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Aggression and boxing performance: Testing the channeling hypothesis with multiple statistical methodologies

Silas G. Martinez
Wright State University

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AGGRESSION AND BOXING PERFORMANCE:
TESTING THE CHANNELING HYPOTHESIS WITH
MULTIPLE STATISTICAL METHODOLOGIES

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

by

SILAS G. MARTINEZ
B.S., United States Military Academy, 1992
M.S., Missouri University of Science and Technology, 1996
M.S., Wright State University, 2002
M.S.S., United States Army War College, 2015

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Wright State University
WRIGHT STATE UNIVERSITY
GRADUATE SCHOOL

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I HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER
MY SUPERVISION BY Silas G. Martinez ENTITLED Aggression
and boxing performance: Testing the channeling hypothesis with multiple statistical
methodologies BE ACCEPTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF Doctor of Philosophy.

David M. LaHuis, Ph.D.
Dissertation Director

Scott N. J. Watamaniuk, Ph.D.
Graduate Program Director

Debra Steele-Johnson, Ph.D.
Chair, Department of Psychology

Robert E.W. Fyffe, Ph.D.
Vice President for Research and
Dean, Graduate School

Committee on
Final Examination

Nathan A. Bowling, Ph.D.

Gary N. Burns, Ph.D

Daniel R. Smith, Ph.D.
ABSTRACT

Martinez, Silas G. Ph.D., Department of Psychology, Wright State University, 2017. Aggression and boxing performance: Testing the channeling hypothesis with multiple statistical methodologies.

D. G. Winter, John, Stewart, Klohnen, and Duncan (1998) demonstrated the first use of the channeling hypothesis to show how the explicit personality trait of extraversion channeled one’s implicit achievement and affiliation personality to predict important life outcomes. Since then, various implicit and explicit measures of personality have been combined, but moderation analyses have predominantly been the “mechanism of operation” to demonstrate the channeling hypothesis (Bing, LeBreton, Davison, Migetz, & James, 2007, p. 147). The current study had two goals. The first goal was to use implicit and explicit measures of aggression to predict performance of 325 men and women from the United States Military Academy in a mandatory boxing course. The second goal was to determine whether or not other statistical methodologies could be established as the mechanism of operation for the channeling hypothesis. Using path analyses of structural equations models, we found that explicit aggression channels implicit aggression to predict boxing performance, but not all facets of explicit aggression were effective channels of implicit aggression. The moderation analysis was the only statistical methodology established as a mechanism of operation for the channeling hypothesis. We found larger effect sizes than are typically found in high-stakes, maximum-performance, or strong situations.
TABLE OF CONTENTS

I. Introduction .................................................................................................................... 1

  Dual-Process Models of Personality ............................................................................ 4

  Channeling hypothesis. .............................................................................................. 5

  Background .................................................................................................................. 6

  Situation. ...................................................................................................................... 7

  Behavior ....................................................................................................................... 9

  Person ........................................................................................................................... 9

Research Question ......................................................................................................... 12

Research Strategy .......................................................................................................... 13

  Model 1: Main effects analyses. ................................................................. 14

  Model 2: Moderation analysis. ................................................................. 15

  Model 3: Mediation analysis.................................................................................. 16

  Model 4: Multiple mediation analysis. ........................................................ 17

  Model 5: Simultaneous moderation and mediation analysis. ................ 18

  Model 6: Conditional indirect effect analyses. ........................................ 19

II. Method ....................................................................................................................... 21

  Participants.................................................................................................................. 21
Procedure .............................................................................................................. 22

Collection of aggression measures................................................................. 22

Collection of other variables of interest related to boxing.......................... 23

Variables of Interest .......................................................................................... 23

NCAA Division I athletic experience............................................................. 24

Sex ......................................................................................................................... 24

Aggressive status ............................................................................................... 24

Boxing performance ......................................................................................... 25

Range Restriction Correction ......................................................................... 27

III. Results ........................................................................................................... 29

Tests of the Channeling Hypothesis ................................................................. 30

Model 0: Preliminary analysis ......................................................................... 30

Model 1: Main effects analyses ....................................................................... 30

Model 2: Moderation analysis ......................................................................... 32

Model 3: Mediation analysis ............................................................................ 34

Model 4: Multiple mediation analysis .............................................................. 35

Model 5: Simultaneous moderation and mediation analysis ....................... 36

Model 6: Conditional indirect effect analyses ............................................... 37
POST HOC ANALYSES. ........................................................................................................... 38

III. DISCUSSION .......................................................................................................................... 41

Moderation: The Still-Dominant Mechanism of Operation .................................................. 41

Findings related to aggression and boxing performance. ................................................. 42

Hostility not useful to predict performance. ................................................................. 43

Putting this Study in the Context of Similar Past Research ........................................ 44

High-stakes versus low-stakes situations. ................................................................. 45

Predicting positive performance versus counterproductive behaviors. ...... 46

Practical significance. ......................................................................................................... 47

Limitations .............................................................................................................................. 48

Conclusion .............................................................................................................................. 49

References .............................................................................................................................. 51
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The <em>a priori</em>, theoretical model of the factors that impact cadet boxing performance</td>
<td>14</td>
</tr>
<tr>
<td>2. Path diagrams for Model 1: Main effects analyses</td>
<td>15</td>
</tr>
<tr>
<td>3. Path diagram for Model 2: Moderation analysis</td>
<td>16</td>
</tr>
<tr>
<td>4. Path diagram for Model 3: Mediation analysis</td>
<td>17</td>
</tr>
<tr>
<td>5. Path diagram for Model 4: Multiple mediation analysis</td>
<td>18</td>
</tr>
<tr>
<td>6. Path diagram for Model 5: Simultaneous moderation and mediation analysis</td>
<td>19</td>
</tr>
<tr>
<td>7. Representative path diagram for Model 6: Conditional indirect effect analysis</td>
<td>20</td>
</tr>
<tr>
<td>8. Path diagram results for Model 1: Main effects analyses</td>
<td>31</td>
</tr>
<tr>
<td>9. Path diagram results for Model 2: Moderation analysis</td>
<td>32</td>
</tr>
<tr>
<td>10. The conditional effect of implicit aggression on boxing performance (CG) versus explicit aggression</td>
<td>32</td>
</tr>
<tr>
<td>11. Spotlight analysis of the conditional effect of implicit aggression on boxing performance at high and low levels of explicit aggression (the moderator)</td>
<td>33</td>
</tr>
<tr>
<td>12. Path diagram results for Model 3: Mediation Analysis</td>
<td>35</td>
</tr>
<tr>
<td>13. Path diagram results for Model 4: Multiple mediation analysis</td>
<td>36</td>
</tr>
</tbody>
</table>
14. Path diagram results for Model 5: Simultaneous moderation and mediation analysis .......................................................... 37

15. Path diagram results for Model 6: Conditional indirect effect analyses. .......... 38
LIST OF TABLES

Table ...........................................................................................................................................................................Page

1. Skill-level Descriptions Used by the DPE Boxing Committee ................................................................. 26

2. Descriptive Statistics and Zero-Order Correlations .............................................................................. 29

3. Summary of Post Hoc Moderation Analyses Using Various AQ Facets.............................................. 39
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I would like to thank my committee for their help and unwavering support in this process—David for working with me in an area outside your normal research activities, Dan for helping frame the problem and “talking me off the ledge” several times, Gary for entertaining my never-scheduled-but-sometimes-off-the-wall stats questions that didn’t really have anything to do with what we were learning in class, and Nathan for modeling for me what an expert in personality looks like.

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DEDICATION

To Erin.

Thank you for the best 24 years of my life!
It is an experience where the cadet learns to stand his ground in the face of aggression, to carry on when tired and hurt, and to keep his head when trauma threatens to overwhelm.

- Colonel James McDonough, U.S. Army (Retired) and John Lucas

I. Introduction

The history of personality testing is inseparable from the development of the professional, standing military of the United States (Zickar & Kostek, 2013). The study of personality can be traced back to Empedocles (5th century B.C.), Theophrastus (4th century B.C.), Aristotle (4th century B.C.), and Galen (A.D. 130-217, D. G. Winter et al., 1998; Zickar & Kostek, 2013). It wasn’t until the advent of WWI that modern psychologists began to develop and implement personality testing in order to match individual recruits’ aptitudes and traits to various military specialties needed in the large-scale mobilization of the US military. Since then, two major approaches to personality measurement came to dominate the personality research literature—explicit and implicit measures of personality.

Explicit traits are more-or-less consistent, generalized, and inter-correlated clusters of behaviors (D. G. Winter et al., 1998). Explicit personality adherents trace their roots through Allport and Jung to Theophrastus. They focus on traits described as character types and behavioral tendencies. The instrument most often used to identify explicit personality traits is the direct, self-report survey. There are various trait
taxonomies (e.g., the 16 Personality Factor questionnaire Cattell, 1943, 1947), but perhaps the five factor models (Epstein, 2010; McCrae & John, 1992) are the best known. Explicit measures of personality can be administered and scored very quickly without special training or requirements for interrater reliability.

Critics of the explicit measurement approach (who are often adherents of the implicit measurement approach) are quick to point out that explicit measures are susceptible to response distortion (Birkeland, Manson, Kisamore, Brannick, & Smith, 2006; Griffith & Robie, 2013; McFarland & Ryan, 2000, 2006; Paulhus, 1984) and that their reliability and validity can be greatly affected by situational strength (Meyer, Dalal, & Hermida, 2010) and frame-of-reference (Lievens, De Corte, & Schollaert, 2008) effects.

Implicit motives are the unconscious disposition to be concerned with and strive for a certain class of goals or incentives (D. G. Winter et al., 1998). Implicit personality adherents trace their roots through Murray and Freud to Empedocles. They focus on motives which are derived from basic fundamental drives (McClelland, Koestner, & Weinberger, 1989). Because they are unconscious, implicit motives cannot be assessed directly, but instead must be assessed by projective measures such as the Thematic Apperception Test (TAT, McClelland, 1987; McClelland et al., 1989; D. Winter, 1988), Implicit Association Test (IAT, Greenwald, McGhee, & Schwartz, 1998), or sentence completion tests (Miner, 1978; Stahl, Grigsby, & Gulati, 1985). Implicit measures, particularly conditional reasoning tests (CRT), seem to be more resistant to response distortion (LeBreton, Barksdale, Robin, & James, 2007).
Critics of the implicit measurement approach (who are often adherents of the explicit measurement approach) are skeptical of the source of implicit measures (e.g., stemming from Freud’s work); are critical of the time consuming nature to administer, train reliable scorers, and score implicit measures (D. G. Winter & Barenbaum, 1985); and are leery of implicit measures’ reputations for not being psychometrically sound (Entwisle, 1972).

As a matter of course, adherents of each approach seemed to attack the other approach and its adherents as wrong. Yet, despite their criticisms of the other approach, neither approach could seem to consistently attain medium or large effects sizes (.30 and .50 respectively, Cohen, 1988) in their research. For example, L.R. James and Mazerolle (2002) seemed to take pleasure in pointing out that explicit measures of personality were, on average, correlated with “naturally occurring behavioral (performance) criteria” at $r = .12$, whereas an implicit measure of personality was correlated with similar criteria at $r = .43$. Not surprisingly, Berry, Sackett, and Tobares (2010) reanalyzed James and Mazerolle’s findings and reported much smaller correlations (e.g., $r = .14$) between implicit personality measures and job performance criteria.

Both types of measures of personality have been used with some success in the military. Duckworth, Peterson, Matthews, and Kelly (2007), Bartone, Kelly, and Matthews (2013), and Kelly, Matthews, and Bartone (2014) found that explicit measures of achievement help predict retention and achievement at USMA. Smith (2012) found that implicit aggression and implicit achievement combined to predict performance at and graduation from the US Army Ranger School. These studies found important relationships between measures of personality and performance in a military context, but
their effect sizes were typically small. Though range restriction of the predictors likely played a role in attenuating effect sizes, using only one type of measure (e.g., explicit or implicit) might also have contributed to these studies finding only small effect sizes. Perhaps a different approach is needed.

**Dual-Process Models of Personality**

As early as 1951, McClelland argued that both explicit and implicit measures were needed to describe personality (McClelland, 1987; D. G. Winter et al., 1998). Personality researchers began to test the assertions that implicit and explicit measures of personality were indeed different constructs. In a meta-analysis, Kollner and Schultheiss (2014) found that overall there were small ($r = .10$), significant correlations of implicit and explicit measures of achievement and affiliation, but there was no significant correlation between implicit and explicit measures of power. They interpreted this to mean that explicit and implicit measures of the same name do capture different constructs. Uhlmann et al. (2012) similarly concluded that implicit measures were not a panacea to be used alone (i.e. without explicit measures).

Some researchers saw parallels between dual-reasoning systems (Kahneman & Klein, 2009; Sloman, 1996) and personality “systems” and reasoned that together implicit and explicit personality processes would correct for the drawbacks associated with using either type of measure alone. Using only explicit measures of personality only allows access to the conscious side of one’s cognitions and behaviors which, as noted above, are susceptible to response distortion. Using only implicit measures of personality gives access to one’s unconscious motives which, while stable over time, are subject to constraints imposed by cultural norms and mores, and therefore, are not always consistent
predictors of behavior (e.g., an implicitly aggressive supervisor might curb his aggression toward subordinates in the presence of his supervisor). Combining implicit and explicit measures had the potential to give researchers access to both the conscious and unconscious aspects of personality. Theoretically, this combination offered a better chance understanding one’s personality in order to better predict or explain his or her behavior.

Several dual-process models of personality were developed including the Cognitive-Experiential Self-Theory (CEST), the Reflective Impulsive Model (RIM), and the Cognitive-Affective Personality System (CAPS, for a full review of these models see Vasilopoulos, Siers, & Shaw, 2013). A major benefit of dual-process models was that they incorporated the situation in their description of how the explicit and implicit personality processes worked together. Among the most useful dual-process models was the channeling hypothesis.

**Channeling hypothesis.** D. G. Winter et al. (1998) coined the term *channeling hypothesis* to explain how implicit and explicit measures of personality worked together. They stated that “our fundamental hypothesis [is] that motives involve wishes, desires, or goals (often implicit or nonconscious), whereas traits channel or direct the ways in which motives are expressed…” (D. G. Winter et al., 1998, p. 231). Hence, implicit personality provides the force or impetus for behavior, but explicit personality traits channel that force to help determine behavior. Put alternately, the channeling hypothesis states that together, both implicit and explicit measures of personality will predict or explain relevant behavior better than either type of measure can do alone. The channeling hypothesis predicts many notable outcomes. Unlike other dual-process models, research
using the channeling hypothesis may use any combination of psychometrically‐sound measures of explicit and implicit personality as its predictors.

D. G. Winter et al. (1998) used an explicit measure of extraversion as measured by the California Psychological Inventory (CPI) and implicit measures of affiliation and achievement as measured by the TAT to predict important life outcomes such as intimate and work relationship satisfaction. M. Bing et al. (2007) used an explicit measure of aggression as measured by the Personality Research Form (PRF) and implicit aggression as measured by the Conditional Reasoning Test of Aggression (CRT-A) and the video-CRT-A to predict a variety of counterproductive work behaviors. Frost, Ko, and James (2007) used an explicit measure of aggression as measured by the Angry Hostility Scale of the Neuroticism, Extraversion, Openness Personality Inventory-Revised (NEO-PI-R) and implicit aggression as measured by the CRT-A to predict aggressive behavior in a competitive context. Moderation analysis has been the statistical method most often used to demonstrate the channeling hypothesis. In fact, the above three studies described their tests of the channeling hypothesis as moderation analyses such that implicit motive was the independent variable, the explicit trait was the moderator, and together they predicted criteria of interest. Before addressing this study’s goal directly, some additional background information is needed.

**Background**

Given that personality testing gained acceptance in America as a useful tool for organizational selection during its association with the military beginning in WWI, it is fitting that this study will continue that association in another military setting—the United States Military Academy (USMA) at West Point. In particular, I seek to use
explicit and implicit measures of personality to explain or predict cadet performance in a mandatory boxing course. Funder (2006) identified three parts of the personality triad: the situation, the behavior, and the person. His triad serves as a useful framework for providing the background necessary to frame the research question.

**Situation.** Sylvanus Thayer is touted as the “Father of the United States Military Academy.” He is also known for the Thayer Method of classroom instruction where “Every cadet should be graded in every class, every day.” In this century, Academy doesn’t necessarily grade every cadet in every class, every day. However, cadets are graded quite regularly in what are known as the three pillars – military, physical, and academic.

The military pillar consists of grades earned in summer duty or leadership assignments at West Point, academic-year leadership or duty positions, and military science courses. Exceptionally good or bad performance in one’s conduct and on physical fitness tests can have an indirect impact on one’s military grades. The physical pillar consists of grades earned in physical education courses, grades for intramural or competitive sports participation, and physical fitness testing. The academic pillar consists of the grades earned in all academic courses, but it does not include grades in military science or physical education courses.

By graduation, each class will be rank-ordered from the number one cadet to the lowest graduating cadet based on a weighted average of their performance in the three pillars. This ranking is the basis of selecting one’s branch of service in the Army (e.g., Corps of Engineers versus Field Artillery) and the location of one’s first duty station (e.g., Hawaii versus Missouri). It even determines the order of choosing the family
quarters one will occupy at West Point should the cadet, as an officer, eventually return to the Academy as faculty or staff. Class rank matters. Consequently, cadets attach heightened importance to every event that contributes to the calculation of their class rank.

For generations, male cadets have been required to take a mandatory boxing course. Starting in USMA academic year 2016-2017 and for the first time in its history, female cadets were also required to take a boxing course.¹ Physical Education Course 116 (PE116), commonly referred to as Plebe boxing, is a half-semester course offered twice per semester. Plebe boxing is a 20-lesson, full-contact course that teaches the basics of boxing to each generation of graduates. Cadets take it during their freshman year, unless exceptional circumstances (e.g., injury) mandate a different time. Like all mandatory courses at USMA, each cadet must pass PE116 in order to graduate. Consequently, cadets attach heightened importance to Plebe boxing.

A key benefit of dual-process models of personality is that they consider the situation. “The explicit system is most influential in situations that present clear goals or require performing challenging tasks over an extended period of time. The implicit system is most influential in situations that present ambiguous goals, require performing well-learned (i.e., automatic) tasks, or call for an immediate response” (Vasilopoulos et al., 2013, p. 132). After considering a variety of criteria, L.R James (1998) concluded that implicit measures predict best in evocative situations—those situations that are personally demanding. In terms of the current study, one’s performance over four years

¹ In the past, women could elect to participate in Plebe boxing, but none of the current instructors can remember a woman ever having volunteered to take the course. Women interested in boxing typically join the Army Women’s boxing team. This allows them to train and develop their boxing skills without any impact on their grades and class standing.
at USMA or over the course of a semester would likely be influenced more by the explicit system while performance in a specific bout in Plebe boxing would likely be influenced more by the implicit system. Clearly, both personality systems are of use in predicting behavior at USMA.

**Behavior.** One behavior that the Army seeks to develop in its leaders is the ability to successfully execute their mission under conditions of stress, fear, physical fatigue, and the threat of actual or imminent bodily harm. Yet, completion of mandatory pre-commissioning requirements involves very few situations that create fear and that portend actual or imminent bodily harm (U.S.Army, 2015). Throughout pre-commissioning training, the vast majority of stressful experiences are combinations of interpersonal conflict, fear of failure, and physical and mental fatigue in pursuit of a grade or a rating. There is no doubt that these experiences classify as evocative, however, the Army would be best served if its future leaders of Soldiers knew that they could exhibit the proper behavior (i.e., function) in the face of fear and physical threats. At USMA, PE116 is one such experience, and performance in Plebe boxing is the behavior of interest in this study.

**Person.** “Practically every student of personality, from Freud to McDougall to Murray and Cattell, has found that human beings are characterized by a need for power, aggression, or domination” (McClelland, 1987, p. 269). Aggression is the aspect of the person that is of interest in this study. While any number of personality traits could have been used, not all of them are likely to be particularly good predictors of boxing performance. For example, a person with high achievement motivation might not seek to achieve in boxing, or a highly conscientious person might not be as diligent in practicing
boxing drills. Aggression is particularly applicable to the behavior of interest in this study. Interestingly, measures of aggression have typically been used to predict dysfunctional behavior (i.e., counterproductive work behaviors), but this study will use them to predict or explain a desired outcome (positive performance) in an aggressive context (Plebe boxing). The explicit measure of aggression used in this study is the short form of the Buss-Perry Aggression Questionnaire, and the implicit measure of aggression used in the study is the CRT-A.

**Explicit Measure of Aggression.** The explicit measure of aggression used in this study is the short form of the Buss-Perry Aggression Questionnaire (AQ). Buss and Perry designed the original questionnaire to measure four facets of aggression: physical, verbal, anger, and hostility. “Physical and verbal aggression, which involve hurting others, represent the instrumental or motivational component of behavior. Anger, which involves physical arousal and preparation for aggression, represents the emotional or affective component of behavior. Hostility, which consists of feelings of ill will and injustice, represents the cognitive component of behavior” (Buss & Perry, 1992, p. 457).

Bryant and Smith (2001) shortened the AQ from 29 to 12 items in order to psychometrically improve it while retaining the four facets. All items on this scale are measured on a 6-point Likert-type scale, ranging from 1 (extremely uncharacteristic of me) to 6 (extremely characteristic of me). Explicit aggression as measured AQ is often thought of as a single second-order factor (i.e., aggression) over the four first-order facets. Consequently, a higher score on the AQ indicates a higher, general aggression level. Bryant and Smith (2001) reviewed the factor structure of the AQ and found that viewing aggression as four first-order facets without an overarching second-order factor
was just as psychometrically sound. Consequently, a higher score on a facet of the AQ indicates a greater propensity to experience or express anger via that facet. For ease of interpretability, item scores are averaged to express each facet score and the facet scores are averaged to express the general aggression level.

**Implicit Measure of Aggression.** CRTs have successfully been used to measure unconscious, personality motives such as achievement motive, power motive, and aggression (DeSimone & James, 2015; L.R James, 1998; L.R. James et al., 2011, in press). CRTs are presented as reasoning tests made up of special logic or reasoning problems. The scoring of these logic problems is designed to detect the unconscious justification mechanisms (JMs) which enable people to justify their behavioral choices (for a full review, see L.R James, 1998). For example, those who are high in aggression don’t wish to see themselves, or be seen as, aggressive so they frame events and develop implicit justifications to make their choices seem rational (e.g. aggressive acts are rationalized as being committed in order to correct injustice, offense, or inequity). This study uses the CRT for aggression (CRT-A) as its measure of implicit aggression.

The CRT-A consists of 22 conditional reasoning (CR) problems and three basic reasoning problems (L.R. James, McIntrye, Glisson, Bowler, & Mitchell, 2004). In each CR problem there are four response alternatives: an aggressive response, a non-aggressive response, and two illogical responses. The basic reasoning problems and illogical responses are included to provide face validity to respondents who are told that they are taking a test of their reasoning ability—in a reasoning test there must be “wrong” answers. Additionally, tracking the total number of illogical responses provides the researcher with a means to identify careless responders.
The response to a single CR problem is not as important as the overall pattern of responses. According to L.R. James and McIntyre (2000), a high score is obtained by choosing a relatively high number of aggressive responses, and consequently indicates that the respondent is implicitly prepared to justify engagement in aggressive behavior. Those who score high (i.e., are very aggressive) see coworkers as either submissive or potential persecutors, prefer confrontation to cooperation, and see hostile intent behind the actions of coworkers. A low score is obtained by choosing a relative low number of aggressive responses (literally, choosing a high number of non-aggressive responses), and indicates that the respondent is not implicitly prepared to justify aggressive behavior. Those who score low (i.e., are conflict avoidant or prosocial) see coworkers as colleagues or even friends, see confrontation as unreasonable and likely lead to more conflict, and see benign intent behind the actions of coworkers. Those who score in the middle are said to be non-aggressive, and will resort to physical aggression if there are no other options, but prefer other solutions to conflict. With the appropriate background provided, the research question may finally be posed.

**Research Question**

There are two goals for this study. The first goal is to use implicit and explicit measures of aggression to predict cadet performance in a mandatory boxing course, and where possible, make generalizations about the relationships between the forms of aggression and boxing performance. The second goal relates to statistical methodology. Moderation analysis is the statistical method most often used to demonstrate the channeling hypothesis (M. Bing et al., 2007; Frost et al., 2007; D. G. Winter et al., 1998). However, L.R. James (2008) reframed the channeling hypothesis, stating that explicit
traits were most properly mediators or simultaneously mediators and moderators (i.e. part of a conditional indirect effect, CIE\textsuperscript{2}) of the implicit motive. Given that the history of the channeling hypothesis has been dominated by moderation analyses, the second goal is to determine if other statistical methodologies can be established as mechanisms of operation for the channeling hypothesis.

**Research Question:** Which statistical methodology or methodologies—moderation, mediation, multiple mediation, simultaneous moderation and mediation, or CIE analyses—best describe(s) the relationship(s) between implicit and explicit aggression and performance in Plebe boxing?

**Research Strategy**

In order to address the research question, I planned to investigate the channeling hypothesis with a progression of analyses. The analyses described below start with a relatively simple but common method for establishing the channeling effect—moderation—and progress from mediation through multiple mediation to CIE. Each step along the progression is a relatively more complex and novel methodological attempt to establish the presence of the channeling effect.

Using a structural equation modeling (SEM) approach to accomplish the analyses, I would model the system by the path diagram shown in Figure 1. There are a total of six variables in the \textit{a priori}, theoretical model. I am interested in how implicit and explicit aggression impact boxing performance. However, specifying the model to include aggressive status (AGG Status), athletic experience with contact sports at the NCAA

\textsuperscript{2} According to Preacher, Rucker, and Hayes (2007), if an indirect effect (\(axb\)) exists, but it is moderated by the another variable, then by definition one has a conditional indirect effect (CIE).
Division I level (Division 1 Athletic Experience), and sex effectively controls for them in the analyses that follow.

![Path Diagram]

Figure 1. The *a priori*, theoretical model of the factors that impact cadet boxing performance

Prior to conducting any analysis, I will ensure that the model has appropriate fit or respecify it until it provides acceptable fit. As a matter of convention, from this point forward only the variables of interest will be highlighted in figures and the descriptions of the analyses proposed in this study. However, the full, respecified model underlies these simplified descriptions and will be used in all calculations.

**Model 1: Main effects analyses.** The gist of the channeling hypothesis is that together, both implicit and explicit measures of personality predict or explain relevant behavior better than either type of measure can do alone. In order to claim support for the channeling hypothesis in this study, one must first understand if, or how well, implicit and explicit aggression each predict cadet boxing performance “alone.” The main effects analyses specified by the path diagrams in Figure 2 will provide that understanding.
Model 2: Moderation analysis. The moderation analysis is specified by the path diagram in Figure 3. Here, explicit aggression moderates the impact of implicit aggression on boxing performance. This moderation is accounted for by the inclusion of their interaction term (IxE) in the model. As Maxwell and Delaney (1993), Irwin and McClelland (2001), Irwin and McClelland (2003), and Fitzsimons (2008) point out, dichotomization of predictors reduces power to detect relationships and can actually induce spurious effects, especially when the predictors are increasingly correlated. I will not dichotomize my predictors. Aguinis and Gottfredson (2010) point out that moderation analyses highlight a theory’s boundary conditions. Spiller, Fitzsimons, Lynch Jr, and McClelland (2013) recommend a spotlight analysis when there are meaningful focal values for the moderator and a floodlight analysis when there are no meaningful focal values for the moderator. Since there are no meaningful focal values for the explicit aggression measure, in the presence of a significant interaction term I will conduct a floodlight analysis. Using techniques specified in Spiller et al. (2013) and Aiken and West (1991), I will identify the Johnson-Neyman point. This is the level of explicit aggression where the simple effect of implicit aggression is just significant.
At each step along the progression of analyses below, statistical support for the presence of the channeling hypothesis by a given analysis (e.g., Model 2) would make the main effects model (e.g., Model 1) uninterpretable just as main effects are uninterpretable in the presence of a significant interaction. Statistical significance of any the models below would allow me to classify that model as an effective statistical method to demonstrate the channeling hypothesis.

**Model 3: Mediation analysis.** The mediation analysis is specified by the path diagram in Figure 4. Here, explicit aggression mediates the impact of implicit aggression on boxing performance. The moderation term (IxE) from the previous step will be removed for this analysis. Consequently, this new model will be assessed for fit and respecified before analysis if necessary.

I will use a bootstrapping to conduct this analysis. A key benefit of bootstrapping is that no assumptions about the shape of the sampling distribution are necessary (Preacher et al., 2007). Baron and Kenny (1986) advocate for the presence of a significant total effect (often called path c) prior to proceeding with any mediation analysis. To them, there must be an effect to mediate or mediation analysis is futile. However, a growing number of researchers (L.R. James, Mulaik, & Brett, 2006; Preacher
et al., 2007; Rucker, Preacher, Tormala, & Petty, 2011; Shrout & Bolger, 2002; Zhao, Lynch, & Chen, 2010) advocate for the elimination of Baron and Kenny’s first step. I concur, and I will not model a direct effect in my model.

Figure 4. Path diagram for Model 3: Mediation analysis.

**Model 4: Multiple mediation analysis.** The multiple mediation analysis is specified by the path diagram in Figure 5. This analysis decomposes explicit aggression into its facets. Consequently, the multiple mediation analysis will allow us to see which facet or facets of explicit aggression are the strongest channels of latent aggression’s impact on boxing performance (Preacher & Hayes, 2008). The moderation term (IxE) is not included in this analysis, however, decomposing explicit aggression into its facets increases the number of parameters in the model. Consequently, this new model will be assessed for fit, and respecified before analysis if necessary. If paths $a_1$ and $b_1$ in Figure 5 were significant, then we would conclude that physical aggression is a significant mediator of implicit aggression with an effect size of $a_1b_1$. Using similar logic, many or none of the facets may prove to be mediators.
Model 5: Simultaneous moderation and mediation analysis. In this analysis, explicit aggression simultaneously moderates and mediates the effect of implicit aggression on boxing performance. It is specified by the path diagram in Figure 6. The moderation is accounted for by the reintroduction of the interaction term (IxE) in the model. Consequently, the new model will be assessed for fit and respecified before analysis if necessary.

There are four possible outcomes of this analysis: a) neither a significant moderation nor mediation, b) a significant moderation but insignificant mediation, c) an insignificant moderation but significant mediation, or d) a simultaneous significant moderation and mediation. Outcomes b or c are likely if earlier analyses show a large effect size for the moderation or mediation respectively. Outcome d would provide solid support for James’ (2008) assertion that the channeling hypothesis involves explicit traits acting as simultaneous moderators and mediators of implicit traits.
Model 6: Conditional indirect effect analyses. The final step in the progression of analyses is actually a set of four analyses. A representative example of one of the analyses is specified by the path diagram in Figure 7. Here the indirect effect of implicit aggression on boxing performance through the physical facet of aggression depends on or is conditional on the level of VHA (a composite score of the verbal aggression, hostility, and anger facets of explicit aggression). Each of the other three analyses in this step utilize a different facet of explicit aggression as the mediator and a composite of the other three factors of explicit aggression (three-factor aggression) as the moderator.

A statistically significant interaction between physical aggression and three-factor aggression would imply that the indirect effect of implicit aggression on boxing performance through physical aggression is conditional on the level of three-factor aggression. Given a significant interaction, I would probe the interaction by identifying the Johnson-Neyman point. This is the level of three-factor aggression where the conditional indirect effect of implicit aggression on boxing performance through physical aggression is just significant.
Figure 7. Representative path diagram for Model 6: Conditional indirect effect analysis.
II. Method

Participants

The primary population of interest was the 1,257 cadets comprising the United States Military (USMA) incoming Class of 2020. The class was similar to recent USMA classes in terms of gender (22.0% female), ethnicity (35.2% non-white), combat veterans (1%), and age ($M = 19.3$ years, $SD = .97$ years). The completion rate for our measures was 54.3% which yielded a 683-person pool of cadets from which to select the sample for this study. The final size for sample one of this study was 325 cadets from the sample of 683 who completed the survey measures. The cadets retained for analysis were each scheduled for plebe boxing during the first semester of USMA academic year 2016-2017.

For sample two, 163 cadets from the USMA Class of 2020 were given the same measures administered to the primary population. However, these measures were collected via on-line survey and had an 85.3% completion rate. The cadets in this sample were all enrolled in an introductory psychology course and earned extra credit in accordance with USMA policy for their voluntary participation in our study. The final size for sample two consisted of 139 cadets from the USMA Class of 2020 who completed the survey measures.

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3 As an estimate of large versus small sample size in SEM studies, the $N:q$ rule is often used where $N$ is the number of cases and $q$ is the number of model parameters that require statistical estimates (Kline, 2016). A 20:1 ratio is often recommended, but a 10:1 ratio, while less than ideal, is acceptable. The most complex model estimated 29 parameters. Hence, the sample size of 325 generated an $N:q$ ratio above the acceptable level of 10:1 but well below the ideal level of 20:1. For the simpler models, the $N:q$ ratio was over 17:1.

4 In addition to the measures reported in this study, participants were also administered the 21-item conditional reasoning test for achievement motive (CRT-RMS, L.R. James, 1998) and a 15-item measure of hardiness (DRS-15, Bartone, 1991, 1995, 2006; Bartone, Roland, Picano, & Williams, 2008). Cadets in this sample consented to have their predictor data linked to their various performance scores throughout their time as cadets including the variables of interest in this study.
For sample three, 438 students from a Midwestern, public university were given the same measures in the same manner as administered to sample two. The completion rate for this sample was 69.3%. The students were all enrolled in an introductory psychology course and earned research participation credit in accordance with university policy for their voluntary participation in our study. The final size for sample three was 305 students who completed the survey measures, and it was 29% male with ages ranging from 18 to 37 with a mean of 19.25 years (SD = 2.89).

Procedure

Collection of aggression measures. We collected measures of implicit and explicit aggression from sample one on the second, third, or fourth day after their arrival at USMA on June 27, 2016 as part of New Cadet testing (NCT). NCT is a longitudinal research program administered by the USMA Office of Institutional Research for the purpose of collecting a variety of instruments (most recurring) from each incoming USMA class. NCT is a series of timed “paper and pencil” survey sessions, and our measures were included in one of the NCT survey sessions. The test administrator informed cadets of the value of their participation and encouraged them to respond honestly. Cadets were informed that participation was voluntary and that all the information provided would be treated as confidential. Cadets also consented to have their various cadet performance scores for the next four years linked to the variables of interest in this study.

5 Participants in sample three were also asked to provide self-report responses to a series of 22 questions designed to quantify certain aspects of their achievement (e.g., GPA), aggressive (e.g., number of physical altercations), and counterproductive behaviors (e.g., number of times they skipped class) during high-school. After providing predictor and criteria data anonymously, participants provided self-report age and sex information.
Collection of other variables of interest related to boxing. PE116 was administered by faculty assigned to the Boxing Committee within the Department of Physical Education at USMA. These faculty were hand-selected officers and civilians who had the opportunity to earn a graduate degree in a relevant discipline prior to assignment at USMA. Upon arrival, they underwent a training regimen designed to help them build expertise in boxing skills, evaluation of skill-level in cadet boxers, and in determining a winner. In their first year assigned to the boxing committee after completing the training regimen, new faculty were paired with a veteran faculty member as part an instruction team. The veteran member of the team was assigned as the primary instructor, and the new faculty member was assigned as the assistant instructor. The primary instructor was responsible for supervising the assignment of grades and skill-level to all cadets assigned to their sections until the chair of the boxing committee deemed that the assistant demonstrated appropriate expertise. By the end of their year-long “apprenticeship,” new boxing instructors became experts who administered the largest collegiate boxing program in America.\textsuperscript{6} In fact, many of the faculty also served as coaches on the National Champion Army Men’s Boxing Team or on the Army Women’s Boxing Team.

Variables of Interest

The variables of interest for this study are implicit aggression (CRT-A), explicit aggression (AQ), athletic experience with contact sports at the NCAA Division I level (NCAA), sex, aggressive status (AGG), and boxing performance.

\textsuperscript{6} The other major service academies, Navy and Air Force, have similar sized programs.
NCAA Division I athletic experience. Prior to the first evaluated bout, boxing instructors canvased each cadet to determine if they were a member of one of Army’s NCAA teams who compete in contact sports. The sports included in this category were: baseball, basketball, football, hockey, lacrosse, rugby, soccer, sprint football, wrestling, boxing, judo, or karate. NCAA is a dichotomous variable with a score of 1 representing recruitment/participation in one of the above sports and score of 0 representing no recruitment/participation.

Sex. Sex was a dichotomous variable with a score of 1 representing male boxers and score of 0 representing female boxers. Under current policy, only men could box men, and only women could box women.

Aggressive status. Aggressive status (AGG) is historically conferred on about 5-10 percent of all cadets indicating that they are extremely aggressive. Identified cadets are so aggressive that the instructors want to consider their aggression when deciding which cadets should box one another. AGG status can make up for a deficit in skill level between opponents when instructors consider prospective bouts. Once identified as such, aggressive cadets tended to always be aggressive. However, the instructors did not typically discover that cadets were aggressive until the evaluated bouts. Most AGG cadets were relatively easy-going during the first five ungraded lessons, but their true aggression became obvious during evaluated bouts. Consequently, once AGG status was conferred upon a cadet, he or she nearly always kept that status for the entire course. AGG was a dichotomous variable with a score of 1 representing aggressive boxers and score of 0 representing non-aggressive boxers.
**Boxing performance.** Boxing performance was measured as the course grade (CG) in total number of points earned. In Plebe boxing all points were earned for performance during the five evaluated, two-round bouts: jab evaluation (Jab Eval), mid-course evaluation (MC), graded bout one (GB1), graded bout two (GB2), and graded bout three (GB3). The maximum point values for each evaluated bout were 50, 150, 250, 250, and 300 points respectively for a maximum course grade of 1000 points.

**Parity.** The selection of cadet pairings for each evaluatedbout was of paramount importance to and, consequently, was personally approved by the chair of the boxing committee. The slate of cadet bouts was intentionally created to ensure that each cadet was fairly matched with his/her opponent. Parity between cadets in each bout provided several benefits. First, it provided each cadet the best opportunity to demonstrate his or her skills since he or she would not be overmatched by an opponent and be forced to stay in a defensive posture the entire fight or conversely, not have to demonstrate any defensive skills because they overmatched their opponent. Second, parity decreased the occurrence of concussion related injuries.\(^7\) Finally, parity ensured that each cadet faced a similarly tough experience in which he or she was just as likely as any other cadet in any other pairing to get hit, hurt, or lose. Consequently, each cadet was just as likely to experience the emotional responses and performance degradation that followed from such experiences while still being expected to carry on and perform. The importance of bout parity led DPE to develop a construct called skill-level to help them consistently place similarly-skilled cadets in the ring together.

\(^7\) Despite its benefits to helping develop leaders of character, mandatory boxing at USMA is under fire from critics as being too dangerous for its cadets since a serious head injury would put them at risk for commissioning, especially when officers commissioned from other sources are not required to box in order to earn a commission (Ricks, McDonough, & Lucas, 2015).
Skill-level. Skill-level was a construct used by the boxing committee to rate a cadet’s ability to perform as instructed. This construct assessed the cadet in the context of only skills that had been taught to date. Evaluated skills included: stance, hand position, movement, jabs, feints, parries, counter-punching, slipping, power punches, and the use of combinations. Table 1 describes the skill-levels as they have been used for over a decade by the boxing committee. It lists the skill-levels by name, describes each one, and provides a verbal description of how often each skill-level is awarded.

Table 1

<table>
<thead>
<tr>
<th>Skill level name</th>
<th>Frequency Awarded (verbal)</th>
<th>Descriptive Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None yet</td>
<td>“Muhamad Ali reincarnated.”</td>
</tr>
<tr>
<td>2+</td>
<td>None yet</td>
<td>“Phenomenal boxer.”</td>
</tr>
<tr>
<td>2</td>
<td>Only 2 ever</td>
<td>The best boxers coming out of USMA including Olympians and NCAA National Champions.</td>
</tr>
<tr>
<td>2-</td>
<td>8-12 per year</td>
<td>Most USMA Boxing Team members earn this level during Plebe boxing.</td>
</tr>
<tr>
<td>3+</td>
<td>Common</td>
<td>The best “normal boxers.” No history of boxing, no intention to box after PE116.</td>
</tr>
<tr>
<td>3 High</td>
<td>Common</td>
<td>Below 9 but better than 7.</td>
</tr>
<tr>
<td>3</td>
<td>Common</td>
<td>Below 8 but better than 6.</td>
</tr>
<tr>
<td>3 Low</td>
<td>Common</td>
<td>Below 7 but better than 5.</td>
</tr>
<tr>
<td>3-</td>
<td>Common</td>
<td>Below 6, but no affective issues such as fear or lack of aggression.</td>
</tr>
<tr>
<td>4+</td>
<td>50-100 per year</td>
<td>Small affective issues, turn away from power punches.</td>
</tr>
<tr>
<td>4</td>
<td>2 - 4 per year</td>
<td>Larger affective issues, turn away from all punches or runs away.</td>
</tr>
<tr>
<td>4-</td>
<td>1 - 2 per year</td>
<td>Gets in the ring but doesn’t do much. Visibly shaken or fearful during or after each bout.</td>
</tr>
<tr>
<td>5</td>
<td>None yet</td>
<td>Someone who refuses to enter the ring.</td>
</tr>
</tbody>
</table>

Note. DPE = Department of Physical Education

Skill-level was assessed at eight points throughout the course: before the Jab Eval, after the Jab Eval, before the MC, after the MC, before GB1, after GB1, after GB2, and
after GB3. Skill-level was a key variable used to develop the slate of cadet pairings for each bout.

**Slate of bouts.** Each primary instructor created a proposed slate of bouts for the cadets in his/her section based on sorting cadets within sex by weight (lowest to highest), then skill-level (highest to lowest), and then aggressive status (aggressive cadets before non-aggressive cadets). The primary instructor created proposed bout pairings based on the sorted list and by taking their NCAA status into consideration. Upon development of his/her proposed slate, each primary instructor briefed the head of the boxing committee who had final approval authority to modify or approve the pairings.

**Bout evaluation.** During each bout, the two members of the instructional team sat adjacent to one another at ringside to evaluate the boxers. One faculty member was responsible for evaluating each cadet in the bout. Between the bout’s two rounds and at the conclusion of each bout, the faculty conferred, and determined the bout grade in points and post-bout skill-level for each cadet. The primary instructor ensured those outcomes were in accordance with boxing committee norms. The bout grades earned by each cadet were summed and the total points earned equaled one’s course grade.

**Range Restriction Correction.** Range restriction, even the loss of just the bottom 20% of a distribution, can pose serious threat to the validity of statistical conclusions (Aguinis & Gottfredson, 2010; Sackett & Yang, 2000). I expected that cadets might represent a more highly aggressive group than their peers at civilian

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8 Sometimes the sorting strategy results in a group of three cadets of a similar sex, weight, and skill-level. Rather than placing one of the cadets into a bout pairing where they would be clearly superior or inferior to their opponent, the primary instructor placed them into a three-cadet bout. In a three-cadet bout, each cadet boxed every other cadet in the bout over three rounds (e.g., cadet A boxed cadet B in round one, then cadet A boxed cadet C in round two, and finally cadet B boxed cadet C in round three). This ensured that every cadet boxed two rounds per evaluated bout against similarly skilled opponents.
colleges (e.g., cadets self-select into a profession whose stated purpose is to fight and win the nation’s wars). Therefore, I compared the descriptive statistics for the CRT-A and AQ scores contributed by sample two with those contributed by sample three. Though there were differences in group means, comparisons of group scores using Levene’s test for homogeneity of variance indicated that there were no significant differences in variance across groups in CRT-A, $F(1,442) = 0.05$, $ns$ or AQ, $F(1,442) = 3.38$, $ns$. Additionally, there were no significant differences in variance across groups in the AQ facet scores: Physical, $F(1,442) = 3.62$, $ns$; Verbal, $F(1,442) = 1.89$, $ns$; Anger, $F(1,442) = 2.98$, $ns$; and Hostility, $F(1,442) = 1.63$, $ns$. Consequently, no corrections for range restriction were necessary, and the following results are based on uncorrected data from sample one.
III. Results

Means, standard deviations, and uncorrected correlations for boxing performance (CG), CRT-A, AQ, AQ facet scores, sex, NCAA, and AGG are presented in Table 2. There was no significant correlation between CRT-A and AQ ($r = .06, ns$). Consistent with other findings (Frost et al., 2007; Kollner & Schultheiss, 2014), I interpret this to mean that CRT-A and AQ do, in fact, measure different and distinct (sharing less than one-half percent of variance) personality constructs. Significant correlations were observed between CG and the following variables: AQ, the physical facet of AQ (AQ-P), and the anger facet of AQ (AQ-A). AQ and its facets were, in general, strongly correlated with one another.

Table 2

Descriptive Statistics and Zero-Order Correlations

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>842.22</td>
<td>28.95</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>CRT-A</td>
<td>4.27</td>
<td>2.09</td>
<td>0.10</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AQ</td>
<td>2.47</td>
<td>0.90</td>
<td>0.11</td>
<td>0.06</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AQ-Physical</td>
<td>2.06</td>
<td>1.16</td>
<td>0.17</td>
<td>0.03</td>
<td>0.83</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AQ-Verbal</td>
<td>2.90</td>
<td>1.10</td>
<td>0.04</td>
<td>0.09</td>
<td>0.75</td>
<td>0.43</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AQ-Anger</td>
<td>2.38</td>
<td>1.09</td>
<td>0.14</td>
<td>0.06</td>
<td>0.87</td>
<td>0.72</td>
<td>0.55</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AQ-Hostility</td>
<td>2.54</td>
<td>1.08</td>
<td>0.01</td>
<td>0.01</td>
<td>0.79</td>
<td>0.53</td>
<td>0.47</td>
<td>0.56</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sex</td>
<td>0.76</td>
<td>0.43</td>
<td>0.00</td>
<td>-0.04</td>
<td>0.02</td>
<td>0.06</td>
<td>0.07</td>
<td>-0.05</td>
<td>-0.01</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>NCAA</td>
<td>0.11</td>
<td>0.31</td>
<td>0.25</td>
<td>-0.08</td>
<td>-0.04</td>
<td>0.03</td>
<td>-0.09</td>
<td>-0.02</td>
<td>-0.07</td>
<td>-0.21</td>
<td>—</td>
</tr>
<tr>
<td>AGG</td>
<td>0.15</td>
<td>0.36</td>
<td>0.26</td>
<td>0.02</td>
<td>-0.02</td>
<td>-0.04</td>
<td>-0.03</td>
<td>0.01</td>
<td>0.00</td>
<td>0.06</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Note. $N = 325$. CG = Course Grade in Points; CRT-A = Conditional Reasoning Test of Aggression; AQ = Short form of Buss-Perry Aggression Questionnaire; NCAA = Experience in Contact Sports at NCAA Division I; AGG = Aggressive Status Confirmed by Boxing Committee.

**Bold** indicates a correlation significant at $p < .05$, two-tailed.

$^a$Sex: 1 = male, 0 = female. $^b$NCAA: 1 = experience, 0 = no experience.

$^c$AGG: 1 = aggressive status conferred, 0 = aggressive status not conferred.

Among the control variables, NCAA and AGG were each correlated with CG, but were not significantly correlated with any of the predictor or other control variables. Sex was not significantly correlated with any of the variables in this study except NCAA.

This was somewhat surprising since women tend to rate themselves as lower in AQ and all its facets than do males (except anger for which there is no difference, Webster et al.,
The correlation between sex and AQ was in the expected direction but lacked statistical significance. Women in this sample had more contact sport experience than men at the NCAA Division I.

**Tests of the Channeling Hypothesis**

Each test of the channeling hypothesis along the progression of analyses was carried out using a path analysis of the structural equations model. Specifically, the Latent Variable Analysis package (lavaan, version 0.5-20) for RStudio (version 1.0.44) was the statistical software platform used for the analyses. The fit of each model was assessed by $\chi^2$, Comparative Fit Index (CFI), Root Mean Square Error Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) fit indices. The criteria for acceptable fit were: a non-significant $\chi^2$, CFI > .95, RMSEA < .06, and SRMR < .08.

**Model 0: Preliminary analysis.** To establish a baseline to which to compare Model 1, I conducted an analysis based on the *a priori* theoretical model (Figure 1) which predicted CG and included the control variables and associated paths, but neither of the aggression measures nor their associated paths. This model was just-identified\(^9\) and it accounted for a significant amount of variance in CG, $R^2 = .13$, $F(3,321) = 15.65$, $p < .05$.

**Model 1: Main effects analyses.** Model 1 was performed as two analyses. Model 1E described the main effect of explicit aggression on CG, and it provided acceptable fit with $\chi^2(2, N=325) = 1.51$, $p > .05$. The significant value for path $b$ ($\beta = .13$, $p = .01$, Figure 8) established that explicit aggression predicted boxing performance.

---

\(^9\) Just-identified models have no $\chi^2$ associated with them because they have zero degrees of freedom. This means that they perfectly reproduce the data and, therefore, demonstrate perfect fit (Kline, 2016).
Model 1E explained more variance in CG than Model 0, $R^2 = .14$, $F(4,320) = 13.42$, $p < .05$ and the difference between the models was significant, $\Delta R^2 = .01$, $F(1,320) = 6.00$, $p < .05$. Model 1I described the main effect of implicit aggression on CG, and it provided acceptable fit with $\chi^2(2, N=325) = 1.59$, $p > .05$. The significant value for path $c$ ($\beta = .11$, $p = .03$, Figure 8) established that implicit aggression predicted boxing performance.

Model 1I explained more variance in CG than Model 0, $R^2 = .14$, $F(4,320) = 13.04$, $p < .05$ and the difference between the models was significant, $\Delta R^2 = .01$, $F(1,320) = 4.67$, $p < .05$. Compared to their bivariate correlations, the addition of the control variables in Model 1 brought significance to a similarly sized correlation between implicit aggression and CG while maintaining the size of correlation between explicit aggression and CG.

* = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Figure 8. Path diagrams for Model 1: Main effects analyses. The top panel shows the path diagram for Model 1E: main effect analysis of explicit aggression. The bottom panel shows the path diagram for Model 1I: main effect analysis of implicit aggression.

In summary, Model 1 established the significant main effects of implicit and explicit aggression. Because Model 1E explained slightly more variance than Model 1I, I will use it as the basis of comparison for the remaining analyses. Statistical significance of any the models below would allow me to classify that model as an effective mechanism of operation of the channeling hypothesis. Furthermore, significance of a below model would make the main effects models (e.g., Model 1E) uninterpretable just as main effects are uninterpretable in the presence of a significant interaction.
**Model 2: Moderation analysis.** Model 2 provided acceptable fit with $\chi^2(3, N=325) = 2.46, p > .05$. Path $d$ shows that the IxE interaction term was significant ($\beta = .14, p = .01$, Figure 9), so I examined the form of the

![Path diagram for Model 2: Moderation analysis. * = p < .05; ** = p < .01; *** = p < .001.](image)

*Figure 9. Path diagram for Model 2: Moderation analysis. * = p < .05; ** = p < .01; *** = p < .001.*

![Conditional effect of implicit aggression on boxing performance (CG) versus explicit aggression.](image)

*Figure 10. The conditional effect of implicit aggression on boxing performance (CG) versus explicit aggression. J-N = the Johnson-Neyman point, the level of explicit aggression where the simple effect of implicit aggression was just significant; CG = course grade in points; The horizontal line denotes an indirect effect of zero; The shaded area represents the region of significance whose lower boundary is marked by the vertical line at the J-N point.*
interaction with a floodlight analysis (Figure 10). Using techniques specified in Spiller et al. (2013) and Aiken and West (1991), I identified the Johnson-Neyman (J-N) point at .04 standard deviations below the mean level of explicit aggression. The JN was the level of explicit aggression where the simple effect of implicit aggression was just significant. The results indicated that explicit aggression moderated the impact of implicit aggression on boxing performance. Specifically, explicit aggression moderated the impact of implicit aggression on boxing performance for cadets of J-N level of explicit aggression or higher, but not for cadets with explicit aggression below J-N.

To further demonstrate the form of the interaction, I also plotted a traditional spotlight analysis using values at plus and minus one SD of the mean explicit aggression

![Figure 11](image)

*Figure 11.* Spotlight analysis of the conditional effect of implicit aggression on boxing performance at high and low levels of explicit aggression (the moderator). CG = course grade in points; High Explicit = slope based on cadets who had AQ scores one standard deviation above the mean; Low Explicit = slope based on cadets who had AQ scores one standard deviation below the mean; Mean CG = shows the mean CG, 842.22 points.
for the high and low explicit slopes, respectively (Figure 11). When explicit aggression was low, there was little change in boxing performance as implicit aggression increased. When explicit aggression was high, boxing performance increased as implicit aggression increased. Thus, implicit aggression had its greatest impact on boxing performance when explicit aggression was high. Cadets who believed they were aggressive performed the poorest when their implicit aggression was actually low, but they performed the best when their implicit aggression was congruent or high. Cadets who believed they were not aggressive, performed at slightly below average levels whether or not their implicit aggression was low or high. Incongruence in aggression motives led to the worst performance among cadets. Cadets with high explicit aggression combined with low implicit aggression had the worst performance among cadets with low implicit aggression—and the worst overall. Similarly, cadets with low explicit aggression combined with high implicit aggression had the worst performance among cadets with high implicit aggression.

Model 2 explained more variance than Model 1E, $R^2 = .17$, $F(6,318) = 11.21$, $p < .05$, and the difference between the models was significant, $\Delta R^2 = .03$, $F(2,318) = 5.96$, $p < .05$. In summary, Model 2 established that moderation analysis was an effective statistical methodology to demonstrate the channeling hypothesis. Explicit aggression channeled implicit aggression (via moderation) to improve prediction of boxing performance.

**Model 3: Mediation analysis.** Model 3 provided acceptable fit with $\chi^2(4, N=325) = 2.23$, $p > .05$. Path $a$ was not significant ($\beta = .06$, $p = .30$, Figure 12), but $b$ was significant ($\beta = .12$, $p = .03$, Figure 12). Mediation requires both paths to be
significant, and they were not. For this data set I cannot conclude that mediation analysis was an effective statistical methodology to demonstrate the channeling hypothesis.

![Path diagram for Model 3: Mediation Analysis.](image)

* $\chi^2(10, N=325) = 22.57, p < .05$ and the RMSEA index was above the acceptable range. Therefore, I cannot conclude that the model demonstrated acceptable fit. I made numerous attempts to respecify the model, but could not respecify it in a way that made theoretical sense (e.g., adding a path from NCAA to implicit aggression). As a last resort, I tried to execute this analysis as a series of mediation analyses where each of the facets of AQ served as the moderator variable, but like Model 3, none of the $a$ paths were significant. Presented below (Figure 13) is the full path diagram for Model 4, but because it could not be properly specified, I cannot draw any conclusions from it.

**Model 4: Multiple mediation analysis.** Model 4 did not meet all established fit criteria. Though the CFI and SRMR indices fell within acceptable ranges, it had significant $\chi^2(10, N=325) = 22.57, p < .05$ and the RMSEA index was above the acceptable range. Therefore, I cannot conclude that the model demonstrated acceptable fit. I made numerous attempts to respecify the model, but could not respecify it in a way that made theoretical sense (e.g., adding a path from NCAA to implicit aggression). As a last resort, I tried to execute this analysis as a series of mediation analyses where each of the facets of AQ served as the moderator variable, but like Model 3, none of the $a$ paths were significant. Presented below (Figure 13) is the full path diagram for Model 4, but because it could not be properly specified, I cannot draw any conclusions from it.
Model 5: Simultaneous moderation and mediation analysis. Model 5 provided acceptable fit with $\chi^2(6, N=325) = 7.41$, $p > .05$. There were four possible outcomes of this analysis: a) neither a significant moderation nor mediation, b) a significant moderation but insignificant mediation, c) an insignificant moderation but significant mediation, or d) a simultaneous significant moderation and mediation. Path $d$ shows that the IxE interaction term was significant ($\beta = .14$, $p = .01$, Figure 14), however, path $a$ was not significant ($\beta = .06$, $p = .31$, Figure 14) while $b$ was significant ($\beta = .14$, $p = .01$, Figure 14). Mediation requires both path $a$ and path $b$ to be significant, and they were not. This analysis resulted in outcome b; a moderation, but no mediation. Comparison of path diagrams for Models 2 and 5 (Figures 9 and 14 respectively) shows that the addition of path $a$ in Model 5 had no impact in size or direction of the moderation relationship between implicit and explicit aggression. Consequently, I prefer the more parsimonious Model 2 over Model 5 to explain the moderation relationship, and do not repeat a
separate, more complex analysis of Model 5 here. For this data set I cannot conclude that simultaneous moderation and mediation analysis was an effective statistical methodology to demonstrate the channeling hypothesis.

Figure 14. Path diagram for Model 5: Simultaneous moderation and mediation analysis. * = \( p < .05 \); ** = \( p < .01 \); *** = \( p < .001 \).

**Model 6: Conditional indirect effect analyses.** As a reminder, the final step in the progression of analyses was actually a set of four analyses. A representative example of one of the analyses is specified by the path diagram in Figure 15. Here the indirect effect of implicit aggression on boxing performance through the physical facet of aggression was thought to be conditional on the level of VHA. Model 6 with the physical facet of AQ serving as the moderator (Model 6P) did not provide acceptable fit with \( \chi^2(7, \, N=325) = 311.70, \, p < .05 \), and no fit indices within acceptable ranges. Even though path \( a \) for all the models in this step along the progression of analyses was statistically insignificant, I made numerous attempts to respecify the model (though it is probable that proper respecification would have had no impact on the \( a \) paths). I simply could not respecify it in a way that made theoretical sense (e.g., adding a path from NCAA to implicit aggression). Presented below is (Figure 15) is the full path diagram for Model 6P, but because it could not be properly specified, I cannot draw any conclusions from it.
Post hoc analyses. The goal of Model 3 was to determine which facet of AQ was the best channel (via mediation) of implicit aggression. However, there were no significant mediation relationships found in the preplanned progression of analyses. In order to get at the same goal of understanding which facet of AQ was the best channel of implicit aggression, I conducted a series of post hoc moderation analyses using the facets and various combinations of facets of explicit aggression as the moderator. The path diagram for each of these analyses was similar to Figure 9, but each replaced explicit aggression with one of its facets or a combination of its facets as the moderator (the interaction term was changed in a similar manner). For example, Model 2H was a moderation model where the single hostility facet of explicit aggression served as the moderator of implicit aggression predicting course grade. Model PVA was a moderation model where the physical, verbal, and anger facets of aggression were combined as a composite, three-factor measure of explicit aggression (PVA) which served as the
moderator of implicit aggression predicting course grade. The other models were similarly named. All models under consideration exhibited acceptable. Table 3 lists the specific $\chi^2$, $df$, path values, and variance explained by model.

Table 3

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>$df$</th>
<th>Path Values</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
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<th>Model 1E</th>
</tr>
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<td>3</td>
<td>.14 .14</td>
<td>.11</td>
<td>.17</td>
<td>.16</td>
<td>.03</td>
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<td>.10</td>
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<td>.16</td>
<td>.03</td>
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<tr>
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<td>.13 .05</td>
<td>.11</td>
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<td>.16</td>
<td>.03</td>
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<tr>
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<td>.14 .15</td>
<td>.11</td>
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<td>.03</td>
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<tr>
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<td>.10</td>
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<td>.19</td>
<td>.04</td>
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<tr>
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<td>.10</td>
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<td>.10 .11</td>
<td>.11</td>
<td>.19</td>
<td>.19</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note. $N = 325$. M1E = Model 1: Main effect analysis of explicit aggression; M2 = Model 2: Moderation analysis; M2P = Model 2 specified with the Physical facet of Explicit Aggression as Moderator; M2V = Model 2 specified with the Verbal facet of Explicit Aggression as Moderator; M2A = Model 2 specified with the Anger facet of Explicit Aggression as Moderator; M2H = Model 2 specified with the Hostility facet of Explicit Aggression as Moderator; M2PVA = Model 2 specified with a composite of the Physical, Verbal, and Anger facets of Explicit Aggression as Moderator; M2PA = Model 2 specified with a composite of the Physical, Anger facets of Explicit Aggression as Moderator. $R^2$ = total percent of variance accounted for by model under consideration; $\Delta R^2$ = change in percent of variance accounted for by model under consideration over the Model 1E; $\Delta R^2$ = change in percent of variance accounted for by model under consideration over Model 0: Control variables model. **Bold** indicates significant at $p < .05$.

$^a$standardized regression coefficients correspond to similarly labeled paths on Figure 9.

At the facet level, Models 2V, 2P, and 2A were effective demonstrations of the channeling hypothesis and explained significant variance in CG. Models 2P and 2A explained more variance in CG than Model 1E and more variance in CG than Model 2. Model 2V did not explain more variance than Model 2 in predicating CG, but did explain significant additional variance over Model 1E. The hostility facet of explicit aggression did not serve as an effective moderator (path $d = .01$, ns) in Model 2H. The combination models 2PVA and 2PA also explained more variance in CG than Model 2. Removing the hostility facet of explicit aggression improved a given moderator’s ability to explain variance in CG. Combined, the anger and hostility (e.g., non-instrumental) facets of
explicit aggression did not serve as an effective moderator (path $d = .10, ns$) in Model 2HA.

In summary, while the physical facet of aggression appeared to be the most important facet of explicit aggression in predicting CG, the anger facet of physical aggression was also an important contributor. Verbal aggression was an effective moderator, but less effective than the overall explicit aggression factor. Finally, the hostility facet of aggression seemed to decrease the ability of explicit aggression to predict CG wherever it was entered as a facet of the moderator. Further analysis showed there was no main effect of the hostility facet of explicit aggression when it was entered as the only predictor in a main effects model similar to Model 1E ($\beta = .03, ns$).
III. Discussion

This study focused on 325 young men and women entering a 47-month experience as Cadets at USMA, their measures of implicit and explicit aggression, and their performance in an evocative situation—Plebe boxing. With this as the backdrop, there were two main goals of the study. The first goal was to use implicit and explicit measures of their aggression to explain their performance in a mandatory boxing course, and where possible, make generalizations about the relationships between the forms of aggression and boxing performance. The second goal was to determine if other statistical methodologies could be established as the mechanism of operation for the channeling hypothesis.

Like many studies, there were mixed results. There was strong support for the utility of the channeling hypothesis. However, only one of the five statistical methodologies tested as mechanisms of operation for the channeling hypothesis was effective—moderation. This study helped make several important findings relating to how implicit and explicit aggression interact to explain boxing performance. Below, I discuss findings related to the two goals of this study, followed by putting this study in the context of similar studies.

Moderation: The Still-Dominant Mechanism of Operation

The vast majority of studies using implicit and explicit measures of personality to test the channeling hypothesis were based on moderation analyses. L.R. James (2008) proposed that the explicit personality could also serve as the mediator through which implicit personality is channeled into behavior. He set a high bar with expectations of seeing “many more moderated-mediation models in the future” (L.R. James, 2008, p.
Though set up to determine whether other statistical methodologies could be used to establish the channeling hypothesis, this study fell short of the James’ bar—it only established moderation as the mechanism of operation. The impact of implicit aggression on cadet boxing performance depended on the level of explicit aggression.

Of the two analytical models in this study that provided acceptable fit and included a mediation analysis (Figures 12 and 14), the $a$ paths from implicit aggression to explicit aggression did not reach statistical significance. In Model 5, even though the mediation relationship was insignificant, the moderation relationship maintained significance. Mediation requires correlation between predictors, and that simply was not the case in this study where implicit and explicit aggression were not significantly correlated ($r = .06, ns$). When implicit and explicit measures share so little variance, there can never be a significant mediation. For mediation to be a viable way to think about the channeling hypothesis, we need distinct, but related constructs. Future research using different implicit and explicit measures of personality could yield a significant mediation relationship. For example, implicit achievement and explicit aggression might be related enough to yield a significant mediation analysis and expand the ability of channeling hypothesis to explain even more complex behaviors.

**Findings related to aggression and boxing performance.**

There were four primary findings relating the forms of aggression and boxing performance. First, people with low explicit aggression do not tend to perform well in aggressive tasks regardless of their implicit level of aggression. In this study, they performed below mean level at all levels of implicit aggression. In other words, if one thinks he is not aggressive, then he likely will not box well. Second, incongruence of
motives tends to lead to the poorest performance. Cadets with high implicit aggression coupled with low explicit aggression had the poorest performance of all cadets with low explicit aggression. Cadets with low implicit aggression coupled with high explicit aggression performed the worst of all cadets in this study. One’s performance is best when relevant implicit and explicit measures of personality are congruent. Similarly, one’s performance is worst when relevant implicit and explicit measures of personality are incongruent. Third, there were no differences in performance or skill level by sex. The women performed as well (and as poorly in some cases) as their male counterparts. Finally, post hoc analyses determined that not all facets of explicit aggression were effective channels of implicit aggression.

**Hostility not useful to predict performance.** Although the relationships of the AQ facets to factors of a five-factor personality inventory (Barrick & Mount, 1991; Hurtz & Donovan, 2000; McCrae & Costa, 1987) were never specified (Buss & Perry, 1992), it appeared that the items that composed hostility (AQ-H) and anger (AQ-A) were closely related to the Neuroticism factor. One can find items similar to AQ-A and AQ-H items spread throughout the Neuroticism factor and its sub-facets on any five-factor inventory. DeYoung, Quilty, and Peterson (2007) performed factor analysis on two of the most popular five-factor inventories and found that each factor could be subdivided into two aspects, regardless of the particular number of facets into which a given inventory subdivided each factor. They divided Neuroticism into two aspects: Volatility and Withdrawal. Volatility, which was closely matched to AQ-A, captured facets like instability, impulsiveness, and anger that implied problems of disinhibition which typically lead one to engage the outside world under stress. In contrast, Withdrawal,
which was closely matched to AQ-H, captured facets like anxiety, depression, and vulnerability that implied problems of inhibition which typically lead one to inward expressions under stress. As the results show, volatility (AQ-A) appeared to help in the prediction of boxing performance, and withdrawal (AQ-H) appeared to have no impact in the prediction of boxing performance.

Not surprisingly, the tendency for those with high AQ-A to direct their neurotic responses outward may help explain why there was both a significant main effect and interaction including AQ-A. Under the pressure of a boxing match, cadets high in AQ-A directed their response outward at the source of their stress—their opponent. Conversely, the tendency for cadets high in AQ-H to direct their neurotic responses inward did not help explain boxing performance—there was neither a significant main effect of nor interaction including AQ-H. So while neuroticism is generally thought to be dysfunctional, the aspect of neuroticism captured by AQ-A helped predict performance in Plebe boxing, and the aspect of neuroticism captured by AQ-H had no significant impact on predicting boxing performance. This relates back to Funder’s personality triad.

The physical, verbal, and anger facets of explicit aggression in conjunction with implicit aggression seem to be useful individual differences of the Person (e.g., cadet) to predict the desired Behavior (e.g., performance in a mandatory boxing class) in the Situation (e.g., four years at West Point) of interest. However, the inclusion of the hostility facet of explicit aggression does not add predictive value in the same triad. Future studies may show AQ-H is more useful in predicting counterproductive behaviors rather than positive performance criteria.

**Putting this Study in the Context of Similar Past Research**
At first glance the findings of this study are consistent with past research. Frost et al. (2007) established the channeling hypotheses via moderation to show how explicit aggression channeled implicit aggression to predict physical, verbal, and passive aggression in a university intramural basketball setting. M. Bing et al. (2007) established the channeling hypotheses via moderation to show how explicit aggression channeled implicit aggression to predict dishonesty, traffic violations, organizational deviance, work complaints field, and organizational citizenship behaviors in a variety of university and job place contexts. Jones (2014) established the channeling hypotheses via moderation to show how explicit aggression channeled implicit aggression to predict deviant behavior as measured by a deviance survey in a university setting. However, a closer comparison will show that the magnitude of the findings of the current study differ from similar past research when considering two factors: the situation (high-stakes versus low-stakes) and the criterion (positive performance versus counterproductive behavior).

**High-stakes versus low-stakes situations.** White, Young, Hunter, and Rumsey (2008), who worked extensively with personality measures during their tenure with the Army’s Project A defined high-stakes testing situations as those where real-life personnel selection and assignment decisions were at stake. DuBois, Sackett, Zedeck, and Fogli (1993) described a continuum where maximum performance situations exist on one end and typical performance situations exist at the other end of the scale. Meyer et al. (2010) preferred to describe the situation by the four facets of its strength: clarity, consistency, constraints, and consequences.

Performance in Plebe boxing exists on the high-stakes, maximum-performance, or strong-situation end of the continuum. There is high clarity. Cadets are placed in a class
and given instruction on how to box so that they can perform during the graded bouts. They know what to expect and what is expected of them. There is consistency. Cadets know that they must take Plebe boxing and earn a passing grade through the five evaluated bouts in order to successfully complete PE116. They are never told that they can skip a bout or that boxing is not really an important course. There are constraints. Cadets must box, and for the first time since its founding in 1802, all cadets, regardless of sex, must box. They have no option to take some other course in lieu of boxing, and their instructors are predominantly military officers who will order the cadet into the boxing ring, if necessary. Finally, there are both immediate and long-term consequences. In the short term, failure to box well will likely lead to physical pain—getting punched. In the long-term, failure to box well can lead to repeating the boxing course, a poor grade, lower respect amongst one’s peers, and even removal from West Point for failing to complete a mandatory requirement.

The multiple $R^2$ of the studies above that occurred in low-stakes situations (e.g., a university study, survey, or self-select intramural basketball game) ranged from .26 to .36. The multiple $R^2$ of the studies that occurred in high-stakes situations (e.g., actual traffic violations, deviance at work, or filing a complaint at work) were much lower and ranged from .06 to .08. The multiple $R^2$ in the current study ranged from .16 to .19 depending on the moderator. It accounted for much more variance than other high-stakes studies, demonstrating that the channeling hypothesis can be an important method to explain variance in performance in high-stakes situations.

**Predicting positive performance versus counterproductive behaviors.** The vast majority of studies using the channeling hypothesis were interested in explaining
aggressive, counterproductive behaviors in competitive situations. This study was
different in that it sought to explain differences in positive performance in an aggressive
situation. L.R. James and Mazerolle (2002) found that implicit aggression, as a single
predictor, had significant correlations of .06 and -.49 in accounting for ACT performance
and supervisor ratings of patrol officers respectively. I am only aware of one study that
used measures of aggression with the channeling hypothesis to predict adaptive behavior.
M. Bing et al. (2007) found a multiple $R^2$ of .04 ($p < .1$) in predicting organizational
citizenship behaviors in an actual work setting. Given that the multiple $R^2$ in the current
study ranged from .16 to .19 depending on the moderator, one can see that in the right
context, aggression can be used to predict performance and not just maladaptive,
undesired, or counterproductive behaviors.

**Practical significance.** Given a large enough $N$, nearly any study can attain
statistical significance, but determining whether or not it has reached practical
significance is an entirely different matter. In their 30-year review on the moderating
effects of variables in a multiple regression, Aguinis, Beaty, Boik, and Pierce (2005)
found that the mean effect size ($f^2$, roughly based on the change in $R^2$) of studies in the
personnel selection literature was .01 for categorical moderators. Consequently, they
considered that an effect size of .01 could be very important. Cohen (1992)
recommended that researchers consider values of $R^2$ or the change in $R^2$ of .02, .13, and
.26 as small, medium, and large effect sizes respectively.

When viewed in isolation, this study’s multiple $R^2$ of .16 to .19 and its change in
$R^2$ of .03 to .04 might not look practically significant. However, when viewed in the
context of personnel selection studies, the change in $R^2$ in this study is about three to four
times as large as the thirty year average. When using Cohen’s effect size categories, the $R^2$ in this study is well above the threshold of a medium effect size. Given the high-stakes context and performance-related criterion of this study, these findings certainly approach practical significance.

**Limitations**

While attempting to control for contact sport experience there were two main issues. First, only cadets who were actually on a team, not those who were recruited and failed to make the team, were tracked (i.e., their contact experience went uncontrolled). Similarly, there was no way to track which cadets participated in a relevant martial art or contact sport in high school who never attempted to participate in a similar pursuit at USMA. Consequently, their previous experience went uncontrolled. Second, the dichotomous nature of the control variable NCAA didn’t account for much variability. We were unable to discriminate a Golden Gloves champion on the boxing team from a bench-warming shooting guard on the men’s basketball team. Though DPE’s practice of using skill-level to ensure bout parity largely controlled for the influences of past experience, without entering it into the SEM, one cannot be sure.

As with any studies conducted in the workplace, a host of other important factors that might have impacted performance in boxing over the eight-week course went uncontrolled. These factors include the amount of sleep, physical fatigue, or existing stress level on the cadets due to other mandatory requirements such as academic courses, military duties, and even other physical training requirements.

Finally, CRTs are much more cognitively taxing to take than many other measures of personality. There are many questions that require multiple comparisons of
possible responses before determining one’s response. A typical question is, “Which of the following is the biggest problem with [the above] reasoning?” Item analysis of CRT-A has shown that more aggressive participants might undermine the test of aggression by reading until they get to the first logical response or by purposely choosing illogical responses (DeSimone & James, 2015). Considering the above in light of the fact that our measures of aggression came near the end of a three-hour testing block and that we screened out responses with too many illogical responses, we might have captured a less implicitly aggressive sample than truly exists in the USMA Class of 2020. Though a comparison of sample of USMA cadets against a sample of college students was employed as a control for this, one could only say there was no statistical difference between the populations. It is not certain that either sample was an accurate reflection of the true level of implicit aggression of the population from which it was sampled.

**Conclusion**

Given the results in this study, the utility of the channeling hypothesis cannot be doubted. Together, implicit and explicit measures of personality greatly improved our ability to predict performance of a behavior of interest in a high-stakes, maximum-effort, and strong situation—the kind of situations where the impact of personality on performance is typically low. Bolstering our findings was the fact that our criteria was desired performance rather than the counterproductive or maladaptive behaviors typically predicted with aggression measures. Though adherents of the implicit and explicit personality schools of thought have been historically adversarial, recent studies have shown that their instruments, however, are complementary.
Starting in the period between world wars, the U.S. military reached for any and every tool to assist in building the largest armed force our country has ever seen. In doing so, it played a key role in the advancement of personnel psychology. It is somewhat fitting then, that the current study also used a military participant pool to advance the understanding of the channeling hypothesis. Though not every goal of the study was met, what was found offers the promise of utility for future selection decisions. Like the military of the past, we must continue to reach for every tool available to improve selection decisions; the quality of our organizations may depend on it.
References


