environmental information gleaned by

police officers in dealing with the public requires visual stimulus, studies have used

negative priming, flanker tasks, and Stroop tasks in experiments with significant results

(Burnham et al., 2014). Burham et al. (2014), along with other studies have found multi-

tasking variables in high pressure situations increased stress/anxiety leading to decreased

performance (Burnham et al., 2014; Derakshan et al., 2009; Nieuwenhuys et al., 2012).

Further investigations into WM, found consistency with load theory (LT) principles in

that WM *load* interferes with selective attention, elucidated by experimentation with a

flanker task (Burnham et al., 2014). Using a flanker task whereby individuals identify a

central target letter flanked by letters considered incongruent (opposite relation to target)

or congruent (directly related to target), or neutral (no relation at all) (Burnham et al.,

2014). The subjects performed the experiment with one flanker object or six flanker

objects and found performance decreased in selective attention under higher load as WM

became depleted, therefore Burnham et al. (2014) uncovered a mediating effect of higher loads on performance efficiency in the updating functions of the central executive.

Moreover, this study used the flanker test to explain with detail LT, as performance in a selective attention task is a function of the WM load and perceptual load, defined as the number of items presented with the target letter and the congruence or incongruence of those flanker items (Burnham et al., 2014). Moreover, LT has shown that congruence of the flanker items decreased distraction, mitigating the inhibition function allowing the shifting function to increase task relevant stimulus capture; and the ability to stay on task depends on WM load (Burnham et al., 2014). Consequently, during a perceived high threat event in policing such as and unexpected encounter with a committed armed suspect an officers' ability to inhibit threat based stimuli rapidly impacting the senses can compromise WM processing (Burham et al., 2014; Nieuwenhuys et al., 2012). In addition, this compromise of WM oftentimes involves a bottom up (stimulus-response) process leading to decreased performance outcomes (Burham et al., 2014; Nieuwenhuys et al., 2012; Regehr et al., 2008). Conversely, if the situation is affectively loaded where the officer has previous information about a possible high-level crime taking place, rapid induction of visual information can cause high levels of stress/anxiety effecting perception leading to an armed force response when none is required (Nieuwenhuys et al., 2012; Regehr et al., 2008). However, investigation into the cognitive aspects of PET and ACT on motor performance would not be complete without what literature has to say about how stress/anxiety affects emotionality and personality characteristics, and trait anxiety impacts performance under stress (Derakshan &

Eysenck, 2009; Flehmig, Steinborn, Westhoff, & Langner, 2010; Kleider et al., 2009;

Nieuwenhuys et al., 2012).

Literature has shown that threat related stimuli takes with it high distractibility

and maladaptive cognitive resource allocation in WM, leading to enhance amygdala

activation and reduced recruitment of pre-frontal cortex, where top-down goal oriented

processing occurs, decreasing efficient task performance through bottom-up processing

(Derakshan & Eysenck, 2009). Correct decision making is critical in high stress

situations oftentimes encountered by police officers, the understanding of PET, ACT, LT,

WM, and other peripheral systems and how they impact decision making is critical for

judicious use of force in contemporary times (Kleider et al., 2009; Nieuwenhuys et al.,

2012). Many studies have compared an armed encounter with a dangerous criminal to a

professional athlete making a critical score (soccer, hockey, basketball penalty shots,

golfing putt) (Cooke et al., 2011; Oudejans, Kuijpers, Kooijman, & Bakker, 2011). In

sports, failure to perform adequately is perceived negatively in social circles of

comparison and evaluation, leading to negative criticism and loss of financial rewards

(Cooke et al., 2011). In police work the stakes are much higher, it can cost the life of an

innocent whether it be the officer, an apparent suspect, or a third party (Nieuwenhuys et

al., 2012). Therefore, consideration into the effects of performance pressure on

kinematics along with the psycho-physiological relationships should be investigated

(Cooke et al., 2011; Oudejans, Kuijpers, Kooijman, & Bakker, 2011).

Kinematics

To better understand how stress/anxiety influences cognitive and perceptual-motor performance outside of previous studies (fundamental task switching, load bearing, visual stimuli tests using colors coding, word recognition, digit evaluation), experimentation focused on whole body kinematic movements were investigated (Oudejans et al., 2011; Saus et al., 2006). In addition, Oudejans et al. (2011) investigates PET and ACT with emphasis on stress/anxiety and motor performance in high level athletic competition regarding pressure induced stress/anxiety, which lead to decreases in performance. Specific to perceptual motor tasks, self-focus theory assumes increases in stress/anxiety are met with shifts in attention of WM to internal matters (Saus et al., 2006). As a result, this focal shift to internal matters draws attentional resources toward the sequential steps of how the skill should be executed (Saus et al., 2006). In an experts' performance processing the conscious deliberation of a motor tasks sequence in detail can be detrimental to performance (Oudejans et al., 2011).

Re-investment Theory

According to Cooke et al. (2011) this conscious process of mental rehearsal of sequential motor tasks can be explained by the re-investment theory, whereby the reinvestment of task relevant knowledge can negatively impact processing capacity of the central executive disrupting the automaticity of expert body mechanics. Moreover, the reversion to a conscious state of cognitive motor control represents a regression to earlier less competent stages of movement control lending to a detrimental effect on performance (Cooke et al., 2011). In professional high level competitive events

(Superbowl, World Cup, Masters, Wimbledon) this outcome in layman's term is called, "choking" under pressure (Oudejans et al., 2011). Studies have shown that when expert performance is consciously attended the actual automaticity of performance is impaired (Oudejans et al., 2011). Obviously, doubt in the viability of the operator's expert perceptual motor skills ever being established in the first place maybe contemplated after such an incident (Cooke et al., 2011; Oudejans et al., 2011).

Stress and performance relationships are heavily studied in sports psychology thereby allowing Nieuwenhuys and Oudejans (2010) to conduct studies focused on the analogous aspects of perceptual motor performance that may or may not be negatively affected by stress/anxiety. Performance in a stressful shooting tasks where target size, target distance, movement of the officer, movement of the suspect, number of rounds fired, and time constraint all have been found to increase perceived stress and anxiety (Nieuwenhuys et al., 2012). Nieuwenhuys and Oudejans (2010) assessed performance effectiveness (shooting accuracy) and behavioral processes such as officers' movement speed, head/body orientation to target, and blink behavior in matters of processing efficiency. Evidently, decreases in shooting performance where significantly related to higher anxiety shooters who moved body position faster giving themselves less time for proper alignment of the sights (Nieuwenhuys et al., 2012; Nieuwenhuys & Oudejans; 2012). Also, the study found rapid changes in head/ body orientation led to turning away from the target too quickly, and the increased blink behavior limited the officer time of alignment of the weapon to the target leading to decreased shot accuracy (Nieuwenhuys & Oudejans, 2010). Other literature has found that speed of the target or general

movement of the target and the officer also increased anxiety in perceptual motor performance lending to a trade off in time options juggling threat related versus task relevant information (Nieuwenhuys & Oudejans, 2012). This approach compromises the visual stimuli and in shooting sports makes the competitor compete with immediate concerns for mental attention (i.e. ACT theory) and relevant concerns to properly calibrate bodily movements to adjust the firearm for accurate target acquisition (Causer et al., 2011; Nieuwenhuys & Oudejans, 2012).

Quiet Eye

Visual stimuli acquired in this case through visual attention and gaze characteristics in competitive sports have shown that variables in target speed, size, and distance can cause stress/anxiety leading to reduced efficiency in gaze behavior meaning the fovea increases the search rate giving less time for QE duration (Causer et al., 2011). The QE duration is defined as the final fixation on the target object in the visuomotor workspace allowing for the operator to engage the cognitive program required for successful aiming on the target, this can take place in highly trained individuals in as quickly as 100 microseconds (Causer et al., 2011). During stress events concentration on task relevance and controlling visual attention specifically the QE phase, when done in longer duration has found more accurate shooting results to occur (Causer et al., 2011; Nieuwenhuys & Oudejans, 2012). Targets moving toward subjects, and subjects moving toward or away from targets have shown to increase threat related responses increasing anxiety and subverting the QE lending to ineffective outcomes and lower hit ratios (Causer et al., 2011; Nieuwenhuys & Oudejans, 2012).

Consider the kinematic effects of anxiety on motor performance, which can lead to increased body movements (Cooke et al., 2011). Although, the past experience believes this extra motor activity is helpful, in the context of pistol shooting events it is deleterious (Cooke et al., 2011). Inefficient kinematic examples of body movement when attempting accurate use of a firearm are rapid head movement in an attempt to pick up as much visual information as possible, muscular tension in the body as it braces for the fight, increasing grip pressure on the pistol (Nieuwenhuys & Oudejans, 2010). Consequently, this physiological response feeds the fight or flight (fear) emotional loop leading to kinematic inefficiency and a re-investment-induced regression of skills (Cooke et al., 2010). Ultimately, performance based on confident application of skills can lead to eustress and positive outcomes (Matthews, 2009). Conversely, decreased confidence can lead to overreactions when under threat and poor decisions making with decreased pistol shot accuracy, both skills maladaptive for law enforcement use of force encounters (Cooke et al., 2011; Matthews, 2009; Nieuwenhuys & Oudejans, 2010). Increased kinematic movement by the novice, untrained, or unprepared officer can result in aggressive overcompensation of movement based on the fear of a perceived threat of a possible gun battle (Cooke et al., 2011; Mousavi et al., 2011). This increased movement can be interpreted as increased effort, but wholly inefficient and probably ineffective in the context of a lethal firearms fight (Cooke et al., 2011; Matthews, 2009; Mousavi et al., 2011; Nieuwenhuys & Oudejans, 2010; Regehr et al., 2008).

It is well documented in literature the analogy between competitive high-pressure events and high stress critical incidents (active shooter, dangerous subject encounter)

(Cooke et al., 2011; Matthews, 2009; Nieuwenhuys & Oudejans, 2010). Also, the effects elicited by the sympathetic nervous system in terms of increased heart rate, tunnel vision (focus on task irrelevant data), tachypsychia (slow time perception), and auditory exclusion (Cooke et al., 2011; Matthews, 2009; Nieuwenhuys & Oudejans, 2010). Furthermore, the effects of the sympathetic nervous system responding to the increasing the heart rate, adrenaline output, and tunnel vision can reflect the endogenous measures of the bodies fight or flight system (Cooke et al., 2011; Matthews, 2009). Both underreaction or overreaction to threat stimulus including affectively loaded situations (such a call for police assistance in an area of violent crime and/or drug areas) can cause the metabolic demands of the fight or flight mechanism along with cognitive arrest of efficient mental processing (Cooke et al., 2011; Matthews, 2009; Nieuwenhuys & Oudejans, 2010). Furthermore, metabolic overload oftentimes tied to cognitive disorientation and confusion of leads to involuntary muscular tension, head movement, and increased blink behavior, all leading to decreases in pistol accuracy, these processes are corroborative with the principles of PET and ACT (Cooke et al., 2011; Matthews, 2009; Nieuwenhuys & Oudejans, 2010).

Personality Dimension N and Emotionality

Literature focused on emotional cues related to threat related stimulus and maladaptive decision making, found officers working in high crime areas replete with high poverty, violence, and drug trafficking more likely to experience threatening police encounters in this work environment (Kleider et al., 2009). Environmental influences associated with heightened physiological arousal elicited negative emotionality such as

fear and anger (Kleider et al., 2009). Kleider et al. (2009) found these factors absorb cognitive resources that would be better used in decision making. Moreover, using PET and ACT with focus on the central executive in WM, lack of emotional control leads to deficiencies in thought and action modification (Flehmig, Steinborn, Westhoff, & Langner, R., 2010). Also, using the ideas of executive control in WM as it relates to cognitive control and reflexive decision making, negative shooting behavior may be predicted (Flehmig et al., 2010). Conversely, when negative emotionality is present due in part to past orientations in WM, an officers' perception of probable impending danger from threat stimuli can augment situational awareness lending to faster responses to real life-threatening behavior (Flehmig et al., 2010; Nieuwenhuys et al., 2011).

According to Nieuwenhuys et al. (2011) in a study using shoot don't shoot scenarios officers with higher anxiety showed quicker judgment and decisions in response to threat, but not necessarily with reasonable shot accuracy. In addition to negative emotionality literature Flehmig et al. (2010) posits trait anxiety conceptually as a personality dimension "neuroticism" (N) as trait anxiety. Furthermore, when an individual has a high neuroticism score, anxiety and negative emotions are usually present (Flehmig et al., 2010). The idea that high-pressure circumstances and high trait anxiety individuals are found to have degraded cognitive functioning versus low N individuals has been supported in literature (Flehmig et al., 2010).

Although, higher anxiety individuals reacted faster to threat stimuli showing quicker judgments and decisions to engage a threat, oftentimes this action was motivated by a negatively stereotyped suspect (black or brown male), which increased responses to

threat cues but also resulted in greater false positive errors (Flehmig et al., 2010).

Consequently, highly anxious officers were found to perceptually "see" a weapon when

encountering a darked-skinned suspect when there was none. These factors lead

Nieuwenhuys et al. (2011) to conclude race bias is a mediating factor in threat related

interpretations during experimental trials (Nieuwenhuys et al., 2011). Kleider et al.

(2009) investigates this phenomena in light of number of tragic events where black men

were shot and killed by police officers though no evident objective threat stimulus was

given by the suspect (i.e. aggressive weapon display, hostile actions). Confounding

factors during these unfortunate events include rapid decision making in an affectively

loaded threatening environment, where WM is tasked and influenced by stereotypes and

past experiences involving black suspects causing heightened threat perceptions with an

expectation of harm (Kleider et al., 2009). Understanding WM in the context of

maladaptive reflexive decision making is critical in creating a cognitive stop gap protocol

requiring higher cognitive control through training (Nieuwenhuys, Savelsbergh et al.,

2012). Training the officer to manage the inhibition function of WM can lead to better

decision making whether to shoot or not to shoot (Kleider et al., 2009; Nieuwenhuys,

Cañal-Bruland et al., 2012).   In the aftermath of such events the officer can experience

post event trauma, related to administrative, social, and possible criminal prosecution

attacking the self-esteem leading to many other mental deficits such as depression

(Kleider et al., 2009; Nieuwenhuys, Savelsbergh et al., 2012; Regehr et al., 2008).

Stress Effects and Mitigation

Anxiety leading to decreased performance can end in maladaptive decisions causing more stress, especially in the aftermath of a questionable officer involved shooting (Regehr et al., 2008). Regardless of the justified and judicious use of deadly force the officer can still experience trauma from this event, these outcomes must be managed if an officer is to remain on the job as a viable servant for the community (Regehr et al., 2008). Acute stress events can lead to mental and physical distress, leading to coping issues for the surviving officer if faced with similar situations in the future (Matthews, 2009; Regehr et al., 2008). Therefore, resiliency training is critical in managing possible cognitive imbalances between perceptual environmental demands (suspect's actual threatening behavior) and officer stress coping capacity (Matthews, 2009; Regehr et al., 2008).

Perceived Stress Scale

Being able to measure stress perception can be helpful in understanding how an individual experiencing an anxiety filled event can impact outcomes whether positive or negative (Regehr et al., 2008). The constructs of stress and anxiety are synonymous and being able to measure the stress perception using the PSS survey can be helpful in quantitatively measuring perceived stress (Petrac, Bedwell, Renk, Orem, & Sims, 2009). Also, the PSS has subscales within the survey helpful in measuring stress as it impacts the present and worry for future outcomes (Petrac et al., 2009). Stress as it applies to distress, is consistently linked to decreases in declarative memory processes through physiological means (cortisol production), leading to a decrease of motor performance

along with cognitive process compromise (Guillot et al., 2003; Petrac et al., 2009; Regehr et al., 2008). In police and military populations though firearms training is compulsory, performance with the weapon is usually stressful due to the inherent precision necessary to be accurate based on target size, distance, and time constraints (Nieuwenhuys & Oudejans, 2012). The officers past experiences whether good or bad can impact the performance of pistol marksmanship on any given day due to the goal directed skill to be a consistent marksman in a qualification or real-world deployment capacity (Nieuwenhuys & Oudejans, 2010; Nieuwenhuys & Oudejans, 2012). The PSS will be advantageous in measuring the perceived stress allowing relationships to performance outcomes to be possibly discovered (Petrac et al., 2009).

Successful police performance in critical shooting tasks requires correct decision making in whether to use deadly force or not. Therefore, understanding anxiety and performance in this context is necessary in determining better training models for use in future law enforcement firearms training programs (Matthews, 2009; Nieuwenhuys & Oudejans, 2010). Literature showing performance enhancement and cognitive resilience protocols as a way of ameliorating the negative impact of anxiety has been found to consist of re-enforcement through training and the understanding of these mechanisms (Fatkin & Patton, 2009; Matthews, 2009). A training methodology using these ideas as the primer for mediating high performance in unexpected, time critical, fast transient, and high stress use of force environments has been forwarded in literature (Colin et al., 2014; Davis & Asliturk, 2011; Emich, 2012; Fatkin & Patton, 2009; Gustafsson & Skoog, 2012; Matthews, 2009).

According to Gustafsson and Skoog (2012) the conceptualization of burnout in highly competitive athletes found the stress effects in competition has a compounding negative impact when the athlete possessed a pessimistic attitude, such as sport devaluation, loss of motivation, loss of perceived skill, these performances failed meet high performance demands. Also, ill health can result from having inefficient resources to handle the stress, but studies into optimistic personalities have found mitigating factors toward stress and burnout (Gustafsson & Skoog, 2012). Moreover, optimists' expectancy value when faced with stress effects while attempting to accomplish a goal directed task possessed higher confidence in their expectations of attainment (Gustafsson & Skoog, 2012). This optimism apparently leads many to gain a sense of control and motivational force, which can be realized as a powerful coping method against distress (Gustafsson & Skoog, 2012). Gustafsson and Skoog (2012) focus on cognitive readiness through Cognitive Behavioral Therapy (CBT) as a means of modifying specific negative thoughts and distorted thinking through awareness of one's own pessimistic bias that can become an effective way of reducing stress, especially when an individual operates in a high stress/anxiety environment.

Cognitive readiness as asserted by Fatkin and Patton (2009) specific to Soldier readiness has optimization and enhancement of cognitive performance through multi-tasked functioning and readiness to adapt to dynamic threats as an outcome in their study. A multi-pronged approach using personality assessments and stress experimentation found readiness protocols enable optimal performance outcomes over duration of time (Fatkin & Patton, 2009). Also, these protocols can be advanced to mediate Soldier

fitness, and those most suited for particular pressures in high stress environments (Fatkin & Patton, 2009). The cognitive readiness protocol uses a standardized assessment model involving the Readiness Assessment and Monitoring System (RAMS), designed to quantify cognitive-perceptual influences of performance including psychological measurements of trait characteristics, stress perceptions, and field expedient stress practicums designed to measure physiological changes (Fatkin & Patton, 2009). Also, Fatkin and Patton (2009) used what was termed Standardized Stress and Readiness Assessment (SARA) methodology involving experimentally induced stress through a marksmanship competition and a situational stress event such as advanced individual training, which is an extension of the Army boot camp training regimen but with more robust components. Seemingly, RAMS and SARA are used in synergy in military circles to effectively measure stress and the impact on performance, using a research-based design to gauge and identify significant predictors of a cognitive and physiological readiness state (Fatkin & Patton, 2009). Optimistic personalities when combined with cognitive readiness models were used to identify strengths and weaknesses, coupled with the positive psychology awareness can seek to enhance performance in high stress, rapidly evolving, fast paced, time critical environments (Colin et al., 2014; Davis & Asliturk, 2011; Matthews, 2009).

Toward Positive Psychology and Dispositional Optimism

Studies regarding the effects of stress/anxiety on performance largely focus on the distress caused by pressure induced by anxiety on the cognitive memory processing models translating to deficient motor performance (Davis & Asliturk, 2011). As a result,

focusing on ways to alleviate distress, understand stress and coping has led to positive aspects of psychology, such as dispositional optimism, positive imagery, and positive psychology, as a way of adapting to life's adversities (Davis & Asliturk, 2011; Gustafsson & Skoog, 2012; Nieuwenhuys & Oudejans, 2010; Regehr et al., 2008). The psychological implications of stress on humans have largely been investigated from a disease-model distress platform where the focus on human performance looked at mostly weaknesses and deficiencies in light of adverse situations (warfare, assault, abuse) (Matthews, 2009).

Seligman and Csikszentmihalyi (2000) forwarded the idea that psychological energies at the time were manifest in negative cognition, affect, and behavior; and a paradigm shift toward human strengths, virtues, and resilience has defined the scope of positive psychology as a branch of psychological science. During this time in history psychological practice was mostly disease pathology directed, but Csikzentmilhalyi (2000) believed using a humanistic approach the study of human resilience in the face of adverse conditions could focus an individuals' macrosocial strengths and virtues (Matthews, 2009; Seligman & Csikszentmihalyi, 2000). What was discovered were positive personality traits that can aid in positive psychology such as, optimism, self-determination, happiness, and subjective well-being (Seligman & Csikszentmihalyi, 2000). It seems that the construct of happiness has some links to cultural macrosocial dynamics where subjective well-being which can be considered a goal directed, value inherent quality of experience regulated by external stimulus and mediated by internal coping mechanisms ((Seligman & Csikszentmihalyi, 2000). Prior to the Positive

Psychology, the concept of eustress was put forward in contrast to distress, as positive

affect, cognition, and behavior stemming from positive events and/or positive outcomes,

whereby immediate goals are met (Gustafsson & Skoog, 2012; Seligman &

Csikszentmihalyi, 2000). Combining these concepts with the self-determination theory

of positive psychology greater objectives can be achieved (Matthews, 2009; Seligman &

Csikszentmihalyi, 2000).

Life Oriented Test-Revised

Positive psychology and dispositional optimism constructs are both linked to

optimism, self-efficacy, resilience, and adaptation make up the quantitative measurement

of dispositional optimism in the Life Orientation Test-Revised (LOT-R) survey an

optimal measurement tool for researchers (Chiesi, Galli, Primi, Borgi, & Bonacchi, 2013;

Matthews, 2009). The LOT-R is related to positive adaptation to adverse life events and

coping strategies as they relate to emotional responses (Chiesi et al., 2013). Literature

has shown strong conceptual links towards positive psychology and dispositional

optimism with LOT-R being a viable diagnostic tool in gathering a quantitative measure

of inherent optimism (Chiesi et al., 2013; Gustafsson & Skoog, 2012; Seligman &

Csikszentmihalyi, 2000).

Dispositional optimism through positive psychology is relevant to my study in the

context in which Matthews (2009) uses eustress conceptualization in response to tactical

situations based on personality, training, and experience. Exceptional environments

faced by the law enforcement professional can include dealing with armed offenders,

escaped convicted, and wanted murderers, whereby encounters must be handled with

extreme competence and control of emotionality (Kleider et al., 2009; Matthews, 2009).
Matthews (2009) hypothesizes that extreme environments can be managed efficiently by
leaders in the military whose personality screening profiles are congruent with optimistic
psychopathologies. Optimism literature deals with self-regulation, and if conditioned
correctly can manage self-control in WM systems (Chiesi et al., 2013; Colin et al., 2014;
Matthews, 2009). Colin et al. (2014) studied the imagery interventions in shooting
performance under threat and discovered imagery visualization can lead to successful
shot execution while the subject was under threat. It seems that positive imagery in this
experiment allowed the officer to limit the negative effects of anxiety on outcomes, these
positive imagery intervention groups scored significantly higher than those without
positive imagery instruction (Colin et al., 2014). Furthermore, Colin et al. (2014) added
emotionality cues along with the visualization script for the positive imagery group and
found no significant change in performance if emotional cues were managed during the
visualization stage. It seems that using the visuospatial sketchpad in WM necessary for
imagery interventions and leaving out the amygdala's emotional response can better
influence decision making under stress (Colin et al., 2014). Moreover, emotional
reactions can a have deleterious effect on the central nervous system leading to cortisol
elevation found to impair verbal, WM, and selective attention systems (Colin et al., 2014;
Regehr et al., 2008). Positive psychology pathology and subsequent training models
increasing threat awareness and management have not been fully realized so far in the
literature.

Summary

The foundational literature supporting this study informed us about stress and performance theories shedding light on the impact stress/anxiety has on the WM systems that control perceptual motor control. Despite literature citing the negative influences of stress/anxiety on WM, an interesting enhancing aspect of stress/anxiety regarding robust focus on task performance with some individuals was uncovered. Nevertheless, efficiency issues came to light when the subject was faced with multiple tasks that strained the WM system led to performance failures in shooting tasks (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010; Vaez Mousavi et al., 2011). Personality traits in this chapter were researched to study how subjects whom possessed personality traits such as neuroticism was strongly linked to performance fluctuations when high stress/anxiety is present (Kleider et al., 2009; Niewenhuys et al., 2011). Furthermore, literature focusing on stress effects on decision-making supports this study by understanding how the scientific community comes to ameliorate the negative impact of stress (Nieuwenhuys & Oudejans, 2010; Nieuwenhuys, Savelsbergh et al., 2012; Regehr et al., 2008).

Dispositional optimism literature is supported in this study as a cognitive means of understanding resilient factors in the human psyche when faced with adverse life-threatening situation that can be anticipated in fields such as law enforcement and the military (Matthews, 2009). However, dispositional optimism as a quantitative measurement has not been analyzed along with accuracy outcomes in a precise pistol shooting task. This study can fill the gap in performance under stress research using dispositional optimism as mediating variable in the possible enhancement of performance

under stress and can be used in future training models for police training in high risk

scenarios. Also, it can serve as a foundation for future studies into mechanism for use in

shoot don't shoot decision making loops and de-escalation protocol.

Chapter 3 includes the methodological design of the study, discussing the

populations used, specific measurement tools, data collection, and statistical analysis.

Also, presented are protection of participants, ethical obligations, and variables used in

previous studies that will be studied and operationalized in the current study so as to add

to existing results, furthering the performance enhancement agenda.

Chapter 3: Research Method

Introduction

The purpose of the study was to determine whether there is a mediating effect of an officers' dispositional optimism score on the relation of stress score to shooting accuracy score. I used a correlational design to determine whether dispositional optimism has a mediating impact on stress and performance accuracy outcomes using a pistol shooting task. In this chapter I describe the rationale behind the design of the study, population, sample size, and participant recruitment. Also, in the methodology section I specifically explain how research surveys and the performance task were administered to the participants and how the data was collected and analyzed. Closing sections address threats to validity and ethical concerns and provide an end of chapter summary.

Research Design and Rationale

In this study I used a correlation and regression design to search for and describe the relationship between dispositional optimism, stress, and performance accuracy using a pistol shooting task. Dispositional optimism was measured using the survey LOT-R, and stress perception was measured by the PSS (Jiang et al., 2014; Taylor, 2015). The scores were analyzed to determine hypothesized relationships between the survey scores and shooting scores. Predictor variables for this study were the survey scores from LOT-R and PSS, and the outcome variable was the shooting accuracy scores for the shooting task (MT). I used multiple regression analysis on the data to estimate any associations between these variables. As exemplified in the work of Field (2013), I examined regression and equations that predicted accuracy scores from the perceived stress scores,

accuracy scores from the dispositional optimism score, a regression predicting the dispositional optimism scores from the perceived stress scores, and a regression predicting the accuracy scores from both the perceived stress score and the dispositional optimism score.

I predicted the dispositional optimism variable to mediate the stress variable on the accuracy outcome variable. Regression coefficients for each of the predictions gave a value, which in turn was used to test the four conditions of mediation for this model: (a) the perceived stress scores must significantly predict the MT pistol accuracy scores, (b) the perceived stress scores must significantly predict the dispositional optimism scores, (c) the dispositional optimism scores must significantly predict the MT pistol accuracy scores, and (d) the perceived stress score must account for less variance in accuracy outcomes (Figure 2, C') than when dispositional optimism is not included in the equation (Figure 1, C). The officers (participants) engaged paper targets with a defined score area (target size) in a pistol shooting exercise, MT shooting tasks conducted by a research associate. The MT condition required the participant to shoot while moving toward the target during the time interval allowed to complete the shooting task. Interpreted was the effect size statistic that showed the strength of relationship between the dispositional optimism, stress, and shooting accuracy. For the independent variables (predictor) and dependent variables (criterion) I used linear regression as means of quantifying relationships between positive psychology, stress effects, and goal directed motor performance.

The rationale for this study originated from literature, which focused on stress exposure of police officers and performance deficiencies (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010; Regehr et al., 2008). Studies relating precise pistol shooting tasks while increasing stress also found negative correlations in performance when anxiety/stress was high (Vaez Mousavi et al., 2011). Shooting behavior in critical incidences have been found to be negatively influenced by emotional distress confounding the cognitive processes of WM and leading to motor performance lapses (Kleider et al., 2009; Nieuwenhuys, Cañal-Bruland et al., 2012; Nieuwehuys, Savelsbergh et al., 2012). Police populations that encounter violent offenders may not have sufficient training protocols to manage mortality issues in high stress encounters (Correll, Hudson, Guillermo, & Ma, 2014; Tritt, Inzlicht, & Harmon-Jones, 2012). Furthermore, when uncertainty and perceptions of imminent physical danger impact cognition, WM can get saturated, leading to many maladaptive decisions, such as using lethal force when unnecessary (Kleider et al., 2009).

Possible time and resource constraints could have been officer availability to take time during their training tour to complete the survey and performance task and the amount of time to acquire the representative sample. Resources provided for the officer for the study were the ammunition required to complete the task and the relevant dollar amount associated with sample number.

Methodology

Population

According to the Federal Bureau of Investigation (2014), there were 93,026 sworn police officers in the Midwest as of 2014. The sampling frame used for this study was active duty law enforcement officers from multiple jurisdictions in the Midwest. The sample frame from the Midwest can be generalized to the overall police population throughout the United States (Federal Bureau of Investigation, 2014).

Sampling and Data Collection

All participants were active duty law enforcement officers. As officers arrived at the facility for training they were asked to voluntarily participate in the study by the designated facility instructor. Conventional studies for mediation utilize .80 power to detect an effect (Fritz & MacKinnon, 2007). Using Fritz and MacKinnon's (2007) mediation analysis and using the bootstrapping method for medium effect sizes for the indirect effect of pathway AB (Figure 2) the sample size needed to detect .80 statistical power is $n = 78$. A limited data set ($n = 80$) was obtained from the research partner and analyzed for this study.

The sample was compiled by the research partner who created a deidentified limited data set to which I had access. Once the data user agreement was approved for use and signed by the research partner, I acquired the limited data set, which I converted into numerical data for statistical analysis. The limited data set is stored in an encrypted file on a removable flash drive that will be secured in a locked vault. All data for this study will be held for 1 year then destroyed.

Variables

Stress perception**.** This measure was used to determine the level of the participants' inherent perceptions of stress regarding the events in their lives. Quantified for this study by the PSS-10 was a self-report survey that was administered before the shooting task was completed. (Taylor, 2015).

Disposition optimism. This measure was used to determine the participant's intrinsic perceptions of positive bias in experiences and outcomes. The LOT-R self-report survey was used to measure this variable. The LOT-R constructs are relevant to positive psychology traits in reference to self-regulation, optimism, and self-determination (Seligman & Csikszentmihalyi, 2000).

Shot accuracy. Counting the number of shots within the designated scoring zone was used to assess performance accuracy, which was compiled by the designated facility firearms instructor and recovered off site by me. Data analysis for the mean percentages for accurate hits were computed for the performance task. Since the task is a 30-round course, 30 hits in the scoring area equals 100% accuracy. The accuracy scored was aligned to each participants' survey scores and then the SPSS tool was used to analyze the data. The greater the score the more accurate the participant performed in the MT task.

Instrumentation and Operationalization of Constructs

The survey instrument PSS-10, reliability (alpha = .86) as a global measure for stress, was created by Cohen et al. (1983). Scheier et al. (1994) created the LOT-R survey, reliability (alpha = .80), designed to measure dispositional optimism (Taylor,

2015). Data for performance accuracy were obtained from the hits scored for the participant's MT.

Moving Test Performance Task

The firearms shooting task consisted of a 30-round course. The score area for this task was delineated by an 8-inch circle. All shots within the circle were considered an accurate hit. The paper target was mounted on a static target carrier and engaged by the participants at the sequential distances no closer than 7 yards (21 feet), 15 yards (45 feet), and 25 yards (75 feet). Each participant used three pistol magazines with the weapon containing six rounds (one round in the chamber with five rounds in the magazine, and two magazines loaded with 12 rounds each secured in the participants' pouches. The MT performance task required the participant to start several yards behind a terminating distance and on start cue begin to move while drawing the weapon and discharging the prescribed number of rounds at the target area. For example, at the seven-yard terminating line, the participant was staged at 12 yards to the target and the participant had five yards in which to move while shooting the correct number of rounds in the designated time frame. At the 15-yard terminating line, the participant's stage distance was 22 yards, and at the 25-yard terminating line, the participant's stage distance was 35 yards. All surveys and performance tasks were compiled as a secondary data in a deidentified limited data set that I collected offsite.

PSS Survey

The PSS is a 10-item self-report survey designed to capture the degree in which individuals perceive situations in their life stressful relative to their ability to cope

(Taylor, 2015). Developed by Cohen, Kamarck, and Mermelstien (1983) and using

Lazarus' transactional stress model which defined the interchange between the appraisal

of the stress and the ability to cope (Wikrama et al., 2013). The commonly used PSS-10

has shown solid reliability (alpha = .86) and moderate validity (alpha = .78) as means of

tracking client's response to a treatment (Taylor, 2015). The PSS self-report survey

answered using a Likert-type scale with response categories ranging from 1 (never) to 5

(very often), with reserve scored items for 4 questions summing the score across all 10

items.

LOT-R Survey

The LOT-R is one of most frequently used measures of dispositional optimism.

Developed in 1994, the revised version was derived from the original LOT to assess

individual differences in optimism versus pessimism (Scheier et al., 1994). LOT-R has

been found to have salient relationships with emotional responses, coping strategies,

allowing for adjustments to managing difficult life events over a large spectrum of

behavioral contexts (Chiesi et al., 2013). The one-factor structure of the LOT-R has been

documented as having solid reliability and validity with adequate measures of internal

consistency (alpha = .80; Scheier et al., 1994). Also, correlations of this scale relate to

psychological well-being, sense of mastery, and sense of coherence (Scheier et al.,

1994). Relating to optimism and positive psychology, this positive bias has been

associated with adaptive coping behaviors and psychological adjustments that can

mediate successful goal-oriented health conscious behaviors (Chiesi et al., 2013). The

LOT-R is a brief 10 question survey using a 5-point Likert scale ranging from strongly

disagree to strongly agree, consisting of six items that are scored and four filler items with negatively worded items that are reverse scored to indicate higher levels of optimism (Chiesi et al., 2013).

Research Question and Hypotheses

RQ: What mediating relationships exist between dispositional optimism and the stress and performance relationship in pistol shooting outcomes?

H_0: In the prediction of accuracy outcomes using stress as the predictor, the coefficient for stress equals zero (regression of Y on X, coefficient X = 0).

$H_0 2$: In the prediction of dispositional optimism using stress as the predictor, the coefficient for stress equals zero (regression of M on X, coefficient for X = 0).

$H_0 3$: In the prediction of accuracy outcomes using dispositional optimism as the predictor, the coefficient for dispositional optimism equals zero (regression of Y on M, coefficient for M = 0).

$H_0 4$: In the prediction of accuracy outcomes, using both stress and dispositional optimism, the coefficient for stress and the coefficient for dispositional optimism is equal to zero (regression of pathway AB, coefficient for pathway AB = 0).

The research question and hypotheses explored the mediating relationship between dispositional optimism and stress as it impacts performance outcomes on shot accuracy in the shooting task. In order for mediation to occur four conditions must be met: looking at *Figure 2* (1) stress must predict accuracy outcomes (pathway *C'*); (2)

stress must predict dispositional optimism in the model (pathway A); (3) dispositional

optimism must predict accuracy outcomes (pathway B); and (4) stress must predict

accuracy (direct effect pathway *C'*) with less strength than when the dispositional

optimism is involved (indirect effect pathway AB) (Field, 2013). Therefore, pathway *C'*

should have a reduced predictive relationship than pathway C in the simple relationship

Figure 1 (Field, 2013). This can help determine whether dispositional optimism has a

role to play in augmenting outcomes in stress and performance studies.

Threats to Validity

Threats to validity of a study can negatively impact the researchers' ability to

accurately conclude whether a variable can have an impact on outcomes versus another

factor contributing to the change (Creswell, 2014). Addressing internal threats to validity

that could weaken the ability to draw correct inferences from the data about the

population studied might include selection, diffusion of treatment, and regression

(Creswell, 2014). Selection refers to participants from the population that have certain

characteristics that may enhance certain outcomes such as greater experience in the

practice of firearms training which can be related to years of service as an officer and/or

prior military or other law enforcement service. Because participants will be randomly

asked to volunteer from a law enforcement population a fundamental firearms skill set

should be equally distributed among the participant group. Second, diffusion of

treatment refers to participants revealing to potential future volunteers the nature of the

tasks to be performed, which can potentially influence outcomes (Creswell, 2014). An

example might be officers training vigorously for the opportunity to participate in the

study so as to competitively do better than other officers. A possible solution in managing diffusion will be the caveat within informed consent, stipulating anonymity of officer, and score.

External validity threats include interaction of selection and treatment, interaction of the setting and treatment, and interaction of history and treatment (Creswell, 2014). The first external threat of selection can be managed by stipulating outcomes are generalized to law enforcement populations. The external threat of setting is lacking due to specific needs for a pistol shooting task to be carried out in a controlled environment, which also allows for better controls for firearms safety and of the shooting task variables. The interaction threat of history is due to generalizability of results to past or future situations. A researcher can replicate this study in the future using the same design and compare results, based over time (bi-annually) to see if the analysis remains consistent. The overall purpose of the study to understand future implications of setting and history as they apply to performance outcomes and the need for varied and consistent training especially with the firearm throughout all law enforcement agencies.

Ethical Procedures

Since, the study utilized secondary data generated as a limited data set, and a Data User agreement was signed by the research partner and approved by the University IRB approval number 05-01-18-0119543, there are minimal ethical concerns regarding the data collection. The limited data set is de-identified ensuring anonymity for the participating officers, therefore no ethical concerns of breaches of confidentiality or identification exist.

All data was codified and stored in password-protected file that only researcher has access to. The hard copy data was stored in a locked vault; the data file entered into SPSS cannot be reconstituted in order to determine the identity of the participant. Hard copy data will be kept for 1 year from official approval date then destroyed. There were no conflicts of interest in this study as there are no sponsors, incentives, or otherwise involved for participation.

Summary

This chapter lays out the methodological design of my study. Showing how a correlational design was used and how multiple regression analysis was used to determine mediation. Discussed was the population sample that was used as and variable mediation model and how it will be applied. Also, acquisition of the secondary data set and how the instruments utilized were analyzed. All data interpretation statistical techniques used SPSS to generate graphs and numerical findings. Possible threats and ethical concerns were mentioned and were applied throughout the course of the study. Chapter 4 details the study results using SPSS with all the various graphs and tables from each statistical test. Chapter 5 interprets the findings and cites the limitations of the study with future recommendations of where the data can take future research.

Chapter 4: Results

Introduction

This study was designed to examine the effects of dispositional optimism and stress in performance task outcomes involving law enforcement pistol accuracy. This study evaluated these factors with the LOT-R, a measure of dispositional optimism, the PSS, and a pistol qualification task. Mediation analysis was used to address the research question and the null hypotheses as follow:

RQ: What mediating relationships exist between dispositional optimism and the stress and performance relationship in pistol shooting outcomes?

$H_0$1: In the prediction of accuracy outcomes using stress as the predictor, the coefficient for stress equals zero (regression of Y on X, coefficient for X = 0).

$H_0$2: In the prediction of dispositional optimism using stress as the predictor, the coefficient for stress equals zero (regression of M on X, coefficient for X = 0).

In the mediation analysis, the regression coefficient computed with this model is path A (see Figure 2 in Chapter 1).

$H_0$3: In the prediction of accuracy outcomes using dispositional optimism as the predictor, the coefficient for dispositional optimism equals zero (regression of Y on M, coefficient for M = 0).

$H_0$4: In the prediction of accuracy outcomes, using both stress and dispositional optimism, the coefficient for stress and the coefficient for dispositional optimism are equal to zero.

The partial regression coefficient for dispositional optimism in this model was path B in the mediation model (see Figure 2 in Chapter 1). Finally, test of the mediation model regressed the pathway AB, finding the coefficient of pathway AB equal to zero.

In Chapter 3, I explained that pathway AB is considered the indirect pathway that involved the mediation variable of dispositional optimism in the mediation model, and the comparison of direct effect of pathway *C'* (see Figure 2 in Chapter 1) against the strength of pathway C in the simple model (see Figure 1 in Chapter 1) can show whether mediation has occurred.

In this chapter I describe the statistical analysis and findings from using regression analysis to determine whether dispositional optimism has any effects on stress and a performance task using a law enforcement officer dataset. The chapter includes data collection, study results, and summary. The data collection discussion details secondary limited data collection procedures. The results show statistical tests used in regression analysis for mediation and specific values calculated with applicable tables and figures where necessary. The summary section addresses the research question and transitions into Chapter 5.

Data Collection

The research partner was a training facility that gathered a limited dataset of deidentified law enforcement officers who have participated in training exercises. I obtained the limited dataset through a data user agreement (Appendix E), which included the overall scores of each data points' PSS score, LOT-R score, and performance task score. After the dataset was acquired, the scores were converted to an excel file and

uploaded to SPSS where a data set file was established. The data sets were labeled PSS

reversed, as the PSS is scored on a zero to 40- point survey totaled through 10 Likert

scaled answers and the lower the score the more positive the respondent (Taylor, 2015).

Therefore, it was necessary to reverse the PSS scores in SPSS using the arithmetic

function in the compute variable section in the transform tab. In the analysis that

followed, the greater the stress score the higher the level of perceived stress by the

respondent. Furthermore, LOT-R data were labelled LOT-R score and the pistol shooting

data were labelled Task score. The LOT-R is a zero to 40-point scored survey with the

higher scores being viewed as positive as well as the Task score being a zero to 30-point

shooting task (Scheier et al., 1994). Conventional studies for mediation utilize .80 power

to detect an effect (Fritz & McKinnon, 2007). Using Fritz and MacKinnon (2007)

mediation analysis and using the bootstrapping method for medium effect sizes for

pathway AB (indirect effect), the sample size needed to detect .80 statistical power was n

$= 78$. A limited data set of ($n = 80$) was obtained from the research partner facility and

analyzed for this study.

Results

The relation between the predictor and mediation variables (PSS score and LOT-

R score) and the dependent variable (Task score) were tested using correlational analysis

to determine whether there is a linear relationship that exists between these variables and

officers' task performances (Task score). All correlational analysis between the variable

were bootstrapped at the default of 1,000 samples. Associations in the r value indicate a

negative or positive linear relationship between the predictor variables and the outcome

variables. Using this analysis, the correlation between the predictor variable of stress

(PSS score) and the criterion variable of task performance supports the null hypothesis

that stress did not significantly affect officers' pistol accuracy performance (Task score),

$r(78) = -.048$, $p > .05$. Similarly, the correlation between the mediator variable of

dispositional optimism (LOT-R score) and officers' pistol accuracy performance (Task

score) was not significant, $r(78) = .024$, $p > .05$.

Table 1 presents the r values, means, and standard deviations along with

correlations among the variables. Interestingly, neither the predictor variable (stress) nor

the hypothesized mediator variable (dispositional optimism) correlated significantly with

pistol task performance. Consequently, the less than significant r values indicate that

neither the predictor variable of stress or the mediator variable of dispositional optimism

independently predicted the officers' task performance accuracy.

Table 1

*Means, Standard Deviation, and Bootstrapped Intercorrelations for Task Score, Stress
Score, and Dispositional Optimism Score*

Variable	M	SD	1	2
Outcome variable				
Task Score	16.24	5.455	-.048	.024
Predictor variable				
1. PSS score	29.20	5.467	--	.591***
Mediator variable				
2. LOT-r score	28.60	4.862	.591***	--

*p < .05. **p < .10. ***p < .001.

Multiple linear regression analysis was used to examine the direct effect of both the predictor and mediator variables on the officers' performance task level. The direct effect for each variable is the partial regression coefficient for the variable. The direct effect provides information about how changes in the variable relate to change in the dependent variable while controlling for the other variables included in the equation. All regression analyses were bootstrapped at the default of 1,000 samples and bias corrected at the .05 significance level. Table 2 presents the regression analysis for the predictor and mediator variable on the outcome variable. The predictor variable (PSS score) and the mediator variable (LOT-R score) accounted for an insignificant amount of variability on the outcome variable (Task score); $R^2 = .006$, F(2, 77) = .251, $p > .05$. Consequently, the regression coefficient for the LOT-R score is not significantly different from zero. In order to test for the mediation effect this test would have to be significant.

Table 2

Univariate Regression Analysis Summary for PSS score variable and Dispositional Optimism variable predicting Task Score Coefficients

Variable	B	SE B	β	t	p
PSS score	-.095*	.144*	-.095	-.676	.490*
LOT-R score	.090*	.171*	.080	-.570	.584*

*results based on 1000 bootstrap samples

The bootstrapped simple regression of the perceived stress prediction on officers' shooting performance found insignificant variability, $R^2 = .002$, F (1,78) = .179, $p > .05$.

Similarly, the dispositional optimism variable predicting officers shooting performance provided insignificant variability as well, R^2 = .001, F (1,78) = .045, p > 05. Based on these results, the mediation effect cannot be supported because the premises have not been met.

Therefore, the primary result of this study is that the mediating effect has not been demonstrated. Because the test of the correlations between the stress variable and task variable and the test of the partial regression coefficient for dispositional optimism in the multiple regression model both show no significant association, dispositional optimism cannot be shown to have a mediating effect on task performance. As a result, the premise to test for the mediating effect has not been met. Although this outcome is unfortunate, further analysis did yield an important result.

Interestingly, Table 3 presents the model summary for the perceived stress prediction, which accounted for a significant amount of dispositional optimism variability, R^2 = .350, F (1,78) = 41.9, p < .05. Also, Table 4 presents the linear relationship through beta to indicate a negative relationship between stress and optimism, meaning as stress increases dispositional optimism decreases, so the survey instrument of the PSS explains 35% of the variability of dispositional optimism (LOT-R survey) in this study.

Table 3

Regression Model Summary for PSS Score Variable Predicting the Dispositional Optimism Variability

Model Estimate	R	R2	Adjusted R2	Std. Error of the
1	.591a	.350	.341	3.95

Predictor variable PSS score

Table 4

Regression Analysis Summary for PSS Score Variable Predicting the Dispositional Optimism Variable Coefficient

Variable	B	SE B	β	t	p
PSS score	-.526*	.098*	.591	6.48	.001*

*results based on 1000 bootstrap samples

Summary of Findings

The research question was established to discover a mediating effect of dispositional optimism on the predictive relation of stress on officers shooting performance. The correlation analysis presented in this study found that neither the effect of disposition optimism levels nor perceived stress levels significantly predicted officers' performance accuracy outcomes. Results from the regression analysis indicate that increased levels of stress and optimism are not related to increased performance outcomes specifically in a performance pistol shooting task. The insignificance results of stress levels on task performance contradict studies in previous literature discussed in

Chapter 2. This result was prohibitive in making a conclusion concerning perceived stress and pistol shooting accuracy outcomes. Nevertheless, the study determined that perceived stress is significantly related to dispositional optimism levels with a robust statistical test. In Chapter 5, I explore the interpretations of the findings including limitations of the study. It closes with commentary on the recommendations for future studies and an examination of the study's implications for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

This study was conducted to determine whether dispositional optimism mediated the relationship between stress and a performance shooting task. This research method used a quantitative approach with secondary data acquired as a limited data set generated by a law enforcement training facility that caters to the active law enforcement population throughout the entire Midwest. Principle findings of this study failed to accept the alternative hypothesis that dispositional optimism would mediate the stress and performance relationship. This chapter presents information on how the findings should be interpreted, addresses the limitations of the study, discusses implications for future research, and considers the potential implications for social change.

Interpretation of Findings

Based on the statistical analysis, three out of the four null hypothesis conditions in the study could not be rejected. The exception found a significant association between dispositional optimism (variable M) and perceived stress (variable X), whereby the null hypothesis ($H_0 2$) could be rejected. This negative relationship between dispositional optimism and stress is similar to the finding of Thomas et al. (2011) where respondents with higher levels of dispositional optimism showed weaker relationships to combat stressors such as deployment demands and PTSD symptoms within military populations. This study specifically highlights the significant relationship found between dispositional optimism and perceived stress in police populations using a performance pistol task not found in previous studies. Similar studies mentioned in Chapter 2 using a shooting task

accuracy as the performance task used high fidelity simulation machines or simulated pistol firing marking cartridges where two conditions of stress scenarios were offered, low and high (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010). This set the basis for a live fire exercise as the performance task for my study. Also, with these tasks, a study of the means using ANOVA with results showing significant changes between the low and high stress scenarios were compared while using an intervention (Colin et al., 2014). Nieuwenhuys and Oudejans (2010) used behavioral measures such as response time, head body orientation, and blink behavior with a high stress scenario using live opponent shooting marking cartridges at the participant. Overall, my model's performance task was not sufficiently challenging to find a statistically significant relationship. Consequently, the relationships using stress and dispositional optimism to predict the performance task was found to be statistically insignificant.

The significant relationship between dispositional optimism and stress can be considered hopeful. The negative linear relationship showing that as optimism levels rise stress perception can be mitigated leading to reducing stress and optimizing performance specifically in high stress task environments as described in the stress effects and mitigation section in Chapter 2 (Fatkin & Patton, 2009; Gustafsson & Skoog, 2012; Matthews, 2009; Thomas et al., 2011). Moreover, the PET and ACT theoretical foundations support the task performance outcomes of the moving and shooting pistol task whereby QE through physical movement and time frame worries may have been solid confounders to shooting accuracy. Shooting score data revealed an average shot accuracy score hovering close to 54% out of a possible 100%. Shown as the mean score

of the performance task being 16.24 (see Table 1 in Chapter 4) out of a possible score of 30. This deficient outcome was discussed in the kinematics and reinvestment theory section in Chapter 2 (Derakshan & Eysenck, 2009; Niewuwenhuys & Oudejans, 2010).

Contrary to expectations, the PSS variable and dispositional optimism variable measured by the PSS and LOT-R survey respectively revealed a lack of significant correlation to the moving and shooting performance. As PSS shows a strong reliability (alpha = .86) with the survey measuring present stress and future worry, consistently linked to declarative memory used heavily in physical task performance in existing literature showing decreased performance outcomes with high subjective stress perceptions (Cohen et al., 1983; Guillot et al., 2003; Petrac et al., 2009; Regehr et al., 2008). Moreover, the LOT-R also shows a high reliability (alpha = .80) measuring dispositional optimism, which is linked to resilience, optimism, and adaptive emotional responses in adverse events. This has been shown in literature to have positive effects on stress mitigation in stressful task performance (Chiesi et al., 2013; Gustafsson & Skoog, 2012; Matthews, 2009; Scheier et al., 1994; Seligman & Csikszentmihalyi, 2000). For this study, both survey measures were considered strong indicators for use in this study. Although both measures found a lack of significance related to the shooting performance task, the PSS and LOT-R can be argued to have wide ranging boundaries measuring other subjective perceptions that consider the future or past, where chronological time is measured in minutes, hours, days, and weeks (Chiesi et al., 2013; Scheier et al., 1994). In this light, these surveys may not take into consideration the time frame (seconds) and the specificity of shooting techniques, including gaze dynamics of QE required for accuracy,

which was compromised by the moving aspect of the shooting pistol task (Causer et al., 2011; Nieuwenhuys & Oudejans, 2012.)

Previous studies used interventions and high fidelity scenario simulators along with shooting tasks in experimentation (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010; Vaez Mousavi et al., 2011). As with the positive imagery study, Colin et al. (2014) used a positive imagery intervention directly related to the parameters of successful officer shot application on an armed attacker. The PSS and LOT-R measures lacked any significant relationships to the function of pistol accuracy through mediation analysis. Nevertheless, dispositional optimism as a construct of the wider positive psychology field in this limited design can still find a place as confounder in stress and performance studies bounded by the PET and ACT theoretical foundations (Nieuwenhuys & Oudejans, 2010).

Limitations of the Study

In addition to the limitations mentioned in Chapter 1 of the dissertation proposal, further limitations were found during the implementation of the study. During the analysis of the limited dataset, the lack of correlation between PSS and LOT-R variables began to emerge. The direct implication was a lack of association toward the results of the moving pistol accuracy shooting protocol. Evidently, the allowance for the surveys and their specific relation to a performance pistol task was shown to be insignificant; previous studies using other subjective stress measures in a pistol accuracy task yielded the same results (Colin et al., 2014). Limitations of reporting high stress management (PSS variable) can be attributed to an officers' need to be perceived as having the ability

to handle stressful situations in policing environments and not wanting to appear vulnerable in their own cognitive appraisal as a law enforcement officer (Cooke et al., 2011; Oudejans et al., 2011). PSS reporting can be marginalized in this light of this bias. As proposed by the theoretical foundations, the low accuracy of 54% out of 100% of the moving and shooting protocol was congruent and insightful, although limited in its associations with stress and dispositional optimism in this study. The limitations in the experimental design found that lacking an intervention protocol such as shooting fundamentals remediation after a basic shooting task and then implementing the moving and shooting task, which compromises the shooting fundamental, may have been beneficial to the study, yielding statistical significance. Incidentally, the construction of dynamic force on force scenarios using biological measures (salivary secretion) and heart rate monitors as a stress response identifier, marking cartridges to simulate pistol deployment with ballistic recoil effects, and a participatory agency would require a cadre of researchers with costs outside the realm of my study (Colin et al., 2014; Taverniers & De Boeck, 2014).

Unfortunately, based on the results the PSS and LOT-R variables could be considered less than a solid choice for significant correlations in mediation analysis using pistol performance tasks. Although the limited data set contained all the necessary variables for the studies' methodology, the lack of experimental vigor through interventions and varied shooting conditions is something that should be researched in resolving this impediment.

Recommendations

Despite the results of this study, stress and performance studies using pistol shooting accuracy protocols with police populations should be investigated for the most efficient means for police weapons and use of force training. Mediating variables that can increase pistol shooting accuracy under stress conditions such as optimism scales should be investigated for future use. Moreover, potential positivity training to mediate stress and increase accuracy outcomes may increase force mitigation de-escalation outcomes where deadly force would only be used as a judicious last resort. Existing research into law enforcement populations and pistol accuracy studies is scientifically limited in North America as most of the studies were conducted in Europe. Quantitative measures for assessing stress and anxiety levels such as heartrate, blink behavior, and salivary response, as well as comprehensive subjective measures used in existing research, should be used in mediation studies to further the exploration into finding viable factors in stress mitigation for sustained pistol deployment decision making and accuracy outcomes. Considering a substantiated theory was used with a solid hypothesis based on existing literature, the outcome should have supported a significant correlation between dispositional optimism as a mediator of the relationship between stress and pistol accuracy. Future studies should be incorporated into the records of any law enforcement entity regarding pistol qualification proficiency or lack thereof. Police departments should allow independent agencies to assess pistol training accuracy and its relations to decision making viability, stress perception levels, and management strategies. Experimental design using a validated construct with positive psychological constructs

such as being used in RAMS and SARA military studies, along with quantitative measures using an intervention between variable shooting conditions, can provide significantly different results (Fatkin & Patton, 2009, Matthews, 2009).

Implications

Positive social change derived from this study can be found on several levels firstly organizationally, whereby increased education of what causes stress can help the officer understand his/her own cues which create negative responses. Officer's working in high crime areas can elicit negative emotions due to threatening encounters that occur on duty (Kleider et al., 2009). Referring to chapter 2, the understanding of PET and ACT as anxiety is mitigated through focus on the WM system can be critical for better decision-making capabilities, specifically under threat related behavior (Derakshan et al., 2009; Derakshan & Eysenck, 2009; Kleider et al., 2009). This understanding can create objective encounters with the public creating an egalitarian policy of discretion in judicious enforcement of the law. These impartial encounters with the police can create positive societal change impacting family and individuals in their belief of law enforcement being a positive entity for the betterment of all people no matter race, religion, or socioeconomic condition.

Studies being conducted regarding mediation between stress and pistol accuracy outcomes are not by this researcher's knowledge been promoted within the confines of the United States. This study can be used in scholarly forums in Law enforcement conferences to shed light into the cognitive construct of the PET and ACT as they influence thinking by understanding the cognitive loading mechanisms under stress and

time compression, and how they compromise decision making during events which cause

fight or flight (mortality salience) responses with regards to use of force by law

enforcement members (Nieuwenhuys & Oudejans, 2010; Tritt et al., 2012). Also, the

significant relationship between dispositional optimism and stress can show dispositional

optimism may positively impact information processing of threat stimulus. Whereby, the

negative outcomes of stress related to threat stimulus are mitigated which can lead to

better decision making and better use of force outcomes (Davis & Asliturk, 2007;

Karademas et al., 2007).

  The study can influence the search for efficient and scientifically verified training

models to increase positive outcomes in police officer decision making in stressful

scenarios. These are ideas improving physical performance outcomes in stressful

environments are not new, but what can be novel is its widespread application to

weapons training. Augmenting the model from force application to force mitigation

through scientifically viable mediation factors with their results disseminated throughout

Law enforcement agencies nationwide. Furthermore, compartmentalized training

modules such as implicit bias, force mitigation, crisis intervention, as well as employee

assistance programs dealing with coping and resilience, are overall structurally

incongruent due to foundational theories of decision making under stress fundamentally

different causing technically performance issues as the training evolutions are furthered.

Consequently, this can lead to a fragmented departmental training protocol where

decision making becomes convoluted and relatively unclear giving way to increased

anxiety and potential for maladaptive use of force options being used when facing rapidly evolving, time critical possibly lethal events (Colin et al., 2014; Davis & Asliturk, 2011).

This studies model sheds light on possible mediating variables of dispositional optimism to help with cope with stress events that encompass up to the most critical, mortality salient lethal force events and the difficulty in pistol accuracy training for real world dynamic force on force incidences (Colin et al., 2014; Nieuwenhuys & Oudejans, 2010; Taverniers & Boeck, 2014; Tritt et al., 2012). Through the PET and ACT foundations of cognitive understanding leading to increased physical performance outcomes and the layering of dispositional optimism on to this foundational theory can lead to the increased speed of mental decision making and the mitigation irrelevant threat stimulus which can cause stress (Burnham et al., 2014; Derakshan et al., 2009; Nieuwenhuys, Cañal-Bruland et al., 2012).

Emphasis on the difficulty of finding a significant training model can be explicitly proposed and a call for departmental transparency in training models and data sharing would be a large boost to positive organizational social change. In effect, proposing a scientifically viable training models that increases positive performance outcomes, mitigate stress, promoting resilience factors during and after action. Coping with acute stress while sustaining efficient cognitive decision making and physical performance skills can lead to efficient and judicious use of force outcomes, while limiting exposure to potentially lethal events is advantageous for both the police and the community. Allowing the public access to the scientific training data would open an era of openness and transparency that can only lead to overall positive societal social change allowing the

thin blue line to be crossed and a real chance for the police and community that it serves to work in synergy.

Conclusion

One application of police powers is the interdiction of crime through the fourth amendment which allows for arrest powers. Inevitably, during the performance of an officer's duties contact with members of society is expected, and with aggressive citizen's maybe unavoidable, as the anti-social element of society falls largely within the jurisdiction of law enforcement (Colin et al., 2014; Nieuwenhuys, Cañal-Bruland et al., 2012). Officers being able to effectively make correct decisions the involve emotional responses due to high stress environments, and the ability to manage maladaptive behaviors are the essence this mediational study of stress and performance factors. Foundationally, stress and anxiety negatively impact performance outcomes that can lead to unintended consequences further eroding public trust and confidence in the law enforcement entity mandated to protect them. Definitive research with police populations with regards to locating mitigating variables in stress and performance training models is a complex topic involving police procedure, policy, and jurisprudence. Although, this research did not garner significant results, the call to continuing research concerning stress mediation on performance pistol task skills opens critical channels to continued research in the field of improved training models for enhanced and sustained performance pistol accuracy outcomes. This model can be used and enhanced experimentally in future models to resolve methodological limitations found in this study, also adding to any results stemming from the use of this model.

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Appendix A: Perceived Stress Survey

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling *how often* you

0= Never 1= Almost Never 2= Sometimes 3= Fairly Often 4= Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? ....

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

2. In the last month, how often have you felt that you were unable to control the important things in your life? ....

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

3. In the last month, how often have you felt nervous and "stressed"? ....

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

4. In the last month, how often have you felt confident about your ability to handle your personal problems? ....

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

5. In the last month, how often have you felt that things were going your way?...

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

6. In the last month, how often have you found that you could not cope with all the things that you had to do? ....

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

7. In the last month, how often have you been able to control irritations in your life?

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

8. In the last month, how often have you felt that you were on top of things?..

    0= Never 1= Almost Never 2= Sometimes 3= Fairly Often   4= Very Often

9. In the last month, how often have you been angered because of things that were

outside of your control?..................................

0= Never   1= Almost Never   2= Sometimes   3= Fairly Often   4= Very Often

10. In the last month how often have you felt difficulties were piling up so high that you could not overcome them? ....

0= Never   1= Almost Never   2= Sometimes   3= Fairly Often   4= Very Often

Appendix B: Perceived Stress Scale permissions

Please feel free to use the *Perceived Stress Scale* for your research.

Mind Garden, Inc.

info@mindgarden.com www.mindgarden.com

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386-396.

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health.* Newbury Park, CA: Sage, 1988.

Appendix C: Revised Life Orientation Test Permission

PsycTESTS Citation: Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Revised Life Orientation Test [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t09267-000

Instrument Type: Test Test Format: Responses to the 10 items of the measure are recorded on a 5-point scale where 0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, and 4 = strongly agree.

Source: Scheier, Michael F., Carver, Charles S., & Bridges, Michael W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. Journal of Personality and Social Psychology, Vol 67(6), 1063-1078. doi: 10.1037/0022-3514.67.6.1063

Permissions: Test content may be reproduced and used for non-commercial research and educational purposes without seeking written permission. Distribution must be controlled, meaning only to the participants engaged in the research or enrolled in the educational activity. Any other type of reproduction or distribution of test content is not authorized without written permission from the author and publisher. Always include a credit line that contains the source citation and copyright owner when writing about or using any test.

Appendix D: Procedure for the Pistol Shooting Task

Moving Test (MT) performance task

The firearms shooting task will consist of a 30-round course. The score area for this task will be delineated by an 8-inch circle. All shots within the circle will be considered an accurate hit. The paper target will be mounted on a static target carrier and engaged by the participants at the sequential distances no closer 7 yards (21 feet), 15 yards (45 feet), and 25 yards (75 feet). Each participant will use three pistol magazines with the weapon containing 6 rounds (1 round in the chamber with 5 rounds in the magazine, and two magazines loaded with 12 rounds each secured in the participants pouches. The MT performance task will require the participant to start several yards behind a terminating distance and on start cue begin to move while drawing the weapon and discharging the prescribed number of rounds at the target area. For example, at the 7-yard terminating line the participant will be staged at 12 yards to the target and have 5 yards which to move while shooting the correct number of rounds in the designated time frame. At the 15-yard terminating line the participant stage distance will be 22 yards, and at the 25-yard terminating line the participant stage distance will be 35 yards.

The following script is the MT shooting task sequence stage by stage and will be recited verbatim to the officers by the firearms training officer, the term "on the buzzer" relates to the shot timer audible cue to begin counting down the time to complete the task.

All participants will stage at 12 yards to the target with an orange cone at the terminating distance to target at 7 yards. All rounds will be discharged while moving as

well as all reloading procedures. Participants will be instructed to move to the orange

cone/ terminating line before holstering their weapon.

The MT performance task script is as follows;

       Stage 1: On the buzzer, while moving draw and fire, 2 rounds in 4 seconds.

       Stage 2: On the buzzer, while moving draw and fire, 2 rounds in 4 seconds.

       Stage 3: On the buzzer, while moving draw and fire 2 rounds, emergency reload,

and fire another 2 rounds in 8 seconds.

       Stage 4: On the buzzer, while moving draw and fire, 2 rounds in 4 seconds.

       Stage 5: On the buzzer, while moving draw and fire, 2 rounds in 4 seconds.

       Stage 6: On the buzzer, while moving draw and fire, 3 rounds in 5 seconds.

       Stage 7: On the buzzer, while moving draw and fire 3 rounds, emergency reload,

and fire another 3 rounds in 10 seconds.

       Stage 8: On the buzzer, while moving draw and fire, 3 rounds in 5 seconds.

For stages 1 through 7 the distance to target is 7 yards (21feet), which is the terminating

distance at which the participant can engage the target. An orange cone will be set at this

distance for the participant.

For stage 9 the participant will stage at the distance of 22 yards to target, and the orange

cone moved to the terminating distance to target of 15 yards.

       Stage 9: On the buzzer, while moving draw and fire, 3 rounds in 7 seconds.

For stage 10 the participant will stage at the distance of 35 yards to target, and the orange

cone moved to the terminating distance to target of 25 yards.

       Stage 10: On the buzzer, while moving draw and fire, 3 rounds in 10 seconds.

Weapons will be cleared, secured and all accurate hits on the target will be scored and

recorded.

Appendix E: Data Use Agreement

Data Use Agreement

Jim Kauber
President / Director of Training
Contact # 360-941-0280
jimkauber@thesitetraining.com

Date August 27, 2017

We agree to supervise and assume responsibility for the administration of the surveys, specifically the LOT-R and PSS, and the performance shooting task.

To support this research inquiry, our organization is also willing to release de-identified data to you, as outlined in the attached Data Use Agreement. The Walden University Institutional Review Board (IRB) will be responsible for ensuring that the student's published doctoral project meets the university's ethical standards regarding data confidentiality (outlined below). We reserve the right to withdraw from the study at any time if our circumstances change.

I understand that the student will not be naming our organization in the doctoral project report that is published in Proquest.

I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.

The doctoral student will be given access to a Limited Data Set ("LDS") for use in the doctoral project according via the ethical standards outlined below.

This Data Use Agreement effective as of August 27, 2017 is entered into by and between Roland Perez and   The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in the doctoral project **in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.** In the case of a discrepancy among laws, the agreement shall follow whichever law is more strict.

1. *Definitions. Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.*

2. *Preparation of the LDS. Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable HIPAA or FERPA Regulations*

3. *Data Fields in the LDS. No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider or shall include the data fields specified as follows, which are the minimum necessary to accomplish the doctoral project: the de-identified survey scores for the LOT-R and the PSS, and the performance task shooting score.*

4. *Responsibilities of Data Recipient. Data Recipient agrees to:*

   a. *Use or disclose the LDS only as permitted by this Agreement or as required by law;*

   b. *Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;*

   c. *Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;*

   d. *Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and*

   e. *Not use the information in the LDS to identify or contact the individuals who are data subjects.*

5. *Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS for the present project activities only.*

6. *Term and Termination.*

   a. *Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.*

   b. *Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.*

   c. *Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.*

   d. *For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said*

alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous.

a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

Partner Organization

Signed: _____

Print Name: _____

Print Title: _____

Doctoral Student

Signed: _____

Print Name: _____

Print Title: _____