AN ABSTRACT OF THE THESIS OF

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in Clinical Psychology presented April 2020

Title: The Effects of Self-Efficacy and Motivation on Fluid Intelligence as Measured by the Block Design Subtest of the WAIS-IV

Abstract approved:

The purpose of this study was to discover if self-efficacy and motivation affects fluid intelligence tasks on the Wechsler Adult Intelligence Scale- fourth edition (WAIS-IV), and the possible influences of those effects on the overall IQ score. The present study explored the relationship between self-efficacy and motivation and its overall effect on IQ scores to determine if an administrator can alter IQ scores by manipulating perceived self-efficacy during a task and enhancing motivation. Participants were selected by graduate students from Emporia State University in the Assessment of Intelligence course. The participants were given four instruments: The General Self-Efficacy Scale, a Motivation Questionnaire, a background questionnaire, and the WAIS-IV. The research design had three randomized groups - 1) control group: WAIS-IV without modifications, 2) Experimental group: WAIS-IV paired with positive affirmations to boost self-efficacy, and 3) Experimental group: WAIS-IV paired with incentives to maximize motivation. The study will use multiple Factorial Analysis of Variance and a Multivariate Analysis of Variance to analyze the results. It was proposed that self-efficacy and motivation may be a direct influence on IQ scores because of their impact on fluid intelligence tasks. However, this study did not receive significant results, so I cannot state that self-efficacy or motivation influences performance on fluid intelligence tasks on the WAIS-IV at this time.

Keywords: self-efficacy, motivation, IQ, WAIS-IV, fluid intelligence; Block Design

The Effects of Self-Efficacy and Motivation on Fluid Intelligence as Measured by the Block Design Subtest of the WAIS-IV

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A Thesis

Presented to the Department of Psychology

EMPORIA STATE UNIVERSITY

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

Stephany Amber Graham

April 2020

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ACKNOWLEDGEMENTS

I would like to express my deepest thanks to my thesis chair, Dr. Wade, who put in countless hours and continued to give me guidance, input, and wisdom throughout the entire thesis process. Next, I would like to express my gratitude towards Dr. Hayes who was exceedingly helpful, supportive, and encouraging throughout the entire process of conducting the experiment. I would also like to thank Dr. Luo, he allotted great wisdom and knowledge, and it was a pleasure to have him serve on my committee. I am extremely thankful for all my committee members without whom the document would not be what it is today.

I would also like to thank my husband and my best friend, Garrett, who provided love and support during the times I needed it most. This thesis was completed because of my daughter, Claira Rose. Having her in my life gives me the motivation to overcome great challenges.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLE PAGE

CHAPTER I

INTRODUCTION

Genetics, schools, teachers, geographical regions, etc., all contribute to the development of an individual's intelligence; however, there also may be other factors besides intelligence that influence one's performance on intelligence tests. The most accessible way to assess for intelligence for adults today is the Wechsler Adult Intelligence Scale (WAIS-IV), as this test claims to give an accurate analysis of one's measured IQ based on maximal performance; however, there are external and internal factors that may skew the results of one's Full Scale IQ (FSIQ) because these factors can affect performance on the test. Some of these factors include: how much sleep the test-taker received the night before, appetite, test anxiety, mood, the administrator, etc. The present study proposes that there are other variables present besides intelligence, such as self-efficacy and motivation, that may affect performance on the Wechsler Adult Intelligence Scale (WAIS-IV), thus altering the FSIQ. The overarching research question of this experiment is, "Can an administrator alter the FSIQ by maximizing self-efficacy and motivation?"

Intelligence

Intelligence tests were first developed in the 19th century by Sir Francis Galton, who tested gifted individuals to assess natural mental abilities (Silva, 2008). However, during the 20th century, the most significant intelligence test was created by Alfred Binet, it is used as the foundation for cognitive ability tests today (Cherry, 2019). Binet was commissioned by the French government to identify students who would excel in school and those who needed additional assistance (Cherry, 2019). Binet and his colleague, Theodore Simon, began developing questions that could predict how well a student would do in academic challenges.

Themes of the test included attention span, memory, problem solving, and subjects learned in school (Cherry, 2019). Binet discovered that some children struggled to answer questions that were designed for their developmental age and other children excelled on questions that were well beyond what was expected (Cherry, 2019). Based on this discovery, he advocated for a measure of intelligence to be established by the average cognitive abilities compared to children in the same age group (Cherry, 2019). This instrument became known as the Binet-Simon Scale. Nonetheless, even Binet recognized the limitations of the test and had stated that intelligence should not be based on a single number because scores can fluctuate over time, are dependent on many factors, and should only be compared to those who have similar backgrounds (Cherry, 2019).

The Binet-Simon scale gained great attention when it came to the United States. Lewis Terman, a Stanford University psychologist, revised the scale by standardizing it to compare the scores to American participants in 1916 (Cherry, 2019). The scale became known as the Stanford-Binet Intelligence Scale, which was the standardized intelligence test in the United States and is still widely used today despite multiple revisions since its original development (Cherry, 2019). The event most attributed to the popularity of intelligence psychometrics was the testing program initiated by the U.S army during World War I in order to determine how psychologically fit recruits were for service (Boake, 2002). This intelligence test had two versions: Group Examinations Alpha and Beta (Boake, 2002). Group Examination Alpha was a written test administered to literate English speakers while Group examination Beta was comprised of pictures administered to minorities who were illiterate and/or not fluent in English (Boake, 2002). This intelligence test was administered to 1,726,966 army recruits from 1917 to 1919 in order to determine which soldiers were the most suited and capable for various positions

in the army (Boake, 2002). Despite its original acclaim, this intelligence test led to erroneous generalizations against entire populations, but psychologists continue to use the Stanford-Binet Intelligence Scales today, now in the fifth edition, as a measure of intelligence.

In 1939, the Wechsler-Bellevue Intelligence Scale was published by David Wechsler, an American psychologist, because he was discontent with the limitations of the Stanford-Binet Scale as he believed intelligence is influenced by multiple factors rather than a single concept (Cherry, 2019). The Wechsler-Bellevue Intelligence Scale was based on the Stanford-Binet Scale, but it was the first intelligence to also include verbal as well as performance scales, introduce subtest scale profiles, and produce multiple IQ scores (Silva, 2008), not just a single total IQ score. Wechsler defined intelligence as "the capacity to act purposefully, to think rationally, and to deal effectively with the environment" (Wechsler, 1944, p. 3), and he viewed intelligence as a multidimensional construct (Silva, 2008). There have been several revisions since the original Wechsler-Bellevue Intelligence Scale, and it is now known as the Wechsler Adult Intelligence Scale-fourth (WAIS) currently in the fourth edition. The WAIS-IV consists of 10 subtests that tap a variety of cognitive abilities such as abstract reasoning, verbal skills, perceptual reasoning and processing speed.

There are various theories regarding the development of IQ, but the general consensus in the field is that both environment and genetics play important roles. According to Borkowski et al. (1997), maternal IQ is a dominant factor in predicting a child's cognitive functioning, and twin and adoption studies largely conclude that genes predominantly determine intellectual skills. However, although the heritability of intelligence is significant, it does not rule out the impact of the environment. Heritability has been found to account for between 40% (Petrill, 2001) to 50% (DiLalla, 2000) of the composition of intelligence, whereas environmental factors

have been found to contribute between 50% (DiLalla, 2000) to 60% (Petrill, 2001). In other words, individuals have a predetermined innate cognitive ability range, but they must develop, bolster, and reinforce their cognitive skills to tap into the full potential of their intelligence.

Lev Vygotsky, an influential social psychologist, speculated that the development of cognitive abilities occurs based on a child's social interaction with others (Vygotsky, 1978). A child observes how others behave, rationalize, and problem solve which they internalize and then replicate when facing similar situations. Another determinant of IQ that has been gaining popularity in research is the quality of mother-child interactions during infancy (DiLalla, 2000). Parents who are perceptive of developmental milestones and cognitive abilities are able to cultivate the progression of cognitive growth by introducing new tasks and concepts that build on the already learned skills of the child, a process which is known as scaffolding (DiLalla, 2000). Studies show that maternal scaffolding can positively influence cognitive abilities, specifically by enhancing verbal and nonverbal skills (DiLalla, 2000).

Personality factors have also been recently researched, and it has been found that certain personality attributes are associated with the growth of intelligence. Woo theorizes that individuals who rank high in 'openness to experience' on the Big Factor 5 personality traits scale generally will seek out abilities that stimulate their mind and exhibit more behaviors that support cognitive development (Woo, Saef, & Parrigon, 2015). In contrast, those who rank low on 'openness to experience' are likely to be resistant to new opportunities and generally will not seek out experiences that will develop intellectual stimulation (Woo, Saef, & Parrigon, 2015). DeYoung (2014) also found a consistent correlation between intellect and openness to experience when studying the relationship between The Big 5 personality traits and cognitive ability. Two other personality factors that are theorized to contribute to intelligence are curiosity

and motivation. Berg and Sternberg (1985) also found similar findings that suggest curiosity and motivation reinforce cognitive development because the motivational component is manifested through curiosity which will drive an individual to explore new stimuli and have new experiences (Trudewind, 2000) that stimulate cognitive skills, thus increasing intelligence.

Intelligence is generally conceptualized as being multi-faceted, but the two main distinguishers are fluid and crystalized intelligence. Cattell defines fluid intelligence, also known as cognitive mechanics, as the ability to recognize new rules and understand new concepts in novel problem-solving domains (Cattell, 1963). Fluid intelligence requires the adaptation to new situations (Geary et al, 2019), and it is a basic cognitive process that utilizes reasoning ability that generates, transforms, and manipulates information in real time to understand new ideas, experiences, and problems (Zaval, 2015). It is measured mostly by using memory tasks, problem solving tasks, or perceptual speed tasks (Zaval, 2015). In the WAIS-IV, the subtests that primarily measure these domains are Block Design, Digit Span, Matrix reasoning, Symbol Search, Visual Puzzles, and Coding. This study focused specifically on the Block Design subtest, which is a type of puzzle that requires problem solving skills, spatial reasoning, and fine-motor skills. The Block Design was chosen for this experiment because it assesses fluid intelligence and it is the first subtest of the intelligence test which allowed procedures to be uniform.

Crystalized intelligence involves a type of cognition that utilizes stored knowledge and long-term memory to solve problems, identify facts and terms, and aid in reading comprehension. This cognitive process uses past experiences to recognize patterns and information in problems based on learned information to help solve conundrums (Kruse, Smchmitt, 2001). The WAIS-IV subtests that primarily measure crystalized intelligence are Vocabulary, Similarities, Information, and Arithmetic.

Although impacted by different factors, crystallized intelligence and fluid intelligence are not independent of each other, and most tasks require both crystalized and fluid intelligence to adequately solve problems. For instance, the Arithmetic subtest requires testers to use their memory and problem solving cognitive skills, but also involves drawing from past experiences and learned information to solve the problem. Here is an example of an arithmetic problem that is similar to one on the WAIS-IV: A jogger runs Monday through Friday for 45 minutes. On Saturday and Sunday, the jogger runs for 55 minutes. How many minutes does the jogger run in one month? The administrator reads the problem to the tester, so the tester must remember the details of the problem as they are solving it which must be done within a 30 second timeframe. This type of problem requires a joint utilization of crystallized and fluid intelligence because the tester is using crystallized intelligence by utilizing their stored knowledge of multiplication and applying fluid intelligence by modifying problem-solving strategies to solve the problem within the time limit. Although most of the subtests require both types of cognitive abilities, some subtests examine one type of intelligence more than the other, i.e., the Block Design subtest heavily relies on fluid intelligence to accomplish the tasks of recreating a design from the stimulus book with one-color or two-color blocks within a time limit.

Self-Efficacy

Self-efficacy is defined as the perceived ability to accomplish behaviors, tasks, and goals. (Bandura, 2010). People can vary in levels of self-efficacy, and it can change over time; therefore, events in one's life can alter levels of self-efficacy, i.e., attending college can increase one's confidence or self-efficacy in a specific field. However, Bandura (2000) theorizes that unless individuals believe they can produce desired effects, they will have little motivation to attempt activities or persevere during difficulties. High self-efficacious individuals are more

likely to maintain commitment to goals, endure efforts when faced with failure, and develop a perception of control while approaching difficult situations. This type of mentality will aid in increasing an individual's satisfaction by increasing the likelihood of accomplishments and decreasing the likelihood of stress and depression (Bandura, 2010). When a person has lower levels of perceived self-efficacy, they tend to view challenges as personal threats, so they often choose to not partake in difficult tasks (Bandura, 2010). They tend to have the opposite perspective of a person with high perceived self-efficacy, so these individuals are characterized as having difficulty attaining goals because they have short drive, weak commitments, and low ambition (Bandura, 2010). Rather than focusing on how they can succeed when a challenge arises, they will fixate on personal shortcomings which increases anxiety over adverse outcomes thus affecting performance (Bandura, 2010). They generally maintain minimal grit when challenges arise and will struggle to return to their normal emotional state after failures, which impacts their motivation in the future. Minimal aversive experiences can cause this type of individual to lose faith in their capabilities, so they are at higher risk for stress and depression (Bandura, 2010).

Self-efficacy levels may correlate with IQ scores because the tester's self-efficacy can affect their motivation to persist through the hurdles of the intelligence test. A tester with low self-efficacy, it is believed, will be more likely to not sustain a high level of mental effort as they encounter difficulty and fatigue. However, a tester who has high self-efficacy will perceive the problems as a challenge and possess high motivation to solve the problems and persist during the intelligence test.

When presented with the question "Can self-efficacy be developed?," Bandura proposed that there are sources of influence that can bolster self-efficacy. The first and most effective way

to develop self-efficacy is through experiences of mastery or proficiency. Successes can aid one's belief that they can overcome obstacles; whereas, failures and especially repeated failure can deter the belief before self-efficacy is established (Bandura, 2010). Individuals generally need to experience an overcoming of obstacles through persevered effort to maintain a sense of self-efficacy (Bandura, 2010). The second way of developing and maintaining self-efficacy is through vicarious experiences of others (Bandura, 2010). This means that observing others who are similar to oneself tenaciously succeeding will increase the observers' belief that they too possess the capabilities to accomplish comparable tasks (Bandura, 2010). Contrarily, observing someone fail despite high efforts can undermine self-efficacy of the observer. The more similarities between observer and model, the greater the influence on self-efficacy; correspondingly, minimal similarities between observer and model will lower the significance of self-efficacy.

Another way to inflate self-efficacy is through social persuasion in which people can instill a sense of self-efficacy in others by expressing to them that they possess the capabilities to overcome an activity or task (Bandura, 2010). Social persuasion can increase self-efficacy and lead people to try to succeed which can promote the development of a particular skill (Bandura, 2010). The last influence Bandura describes that can develop self-efficacy is to minimize stress and negative emotional states while facing challenging situations (Bandura, 2010). The intensity of emotional and physical reactions is important as well as how the reactions are perceived and interpreted. Highly self-efficacious people perceive the state of arousal as an energizing facilitator of performance; whereas, those with lower levels of self-efficacy interpret emotional arousal as debilitating (Bandura, 2010). For example, individuals experiencing strong emotions manifested through physical changes such as increased heart-rate, faster breathing, and sweating

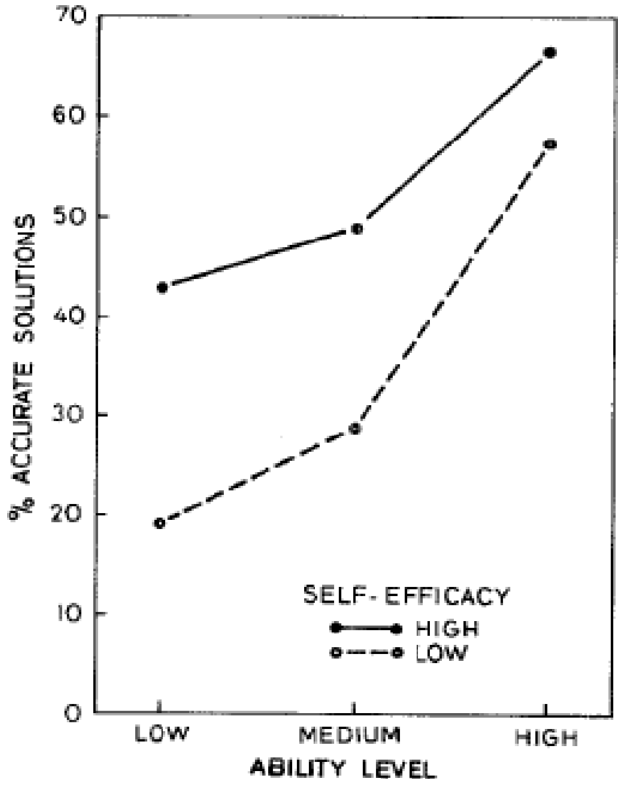
who label this type of arousal as excitement are likely to be more highly self-efficacious; whereas individuals who view this as anxiety are likely to be less self-efficacious because their negative interpretation of their arousal could negatively impact their performance. The present study focused on two of these strategies to induce the perception of self-efficacy during the experiment: participants experiencing mastery and the impact of social persuasion.

There is limited research on the effects of self-efficacy on intelligence tests, however, there is an abundance of research that suggests self-efficacy has a direct impact on academic achievement. Students' self-efficacy about their ability to comprehend academic material can influence their motivation to learn. Schunk (1989) theorized that students who believe they would struggle to understand the material would likely not put forth effort to learn it, whereas those who believed they were capable of learning the material felt more efficacious which resulted in putting in the work to learn the material. A higher sense of self-efficacy led students to outperform those who believed they did not have the capacity to handle the demands of the new material (Schunk, 1989). As students are learning the material, they are accumulating information that may suggest they are learning adequately. This will cause their self-efficacy and motivation to increase (Schunk,1991). However, if the students gathered information that suggested otherwise, their self-efficacy and motivation may decrease unless they can adapt their approach and find a new way to adequately learn the material (Schunk, 1991). Furthermore, Collin (1982) evaluated the relation between accuracy of solutions to mathematical problems and self-efficacy or ability, and it was found that students who were more self-efficacious were quicker to adjust faulty strategies. These student participants performed better than those who were not self-efficacious. The study showed that participants performed poorly on the problems

because they either did not possess the skills to solve the problem or they had the skills but lacked the confidence to utilize the skills (See figure 1).

Figure 1

Means of Mathematical Solutions



Means of mathematical solutions achieved by mathematical ability and perceived self-efficacy. Adapted from 'Self-efficacy and ability in achievement behavior Paper,' by Collin, 1982 data.

Self-efficacy reflects confidence because it is considered to be a disposition that guides a person to behave in a certain way because of belief in oneself (Stankov, 2008). Individuals who have high confidence levels have characteristics of decisiveness and determination whereas those who score low in confidence show characteristics of doubt in their capabilities (Stankov, 2008). Stankov (2008) states that confidence can be correlated with both crystallized and fluid intelligence because higher confidence is linked with higher accuracy on cognitive ability tasks. Thus, it is likely that self-efficacy also impacts cognitive ability tasks and therefore the performance on intelligence tests.

Success and failure of tasks has also been studied, and it has been found that prior experience of success or failure influences the performance on subsequent tasks. Those who succeed at a prior task perform better on the following tasks on average than those who fail at a task (Feather, 1968), indicating that an individual can generally have an idea of how they are performing on a task. Additionally, failure can lead to further short-comings because it can diminish the sense of self-efficacy.

Repeated failure can impede self-efficacy and cause learned helplessness, which is defined as a condition that can occur when an individual or animal has a sense of powerlessness as a result from prolonged trauma or repeated failure, which can negatively affect motivation, cognitive beliefs, and behaviors (Maier & Seligman, 1976). If an individual has low levels of self-efficacy levels, then it is to be expected that they have high levels of learned helplessness and vice versa. Therefore, it may be easy to diminish self-efficacy in a task because even minimal failure can result in the reduction of one's confidence and escalate a sense of learned helplessness. According to the reformulated learned helplessness model, a helpless or pessimistic explanatory style, in which individuals explain uncontrollable aversive situations by blaming self

and believing negative events will occur indefinitely, may experience an increase of depression, loneliness, and physical illness (Schill, 1998).

Another similar construct to self-efficacy is mindset, which is defined as how one perceives their own abilities, which can also impact performance (Dweck, 2015). There are two main types of mindset: growth mindset and fixed mindset. The growth mindset is characterized by understanding that traits can be developed and perceiving obstacles as challenges that develop learning experiences, whereas a fixed mindset is characterized by identifying traits and abilities as established and therefore unable to be improved, changed, or learned. For instance, a student who views their mathematical abilities as innate may say something along the lines of, "I just stink at math," which indicates a fixed mindset. Conversely, a student who believes hard work and dedication can improve their math skills possesses a growth mindset. Dweck (2015) found that mindset plays a primary role in motivation and achievement and discovered that students who had a growth mindset outperformed the students who had a fixed mindset. Individuals who view the tasks on the intelligence tests as a challenge and something they can learn from have a growth mindset, but those who simply give up because they believe they cannot accomplish the task may have a fixed mindset. Therefore, it is expected that individuals who have a growth mindset will most likely outperform those who have a fixed mindset on the WAIS-IV.

Similar to a growth mindset, a mastery-oriented adaptive motivational pattern is characterized by "challenge seeking and high, effective persistence in the face of obstacles" (Dweck, 1986, p. 1040). Individuals who possess this adaptive motivational pattern are likely to enjoy challenges and exerting effort to overcome obstacles (Dweck, 1986). In contrast, the maladaptive or helpless motivational pattern is characterized by avoidance, low effort, and minimal persistence during difficult challenges (Dweck, 1986). This pattern is also accompanied

with negative affect such as anxiety and negative self-talk in the face of difficulties (Dweck, 1986). These two motivational processes impact the success on cognitive tasks (Dweck, 1986). The maladaptive motivational processes severely impeded success, whereas mastery oriented adaptive style seemed unphased by challenges and their performance was facilitated by increased challenges (Dweck, 1986). Therefore, these two motivational processes have profound impacts on cognitive performance because it "affects how well individuals can use their existing skills" and "knowledge and how well they can transfer these new skills and knowledge to novel situations" (Dweck, 1986, p. 1046).

Dweck (2015) encourages teachers to use phrases such as "The point isn't to get it all right away. The point is to grow your understanding step by step. What can you try next?" to develop a growth mindset in their students on cognitive tasks. Similar statements could be implemented on the WAIS-IV administration to further induce a growth mindset and influence how the tester views the tasks on the intelligence test. Intelligence tests do utilize some techniques to maximize motivation in test takers. For example, directions from the Third Edition of the Wechsler Intelligence Scale for Children (WISC-III) manual suggests, "If the child says that he or she cannot perform a task or cannot answer a question, encourage the child by saying, 'Just try it' or 'I think you can do it. Try Again.'" (Duckworth, Quinn, Lynam, Loeber, et. al, 2011). However, these statements have since been omitted and thus may have had an impact on motivation in children. This study hopes to include verbal prompts during the self-efficacy experimental group that will increase motivation in the testers.

Motivation

Motivation can be defined as a person's willingness to accomplish a task or why a person does something (Cherry, 2020). Different influencers can motivate people as it can be impacted

by internal factors or external factors. The most significant distinction between types of motivation is intrinsic versus extrinsic. Intrinsic motivation refers to doing something because of an internal reason such as one enjoys the task, and extrinsic motivation refers to doing something because an outside factor is motivating the individual (Ryan et al., 2000). For example, a person might be motivated to finish graduate school because they find the material interesting and earning a degree will lead to a better paying job. In this example, the person is externally motivated by the prospect of getting a better paying job and is internally motivated by their positive feelings.

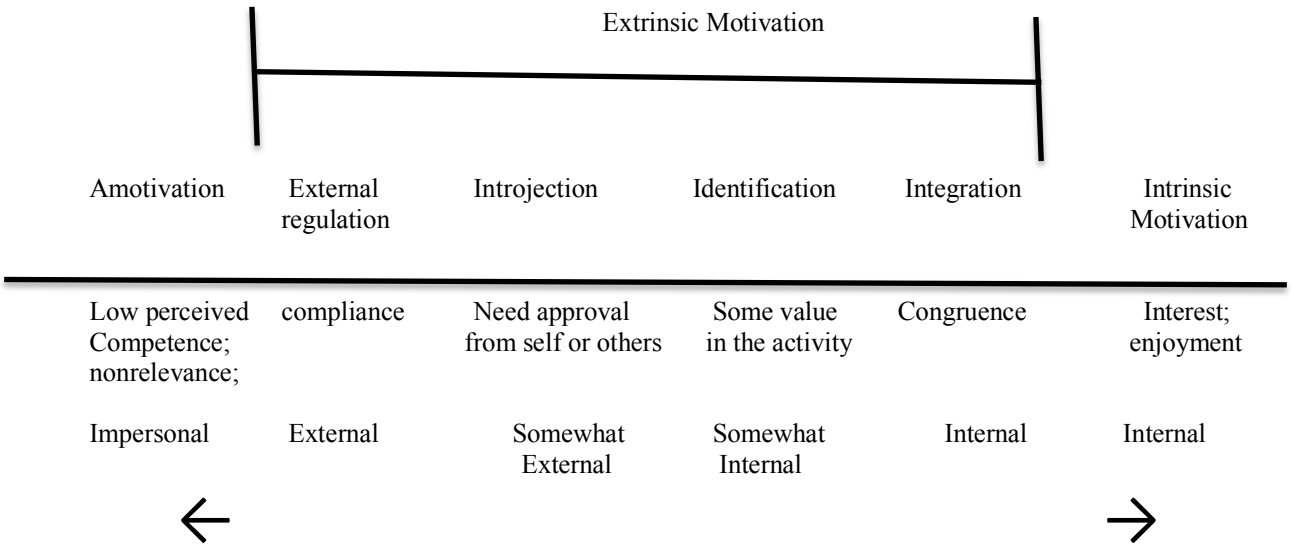
Although intrinsic motivation is an important type of motivation, it transpires less often than extrinsic motivation (Ryan et al., 2000). This is because people tend to place more emphasis on extrinsic motivation because of the responsibilities of roles that generally do not require intrinsically motivated tasks, i.e., occupation, and consequently people generally tend to diminish the importance of personal enjoyment and are extrinsically motivated by society to achieve goals. However, individuals who are extrinsically motivated may perform with resentment, resistance, and disinterest; therefore, intrinsic motivation is generally experienced with more positive feelings than extrinsic motivation.

Motivation is thought to be on a spectrum because there are different variations and degrees of motivation (See Fig. 2). Referring to Figure 2, on the far left is amotivation, which is a state that is characterized by no motivation to act (Ryan et al., 2000). When a person is amotivated their behaviors could exhibit a lack of intentionality: they may feel incompetent, believe there is not a desired outcome, or they do not value the activity (Ryan et al. 2000). To the right of amotivation is external regulation which is a type of extrinsic motivation. External regulation produces the least amount of personal satisfaction and behaviors are purely performed

to satisfy an external demand (Ryan et al., 2000). An example of this is when a student is completing a project merely because of a deadline. Individuals who are externally regulated to do a task typically feel controlled or alienated (Ryan et al., 2000). Another type of extrinsic motivation is introjected regulation. Introjection regulation is a type of internal regulation that motivates people to execute tasks because they want to avoid guilt or anxiety and maintain self-esteem (Ryan et al., 2000). The third kind of extrinsic motivation is identification, which describes a type of internal regulation when the person sees the value in the task and perceives the behavior as his or her own (Ryan et al., 2000). The most autonomous form of extrinsic motivation is integrated regulation because it occurs when a person sees the task or behaviors as fully assimilated to the self (Ryan et al., 2000). This type of motivation shares many commonalities with intrinsic motivation because they are both autonomous and unconflicted, but integrated regulation still has extrinsic motivators such as seeing the instrumental value with respect to some outcomes (Ryan et al., 2000). To the far right of the spectrum is intrinsic motivation which is described as being motivated because it is inheritably enjoyable (Ryan et al., 2000). This type of motivation is self-determined and internal because intrinsic motivation is the type of motivation that propels individuals to act purely based on internal motivators.

Figure 2

Motivation Spectrum



Adapted from 'Intrinsic and extrinsic motivations: Classic definitions and new directions,' by Ryan et al., 2000, p. 61.

Everyone has experienced days when they have an exorbitant amount of motivation to get things done, but on other days they barely have the motivation to get anything done. Why does this occur? Recent findings suggest that there is a causal relationship between motivation and effort. The more effort an individual makes, the more motivated he or she will feel. Furthermore, the more motivated an individual is the more effort he or she will make. Dietrich (2017) conducted a study of 155 student teachers who were asked to record their motivation three times during a 90minute lecture during one semester. Participants were asked how competent they felt, if they understood the material, if they enjoyed the content, and if they found the content useful. Dietrich (2017) found that every single participant in her study experienced extreme fluctuations in motivation in a short time frame of the lecture. This study could be generalized to individuals taking the WAIS-IV because of the similar timeframes (approximately 90 minutes) and sustained mental effort that is necessary to maintain motivation.

Motivation continues to be overlooked because cognitive tests focus on ability rather than other confounding variables such as motivation, but there have been more recent studies on its influence on cognitive ability tests. Studies that have been conducted concur that task motivation can influence academics and test performance, for a lack of motivation contributes to poor performance (Esterman, Reagan, & Liu et al. 2014), and that motivation can also suppress wandering and unrelated task thoughts (Christoff et al., 2009 as cited in Esterman, Reagan, & Liu et al. 2014). Lawrence (1962) conducted a study on how anxiety, task importance, and achievement motivation affected performance on intelligence tests. His findings indicated that participants with high achievement motivation reflect higher scores on intelligence tests regardless of the importance of the task, whereas subjects with low achievement motivation showed poor performance when the task was regarded as high importance (Lawrence, 1962).

Chan (1997) examined the relationship between performance on cognitive ability tests and test-taking motivation and found that test taking motivation has a significant effect on subsequent performance. In other words, subjects who possess lower task motivation will perform worse on the upcoming tasks on a test; whereas, subjects who exhibited higher task motivation performed better on future items. Therefore, performance can be largely attributed to both ability and motivation (Chan 1997).

In order to increase motivation, rewards may be given which have been shown to improve performance by boosting engagement and sustaining attention (Esterman & Michael et al., 2016 & Esterman, Reagan, & Liu et al. 2014). Performance contingent rewards are defined as being given a reward specifically for performing well on a task (Sansone & Harackiewicz, 2000). Performance contingent rewards can enhance intrinsic motivation if the subject perceives the reward as confirmation of their abilities; however, some people view rewards as controlling which will inhibit their intrinsic motivation (Sansone & Harackiewicz, 2000). Esterman et al., (2014) found that subjects who received financial incentives had a greater performance rate than those who did not receive any type of reward. Further, this study found that a financial reward plus feedback informing them of how much money they have accumulated outperformed those who just received a monetary incentive. This occurred because participants who received feedback on how much money they have received are also receiving implicit information on their overall performance. Typically, with the use of performance contingent rewards, the subject will receive feedback on their performance, whether this is explicit feedback from an administrator or implicit feedback by not receiving the reward. If the individual does not receive a reward, he or she may view this experience as negative which may further hinder perceived competence (Sansone & Harackiewicz, 2000) and negatively affect self-efficacy. Additionally, Borghans

(2013) examined the importance of intrinsic and extrinsic motivation on IQ by introducing incentive payments and discovered that when subjects received a financial incentive, they invested more time in answering questions, which increased the overall performance. This means an individual's IQ score is not only reflecting their intelligence (Borghans, 2013) but also other abilities such as motivation. This study also found that subjects wanted to answer questions correctly despite the size of the incentive, thus introducing the idea that an incentive is more important than its monetary value (Borghan, 2013).

Purpose and Significance of this Study

The purpose of this study is to measure the impact of self-efficacy and motivation on the Block Design subtest that could affect the Full-Scale IQ score on the WAIS-IV. As discussed in the literature review, several external and internal factors play a role on how self-efficacy and motivation may influence how well one will do on an intelligence test. This experiment will provide important insight on how self-efficacy and motivation can impact performance on the WAIS-IV, the most frequently utilized adult IQ test. It is believed this research may pave the way for future revisions of intelligence tests and influence how lengthier tests are conducted in general.

Research Questions and Hypothesis

The objective of this study is to determine if intelligence tests, specifically WAIS-IV, accurately depicts intelligence or whether different conditions alter FSIQ scores, as well as observe if an individual's characteristics, particularly self-efficacy and motivation, help determine their FSIQ. Several research questions are addressed through the present study:

- **Research Question 1:** Does increasing test taker's self-efficacy and motivation by the test administrator affect their fluid intelligence scores?
- **Research Question 2:** Does increasing test-taker's perceived self-efficacy on Block Design subtests affect their performance positively?
- **Research Question 3:** Does increasing test-taker's motivation on the Block Design subtest affect performance positively?
- **Research Question 4:** Does administering the WAIS-IV without manipulations result in lower performance on the Block Design?

- **Research Question 5:** Does increasing self-efficacy or increasing motivation result in higher performance?
- **Research Question 6:** Does increasing self-efficacy or motivation on Block Design subtest also impact fluid intelligence on the Matrix Reasoning subtest which will not have manipulation?

It is suspected that an administrator can affect fluid intelligence by increasing scores on subtests that assess fluid intelligence which will impact the overall FSIQ. I assume that increasing self-efficacy or motivation on the Block Design subtest will result in higher performance rates. I assume that the control group, administering the WAIS-IV normally, will result in lower performance on fluid intelligence scales (Block Design subtest and Matrix reasoning subtest) than the experimental groups. I suspect that the Matrix reason subtest, which will not have manipulations, will also be impacted positively on average.

CHAPTER II

METHOD

Research Design

The study conducted is an experimental quantitative study that analyzed primary data to assess the causal relationship of motivation, self-efficacy, and the raw score on the Block Design subtest of the WAIS-IV. The independent variables of the study are self-efficacy and motivation with the dependent variable being means of the scaled scores on Block Design subtest of the WAIS-IV. The experimenter used a between subject design and collected the data through the utilization of the WAIS-IV, General Self-Efficacy Scale, a 40 Item Motivation Questionnaire, and a background survey with open and closed questions. The participants in the control group and the experimental groups took two pretests (the General Self-Efficacy Scale and Motivation Questionnaire) to assess their baseline of self-efficacy and motivation prior to taking the WAIS-IV. The research design consists of three groups: 1) the control, 2) experimental group 1, and 3) experimental group 2. The control group administrators conducted the WAIS-IV without any modifications, the experimental group 1 manipulated the participant's self-efficacy via positive affirmations, and experimental group 2 increased motivation through a financial incentive and knowledge of time limits and value of items during the Block Design subtest. After the completion of the WAIS-IV, the participant completed a background questionnaire (See Appendix F) which included items that assessed their motivation and self-efficacy during the intelligence test. The pretests and postest should support the claim that the study is examining these two concepts (self-efficacy and motivation) are causing an impact on the FSIQ, thus making the experiment internally valid. The experiment results should be generalizable to other adults taking tests, so it is also externally valid. The experimenter applied a Factorial Analysis of

Variance (ANOVA) and a Multivariate analysis of Variance (MANOVA) using SPSS gain results.

Participants

Administrators of the control and experimental groups were derived from the Assessment of Intelligence course from Emporia State University during the Fall 2019 and Spring 2020 semesters. The administrators provided a convenience sample of eight male and 10 female participants that consisted of ages ranging from 20 years old to 58 years old. The study was comprised of three groups (control group, experimental group 1, and experimental group 2) (See Table 1). Each participant was randomly assigned to each group, thus having six participants in each group. The test administrators and participants remained anonymous to the researcher.

Table 1 *Groups:*

Control group	WAIS-IV without modifications
Experimental group 1	WAIS-IV paired with positive affirmations to boost self-efficacy
Experimental group 2	WAIS-IV paired with incentives and knowledge of time limits and points each item is worth to maximize motivation

Instruments

General Self-Efficacy Scale (GSE)

Participants were first given a General Self-Efficacy Scale (See Appendix D), created by Ralf Schwarzer and Matthias Jerusalem in 1995. This scale has high internal consistency reliability and test-retest reliability as Cronbach's alphas coefficient is between .76 and .90 and is shown to be valid (Chen, 2001). The purpose of this scale is to "assess a general sense of perceived self-efficacy with the aim in mind to predict coping with daily hassles as well as adaptation after experiencing all kinds of stressful life events" (Measurement Instrument Database for the Social

Sciences). The scale is comprised of 10 4-pt Likert scale where a 1 rating equals "Not at all" and 4 equals "Exactly True" that is intended for adult participants. The scale should only take the participant less than five minutes to complete.

40 Item Motivation Questionnaire

The Motivation Questionnaire (See Appendix E) was developed by John Horsfield in 2013 to assess motivation as a personality construct through 5 traits (confidence, energy, optimism, discipline, and determination) (Horsefield, 2013). The questionnaire is split up between each trait correspondingly and each section assesses a different area of motivation (Horsefield, 2013). This questionnaire is a 40 item 7-pt Likert scale where a 1 score equals "Very Inaccurate" and a 7 rating equals "Very Accurate" (Horsefield, 2013). Cronbach alpha was .94, so the test shows consistent reliability and validity (Horsefield, 2013). This questionnaire should take the participants around 10 minutes to complete.

Wechsler Adult Intelligence Scale- fourth edition (WAIS-IV)

Following the two pretests, the administrator implemented the Wechsler Adult Intelligence Scale- fourth edition (WAIS-IV), which was released in 2008. This instrument is well-established and highly consistent (Wechsler, 2008). Cronbach's alpha coefficients for subtests in the WAIS-IV range from .87 to .98, so it has adequate test-retest reliability (Wechsler, 2008). The WAIS-IV takes approximately 90 minutes to complete. The purpose of the WAIS-IV is to measure intelligence scales in adults. The scale consists of 10 subtests that yield four scales: Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. The four scales determine the Full Scale IQ.

Background Survey

Participants were given a survey that was developed by the researcher (See Appendix F). The background items assessed relevant information, such as education levels, age, gender, race, etc. The survey concluded with the questions: "How well do you think you did on the intelligence test?" and "Did you feel motivated throughout the intelligence test?" to further compare the participant's level of self-efficacy and motivation during the WAIS-IV.

Procedure

The researcher applied and received IRB approval prior to conducting research. Administrators of the control and experimental groups were derived from the Assessment of Intelligence course from Emporia State University during the Fall of 2019 and Spring of 2020 semesters. Master's level clinical psychology and school psychology students in the class begin to administer WAIS-IV's to participants in November of 2019 during the Fall class and in February of 2020 for the Spring class. Upon reaching out to the professor of the Assessment of Intelligence course, permission was granted to use the students to help with the administration of WAIS-IV's for the experimental and control groups for the study. The students voluntarily administered WAIS-IV's to their participants after receiving permission from the participants to partake in the study. During the duration of the semester, the class is responsible of finding their own participants and conducting a total of 18 WAIS-IV's, so a convenience sampling approach will be used. Participants included family members, peers, students from Emporia State University, individuals from the community, neighbors, etc. The students were not allowed to use participants who could skew the results. This includes students who have taken the Assessment of Intelligence class in the past, students currently in the class, or anyone else who has recently taken a WAIS-IV. The students in this course who volunteered to partake in this study were allowed to choose the participants from their families, students at Emporia State University, community members, etc.

to allow for a variety of participants of this study. The participants were made aware of the purpose of the survey and were informed that the survey and participating in the study is completely voluntary and optional. Participants in the experimental groups and the control group were given the General Self-Efficacy Scale and Motivation Questionnaire as a pretest to measure the participant's baseline of self-efficacy and motivation prior to taking the WAIS-IV. Once the participants completed the assessments, the administrator then conducted the WAIS-IV. The administrators were randomly selected to devise three of the following conditions: control group, increasing self-efficacy experimental group or increasing motivation experimental group. The researcher was randomly assigned the administrators by utilizing envelopes. The researcher placed either control group or experimental group 1 or 2 directions that was enclosed in each envelope. Each envelope contained exactly what the administrator needs to implement the experiment (General Self-Efficacy Scale, 40-item Motivation Questionnaire, Background Survey, gift cards if necessary). The researcher supplied the shuffled envelopes to the professor of the Assessment of Intelligence course to give to the administrators to ensure complete randomization.

The control group first gave the participants the General Self-Efficacy Scale and the 40-item motivation questionnaire. Then they administered the WAIS-IV as the manual suggests, so there was no change to how the administrator gives the intelligence test. The administrators in this group did not give any type of positive reinforcement or statement during the test. After the WAIS-IV was complete, the administrators gave the participants the background questionnaire to complete. Once they completed all of the instruments, the administers placed all of the instruments back inside the envelope to return to the experimenter. This group was compared to the experimental groups.

Administrators in experimental group 1 first gave the participants the General Self-Efficacy Scale and the 40- item motivation questionnaire to complete. Then the administrators implemented positive affirmations to increase perceived self-efficacy during the block design subtest. Administrators gave positive affirmations such as "You are doing a good job," or "The problems are getting more difficult, but I see you are using good strategies to solve them," periodically throughout the test to increase perceived self-efficacy through social persuasion. The administrator socially persuaded the tester that they are performing well on the WAIS-IV which allowed the tester to also believe they are overcoming difficult obstacles. After the WAIS-IV was complete, the administrators gave the participants the background questionnaire to complete. Once they completed all of the instruments, the administrators placed all of the instruments back inside the envelope to return to the experimenter.

Using positive affirmations should not impact the validity and reliability of the test results as doing so is similar to administration of WISC-III, in which administrators used statements such as 'Just try it' or 'I think you can do it. Try Again,' when the child reported that they do not know the answer or indicated that they could not complete the task (Duckworth, et al., 2011). The administrator did not tell the subject if their answer was correct or not during the subtest, so validity or reliability was not obstructed.

Administrators in experimental group 2 first gave the participants the General Self-Efficacy Scale and the 40- item motivation questionnaire to complete. Administrators in the experimental group 2 then introduced a small financial incentive and stated the time limit and how much an item is worth in points during the Block Design subtest to increase motivation. Prior to the subtest, the administrators gave the instructions for Block Design as the manual suggests. Then the administrators stated the instructions for the experimental design which stated

that the participants will receive a small financial incentive if they receive a raw score of at least 55. The administrators gave the time limit and how much each item is worth in points before the subject began each problem. This was implemented in the experiment because it is theorized that time limits/deadlines and introducing a financial incentive regardless of the value may increase extrinsic motivation. Once the subtest was complete, the administrator stated that the subject received a score higher than 55 and the participant received the financial incentive, regardless of their actual raw score. This was predicted to further socially persuade the subject that they are performing well, thus elongating longevity levels of motivation on the subsequent subtests. After the WAIS-IV was complete, the administrators gave the participants the background questionnaire to complete. Once they completed all of the instruments, the administrators placed all of the instruments back inside the envelope to return to the experimenter.

The data from the pretests, the WAIS-IV, and background questionnaire was inputted and stored on SPSS. Both of the pretests utilized precoding so each response had an assigned number, and the tester indicated their response to a question by checking a number. The data was screened for any errors or skipped questions on SPSS. The experimenter conducted three separate ANOVA's and a Multivariate Analysis of Variance (MANOVA) to analyze the means of results.

Chapter III

RESULTS

Research Questions

The first research question tests if increasing motivation and self-efficacy by the test administrators affect test takers' scores of fluid intelligence. The examiner asked self-report questions of levels of motivation and self-efficacy to determine if participants felt motivated and confident about their capabilities during the tasks on the Block Design subtest and if motivation continued throughout the intelligence test. Then the examiner completed an analysis using a Multivariate Analysis of Variance to determine if fluid intelligence was impacted by the conditions on the Block Design subtest and Matrix Reasoning subtest, which assesses fluid intelligence.

The findings of the self-efficacy experimental group were 71% of the participants rated they felt motivated during the Block Design subtest and throughout the intelligence test, and 29% of the participants in the self-efficacy experimental group rated they felt mostly motivated during the Block Design subtest and continued to feel mostly motivated in the following subtests of the intelligence test. The findings of the motivation experimental group were 100% of the participants stated they felt motivated during the Block Design subtest, 83% of the participants stated they felt motivated throughout the intelligence test, and 17% of participants stated they mostly felt mostly motivated during the intelligence test. The findings of the control group were 71% of participants stated they felt motivated during the Block Design Subtest and throughout the intelligence test. However, 17% of the participants stated they felt mostly unmotivated during the Block Design subtest and the mostly unmotivated mindset continued throughout the intelligence test.

The self-efficacy self-report question found that 50% of the participants in the control group stated they felt they did well during the Block Design subtest, 33% stated they did moderately, and 16% reported they did poorly on the Block Design subtest. However, 16% of the participants in the control group felt they did well throughout the intelligence test, 50% concluded they performed poorly, and 33% reported they performed moderately throughout the intelligence test. The findings showed that 50% of the participants in the self-efficacy experimental group stated they completed the tasks in the block design subtest moderately and 50% stated they performed the tasks well, and 50% of the participants stated they did well throughout the intelligence test and 50% stated they did moderately during the intelligence test. The self-reported question showed that 66% of the participants in the motivation group stated they did well during the Block Design subtest and 33% stated they did moderately during the Block design subtest. It also showed that 50% of the participants during the motivation experimental group reported they did well during the intelligence test and 50% stated they performed moderately throughout the intelligence test.

The experimenter conducted a multivariate analysis of variance (MANOVA) to compare the means of the self-reported questions from the background questionnaire, i.e., ratings on how well the participants thought they did on the Block Design subtest and the intelligence test etc. among the self-efficacy experimental, the motivation experimental, and the control groups. There were not statistically significant differences in the conditions and the means of the self-reported question on the Block Design rating, F (8, 24) = 1.10, p = .403; Wilk's $\not\subset$ = 0.538, partial n^2 = 0.27 (See Appendix G).

However, the mean scores for how the participants felt they did on the intelligence test was statistically significant between the self-efficacy and control groups (p = .042), and the

motivation and the control groups (p = .042), but not statistically significant between the motivation and self-efficacy experimental groups(p = 1.00). There was no statistical significance in the mean scores of how well the participants felt they did on the Block Design subtest between the three groups (p = .317). There was not statistical significance between the motivation on the Block design subtest between the three groups (p = 1.00), nor was there statistical significance between the mean scores of motivation throughout the intelligence test (p = .640) (See Appendix H).

The second research question examined the impact of increasing the participant's perceived self-efficacy had on the Block Design subtest scores. To answer this question, the administrators of the self-efficacy experimental group stated positive affirmations during the Block Design subtest to increase perceived self-efficacy then the experimenter conducted an Analysis of Variance (ANOVA) to compare the conditions of the groups to the means of the scaled scores on the Block Design subtest to determine if the self-efficacy group had higher means of scaled scores than the control group. The results depicted that there was no statistical significance between the conditions of the self-efficacy group and the control group Block Design scaled score, F (2,15) = .503, p = .995 n^2 = .06 (See table 4), Tukey's post hoc procedure indicated that the self-efficacy condition (M = 10.33, SD = 1.63) did not do better than those in the control group (M = 10.50, SD = 4.46).

The third research question examined the impact of motivation on performance on the Block Design subtest. To answer this question, the administrators introduced a small financial incentive and stated the time limit and how much an item is worth in points during the Block Design subtest to increase motivation. The researcher then utilized the ANOVA to also compare the conditions of the Motivation experimental group scaled scores to the control group's scaled

scores on the Block Design subtest. The results indicated that there was no statistical significance between the motivation conditions and the control group conditions Motivation condition, F (2,15) = .503, p = .697 n^2 = .06 (See Appendix I), Tukey's post hoc procedure indicated that the motivation group (M = 12.00, SD = 2.76) did not perform better than those in the control group (M = 10.50, SD = 4.46) (See Appendix J). This analysis also answered the fourth question, does the control group have a lower performance rate, because there is no significance between the experimental groups (Self-efficacy experimental group, M = 10.33, SD = 1.63 and Motivation experimental group, M = 12.00, SD = 2.76) and the control group (M = 10.50, SD = 4.46) (See Appendix J).

The same ANOVA analysis could be used to answer the fifth research question which spectates which experimental group would result in higher performance rates; however, there was no significance between the self-efficacy condition (M = 10.33, SD = 1.63) and the motivation condition (M = 12.00, SD = 2.76) scaled scores (See Appendix J).

The sixth research question discusses Matrix Reasoning, which assesses fluid intelligence, which was impacted by the conditions that were introduced during the Block Design subtest. To address this research question, a regression analysis was conducted with Matrix Reasoning scaled scores as the outcome variable and Block
Design scaled scores as the predictor variable. Block Design scaled scores was a significant predictor of Matrix Reasoning scaled scores, β = .58, t (16) = 2.84, p = .012, and accounted for 34% (R^2 = .34) of the variance in Matrix Reasoning Scaled Scores (See Appendix K).

However, an ANOVA test was used to determine if the means of the scaled scores of the Matrix Reasoning subtest are significantly different among the self-efficacy, motivation, and control groups. It was found that there was no statistical significance on the mean scores of

Matrix Reasoning, $F(2,15) = .82$, $p = .46$, $n^2 = .098$ (See Appendix L). Tukey's post hoc procedure indicated that there was not significant difference between Self-Efficacy experimental group (M = 11.33, SD = 2.73), Motivation experimental group (M = 11.17, SD 3.54), or the control group (M = 9.0, SD = 4.15) (See Appendix M).

Chapter IV

DISCUSSION

This study evaluated the effects of self-efficacy and motivation on performance on the WAIS-IV by conducting a quantitative experimental analysis. The purpose of this research was to determine if an administrator could impact the tester's fluid intelligence by introducing different conditions to increase self-efficacy and motivation. However, the results showed that there is little statistical evidence to suggest that self-efficacy and motivation had an impact on the participant's performance on the WAIS-IV during this experiment. Although there is little research on how self-efficacy influences performance on intelligence tests, the results contradict some of the literature that suggests motivation can impact people's performance rates on intelligence tests, e.g., Esterman (2014) found that task motivation can influence academics and test performance, and a lack of motivation contributes to poor performance. Furthermore, Borghans (2013) examined the importance of intrinsic and extrinsic motivation on IQ by introducing incentive payments and discovered that when subjects received a financial incentive, they invested more time in answering questions, which increased the overall performance. However, this study collected opposing findings.

When addressing the first question, "Can an administrator impact fluid intelligence by increasing self-efficacy and motivation?", the results concluded that there is little evidence that self-efficacy or motivation impacts fluid intelligence. However, when comparing the answers on the self-reported questions from the background questionnaire, we found that participants in the self-efficacy experimental group and the motivation experimental group believed they performed better on the overall intelligence test than those in the control group. This is likely due to the conditions of both experimental groups which included positive affirmations stated to the

participants in the self-efficacy group and the motivational group received a gift card, which caused them to believe they received a certain high score during the Block Design subtest. It is surprising that all groups assumed they performed well on the Block Design subtest even though the control group did not introduce factors that increased self-efficacy. Furthermore, participants in the experimental groups did not differ from the control group in relation to their confidence of their abilities on the Block Design subtest despite the conditions that increased self-efficacy and motivation. This may have occurred because the participants in the control group felt they performed well on the Block Design subtest as it is the first subtest of the WAIS-IV and many people find it to be an enjoyable subtest. However, the primary difference between the groups is the self-efficacious feeling throughout the intelligence test. The experimental groups had statistically significant higher self-efficacious feelings than those in the control group. This means that the conditions of the self-efficacy and motivation group impacted the length of their self-efficacious feelings about capabilities and lasted longer than those who were in the control group.

Interestingly, there was not statistical significance between motivation levels of the groups even though the experimental motivation group received a financial incentive, had knowledge of time limits, and were told the value each question is worth in points, which all have been shown to increase motivation (Esterman & Michael et al., 2016 & Esterman, Reagan, & Liu et al. 2014). This contradictory finding shows that a $5.00 gift card and knowledge of time limits and the value of points did not increase motivation in the participants, and perhaps a larger financial incentive is needed. It is noteworthy to mention that individuals who have higher self-efficacy tend to also possess an increased level of motivation (Schunk,1991), which could explain why the self-efficacy experimental group and the motivation experimental group did not

have statistical significance during the Block Design subtest. The possible reason the three groups did not differ in FSIQ mean scores could be because motivation varies and will diminish over time (Dietrich, 2017). Since the intelligence test may take approximately and hour and a half, the tester's motivation could have varied during this time and the conditions of the Block Design subtest in the experimental group did not have lasting effects.

The second research question evaluated the impact of the self-efficacy conditions on performance on the Block-Design subtest, and it was found that there were not statistically significant differences between the mean scaled scores of the three groups. This means that regardless of feeling confident in their abilities, self-efficacy does not impact performance. This finding contradicts previous studies that found that a higher sense of self-efficacy led students to outperform those who believed they did not have the capacity to handle the demands of the new material (Schunk, 1989; & Schunk, 1991).

The third research question assessed the impact of motivation on performance on the Block Design subtest, and it was found that there were no statistical differences between the mean scaled scores of the three groups. This indicates that the three groups did not make a difference in how the tester performed. Furthermore, this shows that despite the level of motivation, the performance of the participant remains generally the same. However, these findings contradict previous studies that show a financial incentive can increase FSIQ scores (Esterman, Michael, et al., 2016).

Fourth, this study evaluated if the control group has a lower performance rate, but this study found that they do not perform worse than the experimental groups. Correspondingly, the fifth question explored which experimental group performed the best but this study found that they performed equally because there were no statistical differences between their performances.

One possible explanation for these findings could be that the testers in the control group may have been motivated by social pressures from the administrators as they could have been a friend or family member. Another explanation could be that the conditions in the experimental group did not impact the participants performance rates.

Finally, the sixth question evaluated the Matrix Reasoning subtest to determine if there was an impact on the scaled scores between the groups. A relationship was found between the Block Design subtest and the Matrix Reasoning subtest that presented that the participants performed relatively equal between the Block Design subtest and the Matrix Reasoning subtest. Nevertheless, when comparing the conditions between the groups, the conditions did not make a difference in performance because one group did not outperform the other. This is a surprising find because even though both subtests are assessing fluid intelligence, the experimental groups had conditions that were attempting to increase tester's performance on the Block Design, but the Matrix Reasoning subtest did not have conditions increasing performance. If the control group had significant differences in scaled scores between the Matrix Reasoning and the Block Design subtest, then we could have concluded that the conditions from the experimental groups during the Block Design subtest impacted Matrix reasoning and possibly fluid intelligence. However, the three groups all had equal differences between Matrix Reasoning and Block design subtests, so this study could not increase performance and alter FSIQ.

So, what does this mean? At the end of the day, it means that the WAIS-IV does a pretty good job of assessing intelligence regardless of the fact that testers are going to have differing levels of motivation and self-efficacy. This study is significant in the psychological field because there is little research on the effects of confounding variables that may impact a person when taking the test, i.e., personality factors. We can see through this study, however, that self-efficacy

and motivation may not have as big of an impact as some might expect and despite having little confidence in abilities and little motivation, one can still perform well on the intelligence test.

Like most studies, this study had limitations that likely impacted the results of the study, for example: most of the participants in the study reported having higher levels of self-efficacy and little research was done on people with low levels of self-efficacy. Likewise, many of the participants reported average to above average motivation levels and only one participant during the study reported they were "mostly unmotivated" while taking the WAIS-IV. Additionally, the study had a limited sample size of 18 with six participants in each group, which drastically impacts the statistical power of the study. Unfortunately, due to COVID-19 quarantine and stay-at-home orders this study was unable to obtain more participants. A larger sample size may be needed to conclude statistical significance between the three groups. It is also possible that the study was limited due to the lack of a controlled environment for administering the test. This may have led to several administrators conducting the tests in environments they felt were best, but were actually impacted by external factors, i.e., distractions, that could have had an impact on this study.

Future studies should contain a larger sample size, have a limited number of (have only a few) administrators, and ensure that the tests are administered in a controlled environment to collect more accurate data. It could also be beneficial to conduct a longitudinal study that follows the participants taking the WAIS-IV (Control group) and the experimental WAIS's (Motivation and Self-Efficacy) six months apart. This would allow the researcher to determine if the conditions make a difference in the participant's performance versus comparing diverse participants with differing FSIQ scores.

In sum, this study cannot conclude that self-efficacy or motivation impacts fluid intelligence or performance rates on the WAIS-IV. It is possible that future studies containing a larger sample size may find different results more in line with the expectations of this study. We hope in the future that further studies will research other confounding variables that may impact performance on intelligence tests; however, researchers conducting these studies should be aware that other variables may not have the impact on intelligence as they initially theorize.

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Appendix A

Institutional Review Board Application

EMPORIA STATE UNIVERSITY™

APPLICATION FOR APPROVAL TO USE HUMAN SUBJECTS

This application should be submitted, along with the Informed Consent Document and supplemental material, to the Institutional Review Board for Treatment of Human Subjects, Research and Grants Center, Plumb Hall 313F, Campus Box 4003. It may also be sent electronically to pfillmor@emporia.edu.

Before approval can be given to use human subjects, you must register with the CITI Program and successfully complete the Human Subject Research (HSR) Course applicable to your discipline. Information and instructions are available at http://www.emporia.edu/research/irb.htm.

Human Subjects Research course was completed on: Date:
If there are multiple investigators, each individual must complete the CITI HSR course.

Name of Principal Investigator(s) (Individual(s) administering the procedures):Stephany Graham

Departmental Affiliation: Clinical Psychology

Telephone: (469) 426-1467 Email address: sparham@g.emporia.edu

Person to whom notification should be sent: Stephany Graham

Mailing Address: 126 W. 15th Ave. Apt 1, Emporia, KS, 66801

Title of Project: THE EFFECTS OF SELF-EFFICACY AND MOTIVATION ON FLUID INTELLIGENCE AND ITS IMPACT ON IQ SCORES

Funding Agency (if applicable): _____

This is a: ☐dissertation ☒thesis ☐class project ☐other research study

Time period for which you are requesting approval (maximum one year): from October 2019 to May 2020. *If the research project extends past the end date requested, you will need to submit a request for a time extension or an annual update. This form is available at www.emporia.edu/research/docs/irbmod.doc.*

Project Purpose *(please be specific)*: The purpose of the study is to measure the impact of self-efficacy and motivation on the Block Design subtest that could affect the Full-Scale IQ score on the WAIS-IV

I. DESCRIPTION OF SUBJECTS:

a. Approximately how many subjects do you expect to recruit for this study? 300
Subject population *(check all that apply)*:

☒Adults ☐Minors (under 18) ☐Young Children ☐Prisoners

☐Disabled ☐Mentally Retarded ☐Mentally Ill ☐Physically Ill

☐Pregnant Women ☐Other:_____

b. For projects conducted in elementary/secondary schools or school settings, **written approval from the appropriate school official must be obtained (principal or building administrator) and attached.** ☒**NA**

What grade are the students in? _____Approximate age of students_____

How many classes are involved?_____
Name of school:_____Location:_____

c. Describe how the participants are to be selected. If you are advertising for participants, include a copy of the proposed advertisement.

All participants will be full-time employees of mid to large sized organizations. I have contacted an executive of a U.S. based staffing agency that has agreed to send the survey to her 80 employee unit. The marketing department at a state university has agreed to take part in the study. A mid-sized training consulting company has agreed to further examine the scale used once IRB approval has been given.

If you are using archival information, you must submit documentation of authorization from applicable organization or entity.

II. PROCEDURES:

a. Describe **in detail** the proposed procedures and benefit(s) of the project. This must be clear and detailed enough so that the IRB can assure that the University policy relative to research with human participants is appropriately implemented. Any proposed experimental activities that are included in evaluation, research, development, demonstration, instruction, study, treatments, debriefing, questionnaires, and similar projects must be described

here. **Copies of questionnaires, survey instruments, or tests should be attached.** (*Use additional page if necessary*.)

The participants will be given two pretests (General Self-Efficacy Scale and 40 item Motivation Questionnaire), the WAIS-IV, and a background survey. Each participant will be randomly assigned to three groups: the control group, increasing motivation experiment group, or increasing self-efficacy experimental group. The control group will take a normal WAIS-IV without any modifications. The experiment group will take a WAIS-IV that is designed to manipulate and increase motivation and self-efficacy through financial incentives, positive affirmations, knowledge of time limits and how much an item is worth in points. The control group will be compared to the experiment group. The main benefit of this experiment is increasing our knowledge of factors, other than ability, may influence performance on intelligence tests.

b. Will questionnaires, tests, or related research instruments not explained in question #II.A. be used? ☐Yes ☒No (*If yes, attach a copy to this application*.)

c. Will the study involve drawing blood or fluids? ☐Yes ☒No

(If yes, attach a detailed description of the procedures that will be followed and precautions and safeguards that will be taken.)

d. Will electrical or mechanical devices be applied to the subjects? ☐Yes ☒No

(*If yes, attach a detailed description of the device(s) used and precautions and safeguards that will be taken.*)

e. If any of the subjects are minors or "vulnerable" (children, prisoners, mentally or physically disabled, pregnant women, physically ill), discuss how their special condition will be handled.

N/a

f. How will the subjects be informed of research findings? Participants will give their email address on the consent forms if they choose to be informed of the results. Once results are collected and analyzed an overview of results will be sent to the email address provided.

III. Confidentiality and Anonymity

a. Explain the procedures for collecting, recording, and storing the data during the study.

The test administrators from the Assessment of Intelligence course will give the instruments back to the researcher. Each assessment will be labeled a number with either experiment group or control group ,i.e., 1C.G. or 2S.E.G. to keep subjects anonymous. The researcher will then gather the data from the website and input it into SPSS.

b. Who will have access to the data during the study? (Access should be limited to protect anonymity of subjects and confidentiality of subject responses.)

The researcher and the administrators.

c. Explain what will happen to the data once the study is completed. How long will the data be kept, how will it be stored and secured, and who will have access to it? How and when will it be destroyed?

The electronic data will be deleted and the hard copy will be destroyed once the study is completed.

IV. Benefits, Risks, and Costs of the Study

a. What are the potential benefits to the subjects, to the field or discipline, or to the University?

The study results will increase the body of knowledge about other variables besides intelligence that are affecting performance on intelligence tests. The information gathered may help future revisions of intelligence tests if we discover other variables are impacting performance.

b. Will compensation (money, extra credit, etc.) be offered to participants? ☒Yes ☐No

If so, how will it be dispersed?

There will be a random drawing for a $25 visa gift card for volunteers to administer the experimental test. Winners will be notified through email that they have won. They will be asked to provide a mailing address that the gift card can be sent. There will also be a financial incentive to motivate participants to maximize performance. A VISA gift card will be given the subjects by the administrators directly after the block design subtest.

c. What risks or discomforts are most likely to be encountered by the subjects? Please consider carefully.

☐employability	☐deception	☐embarrassment
☐financial or personal reputation	☐criminal or civil liability	☐loss of confidentiality
☒emotional stress or discomfort	☐psychological stress or discomfort	
☐physical stress or discomfort	☐other (explain below)	

d. Are there any possible emergencies which might arise in utilization of human participants in this project? ☐Yes ☒No (*If yes, details of these emergencies should be provided here*.)

What safeguards will be used to eliminate or minimize these risks?

e. In your opinion, does the research involve **more than minimal risk** to subjects? ("Minimal risk" means "the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, then those ordinarily encountered in daily life or during the performance of routine or psychological examinations or tests.") ☐Yes ☒No

V. Informed Consent: (Not needed for exempt review)

Unless authorized by the IRB, no investigator may involve a human being as a subject in research under the auspices of the University unless informed consent has been obtained from the subject or the subject's legally authorized representative.

Attach a copy of the informed consent document, as it will be used for your participants.

a. Explain the procedures that will be used to obtain consent.

b. Federal regulations state that the following elements should be provided to each subject. Check each element that is included in your consent document.

☒An explanation of the purpose of the project and the expected duration of the subject's participation.

☒An explanation of the activities or procedures to be followed.

☒A description of any risks or discomforts to the subject.

☒A description of any benefits of the project to the subject or to others.

☒A statement that participation is voluntary and the subject may withdraw at any time.

☒A statement describing the extent to which confidentiality of records identifying the subject will be maintained.

☒An explanation of whom to contact with questions regarding the study.

Explain a request for waiver of any component listed above or other special conditions related to informed consent.

INVESTIGATOR'S ASSURANCE: I certify that the information provided in this request is complete and accurate. I understand that as Principal Investigator I have ultimate responsibility for the protection of the rights and welfare of human participants and the ethical conduct of this research protocol. I agree to comply with all of ESU's policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human participants in research, including, but not limited to, the following:

- The Belmont report, *Ethical Principles and Guidelines for the Protection of Human Subjects and Research*
- The project will be performed by qualified personnel according to the research protocol.
- I will maintain a copy of all questionnaires, survey instruments, interview questions, data collection instruments, and information sheets for human participants.
- I will promptly request approval from ESU's IRB if any changes are made to the research protocol.
- I will report any adverse events that occur during the course of conducting the research to the IRB within 10 working days of the date of occurrence.
- I have read and I understand the ESU Guidelines for Research, Demonstration and Related Activities Involving Human Participants.

_____ _____

Signature of Principal Investigator* Date

FACULTY ADVISOR'S/INSTRUCTOR'S ASSURANCE: By my signature on this research application, I certify that the student investigator is knowledgeable about the regulations and policies governing research with human participants and has sufficient training and experience to conduct this particular study in accord with the approved protocol. In addition,

- I agree to meet with the student investigator on a regular basis to monitor study progress.

- Should problems arise during the course of this study, I agree to be available, personally, to supervise the principal investigator in solving them.
- I understand that as the faculty advisor/instructor on this project, I will be responsible for the performance of this research project.

_____

Printed name of faculty advisor/instructor on project (if applicable)

_____ _____

Signature of faculty advisor/instructor on project * Date

**If application is sent electronically, you must also send either a hard copy of the signature page, or a scanned copy of the original signatures.*

Appendix B

Consent Form for Students in the Assessment of Intelligence Course

INFORMED CONSENT DOCUMENT

The following information is provided so that you can decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you will not be subjected to reprimand or any other form of reproach. Likewise, if you choose not to participate, you will not be subjected to reprimand or any other form of reproach.

Before you decide to participate during in the study, it is important to understand why the research is being conducted and what the process will involve. Please read the following information carefully.

The purpose of the study is to examine the impact of self-efficacy and motivation on intelligence tests. I am asking the students of the Assessment of Intelligence course to conduct experimental Wechsler's Adult Intelligence Scale -edition four on participants of your choosing. Participants may include family members, peers, students from universities including Emporia State University, individuals from the community, neighbors and etc. The participants cannot skew results in anyway, so participants cannot be individuals who have taken the Assessment of Intelligence course in the past, students currently in the class, or anyone who has taken a WAIS-IV within the past 6 months. Participants must also be 18 years or older. The experimental WAIS-IV will take 20-30 minutes longer than a normal WAIS-IV.

The students choosing to administer the experimental WAIS's and the participants will remain anonymous to the researcher. The scores will be compiled into SPSS and will not be linked to you or the participant. The results of the study will be used for scholarly purposes only and will not impact your grade in the Assessment of Intelligence course.

If you choose to participate in the study, you will have the option to enter for a drawing of 1 of 2 $25 Visa gift cards. If you win, you will be notified through the email address you provide to enter the drawing. Individuals who choose to participate can also include on their resume that they were a part of conducting research during their time at Emporia State University. I will be sending information regarding the results of the study to your email after the results have been analyzed.

If you have any questions or concerns, please contact Stephany Graham, at sparham@g.emporia.edu.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

______________________________________ ____________________________

Subject Date

Email address: ____

Appendix C

Consent Form for Participants of the Experiment

INFORMED CONSENT DOCUMENT

Before you decide to participate during in the study, it is important to understand why the research is being conducted and what the process will involve. Please read the following information carefully.

The purpose of the study is to examine the impact of self-efficacy and motivation on intelligence tests. I am asking the students of the Assessment of Intelligence course to conduct experimental Wechsler's Adult Intelligence Scale- edition four on participants of their choosing. If you are reading this consent form then you have been selected to be a part of the experiment. However, you will remain anonymous to the researcher and you are free to choose to not participate in the study or withdraw at any time. If you decide to not participate or withdraw, you will not be reprimanded in anyway. The experimental WAIS will take 20-30 minutes longer than a normal WAIS. The experiment will not cause discomfort in anyway, and you will remain anonymous to the researcher.

If you choose to participate in the study, you will have the opportunity to earn a $5 VISA gift card during the Block design test. If you win, you will be given the VISA gift card immediately after you finish the Block Design subtest. The administrator will give more information and directions before you take the Block Design Subtest. If you wish to know the results of the study please provide your email address below, and once results are analyzed you will be informed through your email.

If you have any questions or concerns, please contact Stephany Graham, at sparham@g.emporia.edu.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

_____ _____

Subject Date

Email address: _____

Appendix D

Self-Efficacy Instrument

GENERAL SELF-EFFICACY SCALE

For each statement, circle the score in the column that best describes you (based on the above scale). Please answer questions as you actually are (rather than how you think you should be), and don't worry if some questions seem to score in the 'wrong direction'.

Not at all	Rarely	Sometimes	Often	Very often
1	2	3	4	5

I can always manage to solve difficult problems if I try hard enough.	1	2	3	4	5
If someone opposes me, I can find the means and ways to get what I want.	1	2	3	4	5
It is easy for me to stick to my aims and accomplish my goals.	1	2	3	4	5
I am confident that I could deal efficiently with unexpected events.	1	2	3	4	5
Thanks to my resourcefulness, I know how to handle unforeseen situations	1	2	3	4	5
I can solve most problems if I invest the necessary effort.	1	2	3	4	5
I can remain calm when facing difficulties because I can rely on my coping abilities.	1	2	3	4	5
When I am confronted with a problem, I can usually find several solutions	1	2	3	4	5
If I am in trouble, I can usually think of a solution.	1	2	3	4	5
I can usually handle whatever comes my way.	1	2	3	4	5

Appendix E

Motivation Questionnaire

	1: Very Inaccurate	2: Moderately Inaccurate	3: Quite in-accurate	4: Neither Inaccurate nor Accurate	5: Quite Accurate	6: Moderately Accurate	7 : Very Accurate
Q 1: I believe in what I do	O	O	O	O	O	O	O
Q 2: I lack belief in myself,	O	O	O	O	O	O	O
Q 3: I can Handle tasks smoothly.	O	O	O	O	O	O	O
Q 4: I don't know my potential	O	O	O	O	O	O	O
Q 5: I can come up with good solutions	O	O	O	O	O	O	O
Q 6: I know how to get things done	O	O	O	O	O	O	O
Q 7: I have little to contribute.	O	O	O	O	O	O	O
Q 8: I can misjudge events.	O	O	O	O	O	O	O
Q 9: I enjoy order	O	O	O	O	O	O	O
Q 10 : Leave my belongings around.	O	O	O	O	O	O	O
Q 11: I love order and regularity.	O	O	O	O	O	O	O
Q 12 : Am not bothered by messy people	O	O	O	O	O	O	O
Q 13: Want everything to be "just right."	O	O	O	O	O	O	O
Q 14: Do things according to a plan.	O	O	O	O	O	O	O

Q 15: Am not bothered by disorder	O	O	O	O	O	O	O
Q 16: Often forget to put things back in their proper place.	O	O	O	O	O	O	O
Q 17: Work hard..	O	O	O	O	O	O	O
Q 18: Am not highly motivated to succeed.	O	O	O	O	O	O	O
Q 19: Plunge into tasks with all my heart.	O	O	O	O	O	O	O
Q 20 : Do just enough work to get by.	O	O	O	O	O	O	O
Q 21: Do more than what's expected of me.	O	O	O	O	O	O	O
Q 22: Set high standards for myself and others.	O	O	O	O	O	O	O
Q 23: Put little time and effort into my work.	O	O	O	O	O	O	O
Q 24: Leave others to do work for me.	O	O	O	O	O	O	O
Q 25: Postpone decisions.	O	O	O	O	O	O	O
Q 26: Am always prepared.	O	O	O	O	O	O	O
Q 27: Find it difficult to get down to work.	O	O	O	O	O	O	O
Q 28: Start tasks right away.	O	O	O	O	O	O	O
Q 29 : Need a push to get started.	O	O	O	O	O	O	O
Q 30: Get to work at once.							

	O	O	O	O	O	O	O
Q 31 : Have difficulty starting tasks.	O	O	O	O	O	O	O
Q 32 : Carry out my plans.	O	O	O	O	O	O	O
Q 33: Avoid mistakes.	O	O	O	O	O	O	O
Q 34: Choose my words with care.	O	O	O	O	O	O	O
Q 35: Jump into things without thinking.	O	O	O	O	O	O	O
Q 36: Stick to my chosen path.	O	O	O	O	O	O	O
Q 37: Think out a cause of action.	O	O	O	O	O	O	O
Q 38: Make rash decisions.	O	O	O	O	O	O	O
Q 39: Rush into things.	O	O	O	O	O	O	O
Q 40: Act without thinking.	O	O	O	O	O	O	O

Appendix F

Background Questionnaire

Please answer the following questions about yourself.

1. Gender:

   A) Male

   B) Female

2. How old are you? _____

3. Did you go to college?

   A) Yes

   B) No

4. Race/ Ethnicity: _____

5. Is English your first language?

   A) Yes

   B) B) No

6. Did you go to…

   A) Homeschooled

   B) Private school

   C) Public school

7. How well do you think you did on the Block Design subtest?

   A) Well

   B) Moderate

   C) Poorly

8. How well do you think you did on the Intelligence test overall?

    A) Well

    B) Moderate

    C) Poorly

9. Did you feel motivated to do your best on the Block Design subtest?

    A) Yes, I felt motivated throughout the test

    B) No, I did not feel motivated during the test

    C) I mostly felt motivated throughout the test

    D) I mostly felt unmotivated throughout the test

10. Did you feel motivated to do your best throughout the intelligence test?

    A) Yes, I felt motivated throughout the test

    B) No, I did not feel motivated during the test

    C) I mostly felt motivated throughout the test

    D) I mostly felt unmotivated throughout the test

Appendix G

Multivariate Test Table

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.928	38.454[b]	4.000	12.000	.000	.928
	Wilks' Lambda	.072	38.454[b]	4.000	12.000	.000	.928
	Hotelling's Trace	12.818	38.454[b]	4.000	12.000	.000	.928
	Roy's Largest Root	12.818	38.454[b]	4.000	12.000	.000	.928
Method	Pillai's Trace	.521	1.145	8.000	26.000	.368	.260
	Wilks' Lambda	.538	1.090[b]	8.000	24.000	.403	.266
	Hotelling's Trace	.749	1.030	8.000	22.000	.444	.272
	Roy's Largest Root	.549	1.784[c]	4.000	13.000	.192	.354

a. Design: Intercept + Method

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Appendix H

Multiple Comparisons Table

Multiple Comparisons

LSD

Dependent Variable	(I) Method	(J) Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SE_BD_Rating	Self-Efficacy Conditions	Motivation Conditions	.1667	.37019	.659	-.6224	.9557
		Control Group	-.1667	.37019	.659	-.9557	.6224
	Motivation Conditions	Self-Efficacy Conditions	-.1667	.37019	.659	-.9557	.6224
		Control Group	-.3333	.37019	.382	-1.1224	.4557
	Control Group	Self-Efficacy Conditions	.1667	.37019	.659	-.6224	.9557
		Motivation Conditions	.3333	.37019	.382	-.4557	1.1224
SE_FSIQ_Rating	Self-Efficacy Conditions	Motivation Conditions	.0000	.37515	1.000	-.7996	.7996
		Control Group	-.8333*	.37515	.042	-1.6330	-.0337
	Motivation Conditions	Self-Efficacy Conditions	.0000	.37515	1.000	-.7996	.7996
		Control Group	-.8333*	.37515	.042	-1.6330	-.0337
	Control Group	Self-Efficacy Conditions	.8333*	.37515	.042	.0337	1.6330
		Motivation Conditions	.8333*	.37515	.042	.0337	1.6330
Motivation_BD_Rating	Self-Efficacy Conditions	Motivation Conditions	.3333	.32203	.317	-.3531	1.0197
		Control Group	.0000	.32203	1.000	-.6864	.6864
	Motivation Conditions	Self-Efficacy Conditions	-.3333	.32203	.317	-1.0197	.3531
		Control Group	-.3333	.32203	.317	-1.0197	.3531
	Control Group	Self-Efficacy Conditions	.0000	.32203	1.000	-.6864	.6864
		Motivation Conditions	.3333	.32203	.317	-.3531	1.0197
Motivation_Test_Rating	Self-Efficacy Conditions	Motivation Conditions	.1667	.34960	.640	-.5785	.9118
		Control Group	.0000	.34960	1.000	-.7452	.7452
	Motivation Conditions	Self-Efficacy Conditions	-.1667	.34960	.640	-.9118	.5785
		Control Group	-.1667	.34960	.640	-.9118	.5785
	Control Group	Self-Efficacy Conditions	.0000	.34960	1.000	-.7452	.7452
		Motivation Conditions	.1667	.34960	.640	-.5785	.9118

Based on observed means.
The error term is Mean Square(Error) = .367.

*. The mean difference is significant at the .05 level.

Appendix I

ANOVA table

ANOVA

MR_Scaled_Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.333	2	10.167	.819	.460
Within Groups	186.167	15	12.411		
Total	206.500	17			

Appendix J

Multiple Comparisons Table

Multiple Comparisons

Dependent Variable: BD_Scaled_Scores

Tukey HSD

(I) Method	(J) Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Self-Efficacy Conditions	Motivation Conditions	-1.66667	1.83081	.642	-6.4221	3.0888
	Control Group	-.16667	1.83081	.995	-4.9221	4.5888
Motivation Conditions	Self-Efficacy Conditions	1.66667	1.83081	.642	-3.0888	6.4221
	Control Group	1.50000	1.83081	.697	-3.2555	6.2555
Control Group	Self-Efficacy Conditions	.16667	1.83081	.995	-4.5888	4.9221
	Motivation Conditions	-1.50000	1.83081	.697	-6.2555	3.2555

Appendix K

ANOVA, Coefficients, and Model Summary Tables

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.326	2.620		1.269	.222
	BD_Scaled_Scores	.656	.231	.579	2.838	.012

a. Dependent Variable: MR_Scaled_Scores

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.579[a]	.335	.293	2.92985

a. Predictors: (Constant), BD_Scaled_Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.156	1	69.156	8.056	.012[b]
	Residual	137.344	16	8.584		
	Total	206.500	17			

a. Dependent Variable: MR_Scaled_Scores

b. Predictors: (Constant), BD_Scaled_Scores

Appendix L

ANOVA Table

ANOVA

MR_Scaled_Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.333	2	10.167	.819	.460
Within Groups	186.167	15	12.411		
Total	206.500	17			

Appendix M

Descriptives Table

Descriptives

MR_Scaled_Scores

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Self-Efficacy Conditions	6	11.3333	2.73252	1.11555	8.4657	14.2009	8.00	16.00
Motivation Conditions	6	11.1667	3.54495	1.44722	7.4465	14.8869	8.00	18.00
Control Group	6	9.0000	4.14729	1.69312	4.6477	13.3523	3.00	13.00
Total	18	10.5000	3.48526	.82148	8.7668	12.2332	3.00	18.00

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Date

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