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Personality Judgment Accuracy and the Role of Physical Fitness,
Cognitive Functioning, and Psychological Well-Being

by

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Abstract

Personality Judgment Accuracy and the Role of Physical Fitness, Cognitive Functioning, and Psychological Well-Being

Thesis Abstract – Idaho State University (2018)

Personality judgment accuracy and physical fitness have both been linked to aspects of psychological well-being and cognitive functioning (Letzring, 2015; Cheng, 2014; Christiansen et al., 2005; Ratey & Hagerman, 2008), but personality judgment accuracy and physical fitness have not been examined together. This research explored potential relationships between these factors. Participants completed an objective measure of physical fitness and a series of self-report assessments and tests to evaluate psychological well-being, cognitive functioning, and perceived physical activity. Participants watched videos of target individuals and filled out other-report measures to judge personality traits. Findings indicated that certain aspects of psychological well-being and cognitive functioning were predictive of physical fitness, but not perceived physical activity. Psychological well-being moderated normative accuracy, while cognitive functioning moderated distinctive accuracy. Finally, psychological well-being and cognitive functioning did not mediate the relationships between either physical fitness or perceived physical activity and either type of accuracy.

Key Words: personality judgment accuracy, psychological well-being, cognitive functioning, physical fitness

Chapter 1: Introduction

Personality judgment accuracy is an inherently social task that people engage in every single day. The ability to judge others accurately in terms of a personality profile is helpful when deciding whom to trust, share sensitive information with, or even with whom to develop a long-term relationship. The ability to be accurate in a first-time encounter is important in social decisions, and can have lasting impact on the relationships we choose to develop and the impressions we make about people. Research supports the idea that the good judge of personality is psychologically healthy in many ways, and is also cognitively complex, indicating some important underlying mechanisms behind this incredibly important social task (Beer & Watson, 2008; Christiansen et al., 2005; Letzring, 2015).

While exercise and physical fitness may at first seem completely unrelated to the social area of personality judgment accuracy, the two areas actually share some important factors. Cardiorespiratory exercise, also known as aerobic exercise, has been shown to result in a multitude of important psychological and cognitive benefits, and is considered to be a vital aspect of maintaining mental health for both clinical and non-clinical populations (Ratey & Hagerman, 2008). These psychological and cognitive outcomes are more prevalent in moderately to highly fit populations, which indicates that cardiorespiratory physical fitness level also plays an important role in these outcomes (Chang, 2014). Because exercise and physical fitness level are predictive of similar psychological and cognitive outcomes that are also indicative of personality judgment accuracy, there is an important link between these two lines of research that has not previously been examined. It is possible that individuals who are physically fit are also

more accurate judges of personality, and if this is the case, it is vital to understand the underlying mechanisms behind this relationship. The purpose of this study is to replicate previous lines of research that connect physical fitness and personality judgment accuracy with cognitive functioning and psychological well-being, and to identify the role these two factors play in the possible relationship between physical fitness and personal judgment accuracy.

Chapter 2: Personality Judgment Accuracy

History of Personality Accuracy Research

Research in accuracy of personality judgment was first popularized in the decades spanning from 1920 to 1950 (Estes, 1938; Vernon, 1933). During this time, research mainly focused on how well personality judgments matched up with the self-perception of the person being judged. In order to be considered accurate, judgments had to match with how the other people perceived their own personality traits, which is known as self-other agreement (Taft, 1955). Self-other agreement and accuracy of personality judgment were studied almost exclusively through self-report surveys, and during this time the study of personality and accuracy was an important and respected field.

A critique by Cronbach (1955) was quick to silence the research in this area, however. In this methodological critique, Cronbach argued that there were unaddressed issues in the way accuracy of personality judgment was measured, and that there were too many problems in basing accuracy on self-other agreement. In addition, he argued that accuracy needed to be broken up into different components in order to evaluate different types of accuracy. Rather than being an attack on the field, Cronbach brought up important methodological concerns that could have been addressed with some work, but

the response from most personality researchers was to change the focus of their research (Funder, 1987).

After this reaction by personality researchers and the resulting near-abandonment of research on personality judgment accuracy, multiple controversies surrounding personality sprung up (Mischel, 1968). Research in personality became largely discredited, and suddenly there was a question as to whether personality was a concept that could be objectively and empirically studied, assuming it existed at all. Within the next decade and a half, a book by Walter Mischel (1968) suggested that personality traits only weakly predict behavior. From this suggestion, audiences concluded that personality traits are not capable of determining behavior, because behavior is simply too inconsistent. The general idea was that situations, rather than personality traits, were the drivers of behavior, and that personality traits are either an imaginary concept, or simply unimportant in understanding human behavior (Bowers, 1973; Mischel, 1968).

The concept of accuracy was largely ignored over the next twenty years. Instead, research focused on the *process* of personality judgment, rather than how people are accurate (Crandall, 1984; Evans, 1984). Social psychologists latched onto a concept known as the “error paradigm,” which asserted that people use representative heuristics, or characteristic ideas about a situation or outcome, to make judgments (Kahneman & Tversky, 1973). An additional concept known as the fundamental attribution error claimed that people explain behavior largely as a result of personality traits, instead of taking into account the role of situational pressures, which is thought to lead to erroneous judgments and inaccuracy (Ross, 1977; Nisbett & Ross, 1980). Research on these topics was incredibly popular for many decades, and further isolated accuracy research.

By the early 1980's, things finally started to change for accuracy research. Research began appearing that challenged the widely held concepts of inaccuracy and the fundamental attribution error (Funder, 1982; Swann, 1984). This research refuted the idea that people are inaccurate judges, instead arguing that people are actually surprisingly accurate in their judgments of others. Research by Funder (1987) demonstrated that people are generally accurate in predicting the behavior of others based on personality traits, and highlighted the importance of personality in predicting behavior. Within the next two decades, accuracy research and personality psychology finally began addressing the issues presented by Cronbach (1955) that had plagued the field for so many years, and the field made a powerful resurgence (Funder, 1980; Kenny, 1991).

One of the glaring issues of early personality accuracy research had been its exclusive use of self-report questionnaires as criteria for accuracy. One of the main problems present with relying on self-report criteria is that it does not account for errors in judgment (Hofstee, 1994). It is not plausible to think that an individual knows their personality better than anyone, when personal biases can interfere with objectivity. The challenge, thus, was to figure out how to create a more reliable criterion; something that was both dependable within a scientific framework, and yet realistic within an abstract, social context. The answer to this was to create a criterion based on a combination of self-rating of an individual's personality, multiple ratings from people who know the individual well, and/or coded behavior assessed by the researcher, which is known as *realistic accuracy* (Funder, 1995; 1999; Letzring & Human, 2013). This mixture of evaluations provides a broader and more valid indicator of an individual's personality make-up, and does not solely rely on the individual's self-knowledge.

In addition to understanding how accuracy criteria are conceptualized, it is also important to understand how the definition of personality is currently understood within the field. The Big Five is currently the most widely accepted paradigm within personality psychology, and encompasses five trait dimensions: Extraversion, Neuroticism, Openness to Experience, Agreeableness, and Conscientiousness (John, Naumann, & Soto, 2008; John & Naumann, 2010). Different models of personality incorporate additional levels of personality, such as facets and personal characteristics (DeYoung, 2015; McAdams, 1995). Depending on the model, traits may or may not be conceptualized separately from values, motivations, or personal identity, but these aspects are often still closely intertwined (Hofstee, 1994). A basic understanding of personality comes from Funder (2004), who stated that personality is “an individual’s characteristic patterns of thought, emotion, and behavior, together with the psychological mechanisms...behind those patterns” (p. 5). While personality can be understood in a more complex manner with multiple levels of description, this project will focus on the traits that are conceptualized to make up personality, through the lens of the Big Five model (John et al., 2008; John & Naumann, 2010).

The Realistic Accuracy Model

The Realistic Accuracy Model (RAM) is a well-known method of conceptualizing how accurate judgments are made (Funder, 1995). It was designed in answer to many of the critiques that had plagued personality accuracy research over its history. RAM draws inspiration from Brunswik’s Lens Model, which represents the relationship between an object and accurate judgment of that object (Brunswik, 1956). According to Brunswik’s Lens Model, objects give off informational cues from which judgments can be inferred.

Some of these cues are helpful and relevant to the judgments being made, while others are misleading or unimportant. In addition, these cues must be utilized correctly in the judgment of that object in order for accuracy to be possible. RAM utilizes the basic components of this model and discusses how accurate judgments are possible (Funder, 1999; 2012).

The main components of RAM include a four-step process of how accurate judgments take place, which is comprised of the *relevance*, *availability*, *detection*, and *utilization* stages (Funder, 1995; 1999; 2012). The first step necessary for personality judgment accuracy to take place is *relevance*. In order for a personality trait to be judged accurately, the target must do something that is *relevant* to the trait. For example, if targets who are high in extraversion behave in an extraverted way, they are more likely to be judged in ways that correspond to their true nature. The second step is for the cues to be *available*. For instance, if a target is only extraverted around friends and family but not around new acquaintances or strangers, the trait will not be made available in all circumstances. In these two steps, it becomes essential that the proper cues are provided by the target in order for an accurate judgment to be possible.

The third step in the process is *detection* (Funder, 1995; 1999; 2012). Cues to a trait may be made both relevant and available by the target, but if they go unnoticed by the judge, an accurate judgment cannot take place. In order for detection to take place, a judge must pick up on the cues provided by the target, which requires attention and focus on that target's behaviors. Only cues that are successfully *detected* can contribute to accuracy. Lastly, *utilization* of the cues is the final step necessary for an accurate judgment. If cues are not utilized in the correct way, then they will not contribute to

accuracy. For instance, if a target is high in openness to experience, has behaved in ways that are *relevant* to the trait, and has made the cues *available* to the judge, then the judge has the opportunity to successfully *detect* the cues. However, if those cues are then incorrectly *utilized*, and the judge decides that the person is low in openness, then judgmental accuracy will be low. This four-step process described by RAM requires that all steps take place in the proper order, and asserts that if any of the steps are missed, accuracy is impossible.

RAM also discusses four moderators that influence the process: the *good judge*, *good target*, *good information*, and *good trait*. The *good judge* and the *good target* play the lead roles in the social interaction of personality judgment accuracy. It is up to the *good target* to display cues that are relevant to their personality traits, as well as to make those cues available to the judge. Good targets typically behave more consistently across situations and are more open about their emotions (Funder, 2012; Colvin, 1993; Human & Biesanz, 2013). The role of the *good judge* is to detect cues provided by the target and to correctly utilize those cues. The good judge is typically likable, good in social scenarios, and psychologically well-rounded (Human & Biesanz, 2011; Letzring, 2008; 2015). In addition, the good judge is more likely to behave in ways that encourage targets to give off relevant cues about their personality, thus increasing the likelihood of a more accurate judgment. These concepts regarding the good judge will be further discussed in a later section.

The *good trait* and *good information* are also important moderators that influence accuracy. Good traits include personality traits that are more visible or available to a judge. These include aspects of the self that are considered more socially desirable, or

traits that are more often expressed in social situations, such as agreeableness or extraversion (Funder, 2012). Good information includes information about a target that is more telling of their true personality, and includes both *quantity* and *quality* of information. While access to high *quality* information about a target, such as relevant cues, is a vital aspect of good information, it is also important that the judge receives enough *quantity* of information from a target to make an accurate judgment (Letzring, Wells, & Funder, 2006). This type of information becomes more abundant over time, such as in longer interactions when quantity becomes fruitful, or close relationships in which quality of information improves (Biesanz, West, & Millevoi, 2007).

This project will utilize RAM as a framework for understanding the underlying mechanisms of accurate personality judgment. In particular, focus will be on the moderator of the *good judge*, as well as the *detection* and *utilization* stages of the four-step process, because this project is not looking at the social interaction as a whole, but instead exclusively evaluates the judge's ability to accurately judge others outside of active social engagement.

The Social Accuracy Model

The Social Accuracy Model of interpersonal perception (SAM; Biesanz, 2010) is a model used to estimate accuracy. For the purpose of this project, SAM will be used to estimate the judges' accuracy across targets. The model breaks down accuracy into different components, which are considered to be descriptive of both the judge and the target. In SAM, the judge's perceptions of a target are predicted by multiple assessments of that target, which results in an estimate of accuracy. For the current project, the accuracy criterion for each target is gathered through multiple assessments from

individuals who know the target well, as well as a self-report assessment from the target (Letzring et al., 2006; Letzring & Human, 2014). In some instances, behavioral coding by the experimenter is also done. A unique feature of SAM is that the accuracy criterion for each target are the predictor variable in the analysis, with the perceptions of the judge acting as the outcome variable (Biesanz, 2010). In this way, the accuracy criterion is viewed as a fixed point, while level of accuracy varies.

Accuracy is broken down into different conceptual components, referred to as *perceptive accuracy* and *expressive accuracy* (Biesanz, 2010). Perceptive accuracy refers specifically to the accuracy of the judge, and is the ability of a judge to accurately judge targets, when compared to other judges of those same targets. In a similar fashion, expressive accuracy is the ability of targets to accurately represent their personality in a way that encourages accuracy, especially when compared with other targets. These two components are further broken down into *distinctive accuracy* and *normative accuracy*, which are applicable to both the target and the judge.

In terms of perceptive accuracy, normative accuracy refers to judgments across targets that are in line with the average person, while distinctive accuracy refers to a judgment of distinction that reflects how each target differs from the average person (Biesanz, 2010). In terms of expressive accuracy, normative accuracy is the ability to accurately portray similarities to the average person, while distinctive accuracy is the accurate portrayal of unique and distinctive qualities. In short, while normative accuracy refers to how a person is in line with the typical, average person, distinctive accuracy is focused on differences or distinctions from that mold. SAM accounts for both types of accuracy within the model, for both the target and the judge. For the purposes of this

project, the focus will be on perceptive accuracy, or the accuracy of the judge, and both distinctive and normative accuracy.

Research in Personality Judgment Accuracy

Research has identified a number of important moderators of the good judge that suggest several important personal factors that are involved in accuracy. The good judge of personality possesses strong social skills, is psychologically well-adjusted, and is emotionally sensitive (Beer & Watson, 2008; Letzring, 2008). In addition, the good judge possesses higher levels of agreeableness, openness to experience/intellect, and extraversion, indicating that personality traits play an important role in accuracy (Davis & Kraus, 1997; Letzring, 2008, 2015). These positive personal factors allow the good judge of personality to interact more meaningfully in social situations, utilize cues more efficiently, and make more accurate judgments of personality in a variety of social scenarios.

Empathic accuracy, or the ability to accurately judge emotions and thoughts in others, is thought to be a necessary first step in explaining a person's enduring personality traits (Ickes, 1993). Because personality judgment accuracy is an inherently social task, the ability to understand emotions and their role in behavior is vital (Colvin & Bundick, 2001). Specific research in this area has found that good judges possess both empathy and sympathy in social situations, and are also more open about their own emotions (Letzring, 2008). Empathic accuracy is also related to other positive outcomes such as psychological adjustment and better performance in social situations overall (Gleason, Jensen-Campbell, & Ickes, 2009).

Another important factor that is considered to play a significant role in accuracy is cognitive complexity, or intelligence (Davis & Kraus, 1997). Cognitive complexity and the openness trait (also sometimes referred to as intelligence) have well-established links to personality judgment accuracy throughout the literature (Christiansen et al., 2005; Lippa & Dietz, 2000; Mayer, 2014). The process of accurately judging another's personality is a cognitively taxing process, and one that requires good memory for past behaviors. The process also requires the ability to take abstract information, such as how a person's behavior relates to a certain personality trait, and transform it into useable material to make a judgment. The ability to handle a high cognitive load and process information efficiently is considered beneficial, and intelligence combined with social aptitude and a good memory are thought to be essential characteristics for the good judge (Christiansen et al., 2005).

Psychological adjustment is a consistent predictor of the ability to accurately judge others (Davis & Kraus, 1997; Letzring, 2015). The good judge is psychologically healthy, comfortable in social scenarios, and able to interact in meaningful ways with others (Beer & Watson, 2008). Psychologically healthier individuals tend to have greater self-knowledge of their own personality traits, and are also judged by others with higher levels of self-other agreement (Human & Biesanz, 2011). One reason why this may be the case is that psychologically healthier individuals are more comfortable in revealing their own traits, making others feel at ease and more willing to reveal meaningful cues about themselves (Colvin, 1993). Based on these social, emotional, psychological, and cognitive factors, the profile of the good judge is highly positive and includes many aspects that are essential in positive social engagement.

Psychological Well-Being

The concept of psychological well-being refers to a variety of mental, affective, and psychological factors that are indicative of a person's health and happiness.

Classically, there are three main components of psychological well-being (also interchangeably known as subjective well-being in the literature) that have been widely accepted: cognitive appraisal of life quality, or life satisfaction; presence of positive affect; and lack of negative affect (Arthaud-Day, Rode, Mooney, & Near, 2005). Various related factors are considered to be indicative of these components, and make up a general concept of psychological well-being. In addition, there are important social components that should not be ignored in a basic understanding of psychological well-being, as a social context is essential in understanding the bigger picture of human health, happiness, and functioning (McCrae & Costa, 1991; McCrae, 2002). Psychological well-being has a well-established relationship with personality traits and other individual factors, such that various personality traits predict well-being throughout the lifespan. In addition, psychological well-being is an important factor of personality judgment accuracy, more specifically normative accuracy (Human & Biesanz, 2011; Letzring, 2015).

Other factors associated with psychological well-being include management of mental health issues such as stress, depression, and anxiety, which are buffered by various components of the construct (Thoits, 2011). Other important factors include emotional stability and emotional intelligence (Thory, 2015; Bar-On, 2010), life satisfaction (Thoits, 2011; Liu, Li, Ling, & Cai, 2016), and social support (Thoits, 2011), which have all been identified as important and related constructs of psychological well-

being (Costa & McCrae, 1980). For this project, psychological well-being is conceptualized as the mental, psychological, affective, and social components that make up the average person's ability to maintain balance despite challenges, and function positively in day-to-day life (Dodge, Daly, Huyton, & Sanders, 2012). Physical health components of well-being are considered a separate construct, and will not be included as an integral defining aspect of psychological well-being.

Psychological well-being has been related to many positive social and cognitive outcomes, including the ability to accurately judge personality traits (Beer & Watson, 2008). More specifically, the psychologically well-rounded individual is more accurate in *normative* judgments of personality, or judgments in which, on average, targets are judged as being similar to the average person (Letzring, 2015). Psychological well-being has also been linked to specific personality traits, with extraversion positively predicting, and neuroticism negatively predicting, psychological well-being (Costa & McCrae 1980; McCrae & Costa, 1991; McCrae, 2002). This supports the idea that psychological well-being is tied to affective states, and that while extraversion typically predicts positive affect and higher scores on psychological well-being, neuroticism predicts negative affect and lower scores on psychological well-being. Agreeableness is also positively related to psychological well-being, in addition to normative accuracy, indicating that the psychologically well-adjusted individual is both agreeable in social situations and a better normative judge of personality (Letzring, 2015). One possible reason for this might be that psychologically well-adjusted individuals simply have a better concept of what the average person is like, and are therefore more adept at judging personality traits in such a fashion.

Components of Psychological Well-Being

Life satisfaction is defined as a cognitive appraisal of life quality, and is an important aspect of psychological well-being (Diener, Emmons, Larsen, & Griffin, 1985). Research has found life satisfaction to be predictive of the ability to cope with stress in positive ways. High levels of stress and lack of effective coping strategies can lead to psychological, cognitive, and physical consequences, and are considered a detriment to overall health and well-being (Antonovsky, 1979; Gilboa, Shirom, Fried, & Cooper, 2008). For those high in life satisfaction, unnecessary stress that hinders goals is experienced less often, but stress that is perceived as a challenging or necessary obstacle to achieve goals is coped with in a positive way, actually resulting in increased life satisfaction (Flinchbaugh, Luth, & Lee, 2015; Podsakoff, LePine, & LePine, 2007).

Other important cognitive and psychological benefits of life satisfaction include higher levels of positive affect and lower levels of negative affect, which contribute to psychological well-being in the forms of emotional stability and psychological functioning (DeNeve & Cooper, 1998; Norlander, Bood, & Archer, 2002; Karlsson & Archer, 2007). Life satisfaction has been negatively related to the personality trait of Neuroticism throughout the literature, and decreases the likelihood of developing anxiety, depression, and other mental health disorders (Deneve & Cooper, 1998; Steel, Schmidt & Shultz 2008). In addition, those high in life satisfaction also benefit from positive social outcomes, and report higher levels of self-esteem and social connectedness with peers (Baumeister et al., 2003; Lu et al., 2015).

Social support refers to perceived feelings of belonging, connectedness, and trust in one's social group. Social support has been found to be an incredibly indicative aspect

of psychological well-being, and promotes health in physical and psychological ways. Social integration and feelings of social connectedness are beneficial to health, and serve as a means of buffering stress (Cohen, 2004). Even for those without heightened levels of stress, social support encourages engagement in more normative health behaviors, which promotes overall well-being. In addition, social interaction and feelings of social support promote general psychological well-being in that it encourages feelings of positive affect while decreasing negative affect (Thoits, 2011). These feelings of positivity encourage individuals to care more about the state of their overall well-being (Cohen, 2004).

Social support and the benefits of companionship and positive relationships are also related to better self-evaluations of worth, also known as self-esteem (Rosenberg et al., 1995). Higher levels of self-esteem are related to a host of positive outcomes, such as increased happiness and life satisfaction, as well as mental health outcomes such as reduced negative affect and lowered symptoms of depression and anxiety (Baumeister et al., 2003). Social support is also related to feelings of self-efficacy in various life domains, and those with greater feelings of social connectedness typically feel a greater sense of control over their lives (Thoits, 2011). This sense of control acts as a positive coping strategy, and once again serves as a buffer to stress and other mental and physical health outcomes (Taylor & Stanton, 2007).

The concepts of higher positive affect and lower rates of negative affect are considered vital to the concept of psychological well-being, and are discussed both as an integral part of the definition of psychological well-being, as well as outcomes of its various related factors. Personality traits in particular are related to these affective components, such as the traits of emotional stability, extraversion, and agreeableness

(Ojha & Yadav, 2014). An important concept indicative of the affective and psychosocial aspects of psychological well-being is emotional intelligence, or the ability to understand, manage, and accept emotions in oneself and in others. Emotional intelligence has been found to be strongly related to psychological well-being, as well as similar and connected constructs such as happiness and life satisfaction (Bar-On, 2010; Higgs & Dulewicz, 2008). Research supports the idea that emotionally intelligent people are also typically psychologically well-adjusted, and that emotional intelligence predicts the ability to function effectively in social situations in which an understanding of emotion in others is essential.

Emotional intelligence is related to a host of social, psychological, and health-related outcomes, which are very similar to the positive outcomes for other factors of psychological well-being. Those with higher emotional intelligence report higher levels of life satisfaction, and typically perceive higher levels of social support by viewing their social network more favorably (Di Fabio, 2015). Emotional intelligence predicts lowered risk of mental health issues such as depression and anxiety, and reduces the likelihood of problematic health behavior such as excessive drinking. This important factor of psychological well-being also predicts better cognitive performance and academic achievement, and is related to quicker recovery from negative affect (Andrei, Mancini, Mazzoni, Russo, & Baldaro, 2015; Limonero, Fernández-Castro, Soler-Oritja, & Álvarez-Moleiro, 2015). This indicates that those higher in emotional intelligence experience negative affect for shorter periods of time, thus demonstrating the ability to cope with challenges more effectively, resulting in better psychological well-being.

In conjunction, these factors of psychological well-being give us an idea of what the psychologically healthy individual looks like. While classic components of psychological well-being need to be taken into consideration (life satisfaction, positive affect, and lack of negative affect), other factors are also extremely representative of the construct of psychological well-being, and further represent the person within a social context. This project will incorporate social support and emotional intelligence within the framework of psychological well-being, as research supports the idea that these psychosocial and affective constructs are vital in fully understanding the psychologically well-adjusted individual, and are closely related to other components of psychological well-being. A combination of these elements is representative of the cognitive, affective, social, and psychological aspects of a person that are indicative of an overall understanding of psychological well-being.

Cognitive Functioning

Cognitive functioning is defined as the mental abilities of an individual that are essential in the process of learning, remembering, and utilizing information. The concept can be broken down into multiple parts depending on the specific components of interest, such as intelligence, cognitive complexity, analytical and verbal reasoning, and memory (Chang, 2014). These are all important aspects of cognitive functioning, and research has found that the good judge of personality is typically more intelligent and more cognitively adept, and is thus better able to learn, remember, and utilize information necessary to make an accurate judgment of personality (Christiansen et al., 2005; Lippa & Dietz, 2002).

Cognitive functioning has also been linked to physical fitness level and exercise, with regular exercise resulting in direct effects on the brain (Barenberg et al., 2011; Hillman, 2009). Research examining the effects of exercise on neural activity in the brain has pointed toward improvements in neural activity related to information processing, inhibitory control, and accuracy of answers to analytical test questions, which are all important components of executive cognitive functioning and the ability to learn and recall new information. In addition, research has found that physical fitness level is also related to cognitive functioning, in that individuals who are more physically fit experience a greater boost to various aspects of cognitive functioning after exercise than those with lower physical fitness (Chang, 2014). This indicates that physical fitness level plays an important role in the effects of exercise, and that those who are more physically fit experience greater cognitive benefits as a result. It has also been found that the greatest cognitive benefits of exercise come within a relatively short time-period after exercising, but that individuals who are more physically fit experience a longer lasting effect (Ratey & Hagerman, 2008). This is because the brain's adaptation to the continued stress of exercise allows for less negative demand as a result of this stress, which in turn creates an environment in which cognition becomes more efficient.

For the purposes of this project, cognitive functioning is conceptualized through four aspects that are considered to be important to personality judgment accuracy: dispositional intelligence, fluid intelligence, attributional complexity, and memory for information related to the targets of personality judgments. These four aspects are important in the ability to think about, remember, utilize, and transform information in a complex way, which are all important aspects of personality judgment accuracy

(Christiansen et al., 2005). Through this definition, cognitive functioning captures more than just intellectual components that help people learn, remember, and utilize knowledge in an abstract and impersonal sense, but also captures intellectual components that can be considered beneficial within a social context.

Components of Cognitive Functioning

One important aspect of cognitive functioning is dispositional intelligence (Christiansen et al., 2005). Dispositional intelligence encompasses the ability of an individual to understand and take meaning from the characterological attributes, motives, values, and behaviors of an individual (Ritchhart, 2001). This type of intelligence describes an individual's intellectual ability in real-world social scenarios, rather than performance academically or in specific abstract scenarios. Rather than simply defining an individual's abilities in a certain subject area or narrow circumstance, dispositional intelligence describes how people actually use the intelligence they have in everyday life (Perkins, Tishman, Ritchhart, Donis, & Andrade, 2000). Dispositional intelligence is also classified through sensitivity to circumstances, understanding of the correct ways to engage depending on the circumstances, as well as the inclination and ability to engage in a variety of situations and correctly perform in socially acceptable ways (Perkins & Tishman, 2001). Dispositional intelligence has been used as a measure of cognitive functioning within the personality judgment accuracy literature, and is related to the ability to more accurately judge personality in others (Christiansen et al., 2005).

Another important aspect of cognitive functioning is fluid intelligence, or the ability to correctly reason and solve problems in new situations (Cattell, 1971). This type of intelligence describes the abstract and logical reasoning patterns of an individual, and

the ability to make logical judgments based on the information provided. Fluid intelligence has been found to have a strong relationship with working memory, or the ability to correctly hold in mind, process, and utilize information, which indicates that individuals who are more fluidly intelligent are also better able to simultaneously work with large amounts of information and keep new information in mind (Gignac, 2014). Fluid intelligence has also been linked to an individual's need for cognition, or the natural inclination of an individual to engage in deeper, more complex thought processes (Hill et al., 2013). This is an individual difference that points to more cognitive complexity, and the enjoyment of utilizing complex processes in overall understanding and decision making. Fluid intelligence is related to personality judgment accuracy in that individuals who are better able to reason and logically predict an outcome based on complex, abstract information, are more likely to make accurate judgments of a target individual based on the abstract cues provided by that target (Lippa & Dietz, 2000).

Attributional complexity is defined by the ability to understand and utilize information related to social behavior in more complex ways (Fletcher et al., 1986). Individuals who are higher in this area of cognitive functioning use more complex schemas when explaining the behavior of others, are able to discriminate between and integrate multiple complex explanations of behavior, and elaborate more on these explanations. Research has found that when asked to judge a target's attitude toward an issue while that target's behavior is being influenced by powerful external circumstances, individuals with higher attributional complexity who have been encouraged to use deeper levels of processing are more likely to be accurate in their judgements compared with those who are lower on this aspect of cognitive functioning (Fletcher, Reeder, & Bull,

1990). Attributional complexity has also been linked to higher levels of intelligence as well as need for and enjoyment of more complex cognitions (Fast, Reimer, & Funder, 2008). In addition, high levels of attributional complexity are related to less bias in judgements of targets, and less reliance on stereotypes or the fundamental attribution error (Follett and Hess, 2002). These research findings point to the idea that individuals with higher levels of attributional complexity are capable of making more complex judgments of individuals while considering multiple perspectives and explanations of behavior, which should be related to more accurate judgments of personality traits.

The last component of cognitive functioning is memory, which is a concept that is theorized to be related to personality judgment accuracy. Individuals with a better ability to remember information about a target, in combination with the ability to more easily work with abstract information, as in the case of attributional complexity, are more likely to remember and correctly utilize important information that is necessary to make an accurate judgment (Christiansen et al., 2005; Fletcher et al., 1986). In addition, research has found that individuals with better episodic memory, or memory for specific events, are able to make more accurate judgements when faced with a task that is based on a series of rules (Hoffmann, von Helversen, & Rieskamp, 2014). Memory of a target theoretically relies on the ability to correctly remember the behaviors, expressions, and verbal descriptions of an individual, which are all important cues necessary to make an accurate judgment (Christiansen et al., 2005).

Physical Fitness

Research supports the idea that physical fitness level is an essential aspect of an individual's sustained health and well-being (Ratey & Hagerman, 2008). Positive

outcomes of physical fitness are astonishing in number, and include psychological, cognitive, and mental health benefits, as well as the prevention of many disabilities and diseases across the lifespan. A plethora of research indicates that positive benefits can be had from just a single bout of moderate exercise, which become heightened and sustained as physical fitness level increases (Chang et al., 2014). Despite these numerous benefits, the vast majority of Americans are unfit and overweight, and too many die every year by complications due to preventable outcomes such as heart attacks, heart disease, and cancer (Pate et al., 1995). In addition, individuals typically overestimate how much they are really exercising, and report many deterrents for not engaging in more exercise (Rhodes & De Bruijn, 2013). Building on this body of research is essential for understanding the factors that are related to regular exercise throughout the lifespan. In addition, further research in this area will enhance knowledge of the benefits of exercise on the human body and brain, and will extend our understanding of how exercise impacts our social lives and social functioning.

Previous research has linked various personality traits with exercise and physical fitness, and suggests that certain individuals may be more likely to choose exercise than others (Costa, Oliva, & Cuzzocrea, 2014). In particular, people who exercise report higher levels of extraversion, which is a trait also related to psychological well-being and personality judgment accuracy (McCrae, 2002). Research has in addition linked higher levels of conscientiousness and lower levels of neuroticism with physical fitness and exercise (Rhodes & Smith, 2006). This set of findings indicates that a certain personality profile is indicative of an active lifestyle, and those who choose to exercise are typically

higher in positive affect, lower in negative affect, and may be more aware of influential health factors and health-related behaviors.

Understanding that personality shapes the likelihood of engagement in regular physical activity suggests that individual differences play an important role in this health-behavior, and that there is some level of individual choice in physical activity engagement. For this project, physical fitness will be defined as an individual's perceived level of physical fitness and objective cardiorespiratory fitness level. Other health-related factors such as disease and disability, which could confound cardiorespiratory fitness, will not be examined within this study. While other health-factors, such as nutrition, are certainly important considerations in explorations of personality and overall well-being, research suggests that cardiorespiratory exercise and fitness level play vital roles in different aspects of psychological well-being and cognitive functioning (Chang, Labban, Gapin, & Etnier, 2012), which are also two predictors of accurately judging personality in others (Christiansen et al., 2005; Letzring, 2015). Most individuals have some level of choice surrounding engagement in physical activity, and because the choice to engage in aerobic activity in particular can be extremely preventative of health issues later in life, as well as especially predictive of benefits to cognitive functioning, cardiorespiratory fitness is of primary concern in this initial exploration (Pate et al., 1995; Ratey & Hagerman, 2008). Individual factors suggest that some individuals might be more likely to choose an active lifestyle than others, and this profile is also suggestive of better psychological well-being and personality judgment accuracy (McCrae, 2002).

Psychological Outcomes of Physical Fitness

It is well-established throughout the literature that physical fitness is related to a number of psychological benefits, such as reduced stress levels. Exercise puts a healthy stress on the body, which the body then has to learn to adapt to over time (Ratey & Hagerman, 2008). The cross-stressor adaptation theory posits that when the body encounters stress from an outside stimulus, such as a psychological stressor, regular physical activity allows the body to maintain a more balanced physiological state, and respond less reactively to the stressor (Sothmann, 2006). Some conflicting research has not found this reduced stress reactivity in physically active individuals, but instead has found a quicker recovery time from the stress response (Jackson & Dishman, 2006). Despite this, more recent research that specifically examined personally relevant-stressors found support for the idea that physically active individuals respond less reactively to stress in the moment, rather than after the fact (Haaren et al., 2016; Klaperski, von Dawans, Heinrichs, & Fuchs, 2014). While there is still some debate, it is clear that regular exercise has some relationship to how the physically fit individual experiences psychological stress, with better stress management being linked to better psychological adjustment (Ratey & Hagerman, 2008).

In addition to the benefits of regular exercise on stress, increase in activity level is also a strong treatment in clinical cases of depression and anxiety. Regular moderate exercise has been found to not only reduce symptoms of depression, but to also regulate mood over long periods of time (Blake, Mo, Malik, & Thomas, 2009; Mura & Carta, 2013). When used in combination with a mental intervention, such as regular meditation, the effects of exercise on symptoms of depression becomes even more pronounced (Heinzel, Lawrence, Kallies, Rapp, & Heissel, 2015). While research examining the

effects of exercise on clinical cases of anxiety is more limited than the depression literature, some research has found beneficial outcomes for anxiety as a result of physical fitness (Jayakody, Gunadasa, & Hosker, 2014; Wipfli, Rethorst, & Landers, 2008). These results extend to non-clinical cases as well, and research looking at anxiety in healthy individuals found that low to medium-intensity exercise reduced anxiety sensitivity, but high-intensity exercise resulted in even greater reductions. Once again, these results are important in that reduction of anxiety in a normal population is indicative of better psychological well-adjustment (Ratey & Hagerman, 2008).

Other important psychological benefits of regular physical activity include important social, emotional, and mental health factors. Physical fitness has been linked to improved self-regulation and the ability to follow through with goals, as well as better self-perception and self-efficacy (Lubans & Morgan, 2009). Interestingly, physical fitness has been found to increase self-acceptance, and those who exercise regularly report a more positive view of themselves and greater self-esteem (Crone, Smith, & Gough, 2005). Research investigating the relationship between regular physical activity and life satisfaction in cancer survivors found similar mental health results, in that those who exercised regularly reported higher life satisfaction than those who were sedentary. In addition, physical fitness has also been linked to emotional intelligence, with emotional intelligence and mental health being important predictors of regular exercise (Li, Lu, & Wang, 2009; Omar, Ismail, Omar-Fauzee, Abdullah, & Geok, 2012). Within a social context, regular physical activity can result in enhanced psychological benefits such as higher levels of perceived social support and increased social interaction, which indicates that the environment of exercise is also an important factor (Stathi et al., 2004). Based on

this line of research, the benefits of exercise involve not only the physical factors of health maintenance, but also the mental, emotional, and even social aspects that are enhanced through exercise.

Cognitive Outcomes of Physical Fitness

Research investigating the benefits of regular physical activity has found a plethora of cognitive outcomes related to both physical fitness level and acute exercise at moderate intensity (this refers to a single bout of exercise, usually for 20-30 minutes at 65-75% maximum heart rate). It is well established that children and adolescents with higher physical fitness levels consistently perform better on tests of academic ability than sedentary peers, particularly in highly analytical subjects such as mathematics (Castelli Hillman, Hirsch, Hirsch, & Drollette, 2011; Howie & Pate, 2012). While engagement in regular physical activity over a period of several weeks has been found to improve analytical subject scores in general, the greatest benefit to test scores seems to come within 30 minutes post-workout, with physical fitness level moderating the relationship (Barenberg, Berse, & Dutke, 2011; Phillips, Hannon, & Castelli, 2015). In other words, moderately to highly physically fit individuals receive the greatest benefit, while individuals with low physical fitness levels are not positively impacted.

Further research has examined the moderating effects of physical fitness level on the relationship between acute exercise and cognitive functioning. Research has found that for tasks that measure multiple components of cognitive functioning, individuals who are moderately or highly physically fit perform better after a moderate bout of aerobic exercise, but the same is not necessarily true for individuals with low physical fitness levels. One reason for this may be that individuals with lower physical fitness levels

simply do not have the additional resources to spare for cognition during exercise, and that cognitive functioning is weakened as a result (Chang et al., 2012).

Based on research investigating the relationship of exercise on psychological factors, as well as the effects of exercise on cognitive functioning, physically fit individuals are typically psychologically healthier, function better cognitively, and perceive social networks more favorably. The physically fit individual is also typically more extraverted, less neurotic, and reports a higher level of life satisfaction, which indicates an overall profile of psychological well-being (Diener et al., 1985; Karlsson & Archer, 2007). While previous research has investigated physical fitness in relation to a number of psychosocial and cognitive factors, there is no record of the social task of personality judgment accuracy being paired together with this important component of overall health and well-being.

Research examining predictors of personality judgment accuracy has found relationships to factors such as psychological adjustment, cognitive functioning, high levels of extraversion, and low levels of neuroticism (Christiansen et al., 2005; Costa et al., 2014; Letzring, 2015; McCrae, 2002), which all are also outcomes of physical activity. Because research in both areas points toward similar psychological, social, and cognitive factors as influential components, this project will investigate physical fitness in conjunction with personality judgment accuracy, while concurrently examining the relationships of these factors to psychological well-being and cognitive functioning. It is hypothesized that 1) physical fitness will positively predict psychological well-being and cognitive functioning (in support of the physical fitness literature); 2) psychological well-being and cognitive functioning will positively predict both normative and distinctive

personality judgment accuracy (in support of the personality literature); and that 3) cognitive functioning and psychological well-being will mediate the relationship between physical fitness and both normative and distinctive personality judgment accuracy (bringing these two literature together).

Chapter 3: Method

Participants

Participants consisted of 248 male and female undergraduate students from Idaho State University, ranging in age from 18-43. Gender consisted of 35% males and 65% females, and ethnicity consisted of 76% Caucasian, 13% Asian, 4% African-American, 4% Hispanic, 2% Biracial, and 1% Other. Class standing consisted of 43% Freshmen, 29% Sophomores, 17% Juniors, and 11% Seniors. An additional 15 participants participated in the study but were not included in the final data analysis due to failing more than 20% of the embedded attention-checks. Most participants were made up of students from the Psychology department, with 14 participants coming from the Sport Science and Physical Education department. Psychology students signed up for the study through the Psychology Research Sign up Board (managed by SONA Systems) for class credit, while Sport Science and Physical Education students were provided with extra credit by an instructor. In order to participate in Session 2, participants were required to be between the ages of 18 – 25; and free of physical disabilities, illnesses, pregnancy, or self-reported anxiety. These are potential confounds that interfere with the results of objective physical fitness testing (such as the ARCET). All students who completed the entire study (or who were excluded from Session 2 for not meeting the above criteria) were entered into five separate drawings for a \$20 Amazon gift card.

Three power analyses were run to determine the proper sample size for this study. A separate analysis was run for each hypothesis, based on the type of statistical methods chosen. Power was set as .80 for all three analyses. For Hypothesis 1, the program GPower was used to determine the sample size needed to detect an effect size of .25 in a basic regression, with the results indicating that a sample of 197 would be appropriate. This effect size is consistent with other findings regarding physical fitness and cognitive functioning or psychological well-being (Chang et al., 2014). For Hypothesis 2, the program Optimal Design was used to determine the sample size necessary to detect an effect size of .25 and an intraclass correlation of .30 using the Social Accuracy Model with a moderator variable, with the results indicating a sample size of 212 (Raudenbush et al., 2011). For a slightly larger effect size of .30, a sample of only 149 would be required. Once again, this effect size was consistent with previous personality judgment accuracy literature, and the intraclass correlation was consistent with previous projects using similar analyses (Christiansen et al., 2005; Letzring, 2015). Finally, for Hypothesis 3, the powerMediation package in the statistical program R was used to determine an appropriate sample size for a mediation analysis examining the significance of the *ab* path (Qiu, 2015). For this analysis, various possible levels of the regression coefficient were entered (.2, .3, and .4), alongside differing levels of the standard deviation of the mediator (2 and 3), standard deviation of the error term (1.5, 2, 3, and 4), and the correlation between the predictor variable and the mediator (.25 and .30). Across 13 possible combinations of these values, the largest sample size required was 216, barring one extreme requirement of 485. The majority of sample sizes were well below 200. Based on the results of all three power analyses, a sample size of 200 was identified as

being adequate for the requirements of the study, across all three hypotheses. In order to meet the criteria for inclusion in the final sample size of 200, participants must either have completed both Sessions 1 and 2, or have been excluded from Session 2.

Participants who did not complete Session 2 due to attrition were still included in the final analyses (where applicable), but not for the base requirements of the power analysis.

Measures

Psychological Well-Being. Five measures made up the psychological well-being composite score. The 14-item version of the Psychological Well-Being Scale (PWB; Ryff 1989; Ryff & Keyes, 1995) assesses psychological well-being across six domains, which include Self-Acceptance, Positive Relations with Others, Autonomy, Environmental Mastery, Meaning in Life, and Personal Growth. The 14-item version includes 84 total items, with 14 items for each domain, and includes a 6-point response scale ranging from *completely disagree* to *completely agree*. The PWB has been validated in a number of studies, and is considered to be one of the main models of conceptualizing psychological well-being (Ryff, 1989; Ryff & Keyes, 1995; Ryff, Lee, Essex, & Shumutte, 1994). The 14-item version of the PWB has good internal consistency across domains ($\alpha = .83 - .91$) and correlates extremely well with the full version ($r = .98$). For the current study, this measure was found to have excellent internal reliability ($\alpha = .94$).

Positive and negative affect were assessed using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a 20-item measure that includes a series of words corresponding to either positive or negative emotions, with 10 items per category. For each word, participants select from a 5-point scale ranging from *not at all* to *extremely*, to indicate how often they feel that emotion in general. The

PANAS has high internal reliability, and only slight quasi-dimensional properties across positive and negative affect ($r = -.12$, or 1% - 5% shared variance) compared with other measures of affect. It has good internal reliability for both scales (PA $\alpha = .88$; NA $\alpha = .77$) and has demonstrated adequate reliability over a 2-month period (PA $r = .68$; NA $r = .71$; Watson et al., 1988). For the current study, both scales were found to have good internal reliability (PA $\alpha = .84$; NA $\alpha = .83$).

The Satisfaction with Life Scale (SWLS) was used to assess life satisfaction (Diener et al., 1985). The SWLS is made up of 5 items on a 7-point scale, ranging from *strongly disagree* to *strongly agree*. The SWLS has good internal reliability ($\alpha = .87$) and test-retest reliability over a period of two months ($r = .82$; Diener et al., 1985). For the current study, this scale was found to have adequate internal reliability ($\alpha = .83$).

Emotional intelligence was examined through the use of the Wong and Law Emotional Intelligence Scale (WLEIS; Law, Wong, & Song, 2004), which is a 16-item measure on a 7-point scale that ranges from *totally disagree* to *totally agree*. Items range across four different domains, which assess Self-Emotions Appraisal, Others' Emotions Appraisal, Use of Emotion, and Regulation of Emotion. Internal reliability was high for each of the subscales (α 's = .82-.90). For the current study, an adequate internal reliability was found ($\alpha = .83$).

Lastly, perceived social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS is a 12-item measure that utilizes a 7-point scale ranging from *very strongly disagree* to *very strongly agree*. Perceived social support is assessed across three domains of life, which include Family, Friends, and Significant Other. The MSPSS shows good internal

reliability for an overall score ($\alpha = .89$) and strong reliability for each of the three subscales (r 's = .82-.94). For the current study, strong internal reliability was found for the overall score ($\alpha = .90$).

Cognitive Functioning. Cognitive functioning was assessed through a test of dispositional intelligence, a self-report measure of attributional complexity, and a test of fluid intelligence. A brief 3-question test of memory was developed for the purposes of this project that was based on information about the targets within the videos.

Dispositional intelligence was assessed through a partial version of a multiple-choice questionnaire developed and utilized initially by Christiansen et al. (2005) for use in a study examining personality judgment accuracy and cognitive functioning. This test consists of 45 items, with each question offering a brief description of an individual's behavior, and a prompt for participants to choose an answer that best identifies the dispositional traits that are related to that behavior. This assessment was developed based on well-known relationships within the personality judgment accuracy literature, and has adequate internal reliability ($\alpha = .82$). In order to reduce the time necessary to take this assessment, only 22 questions of a potential 46 were chosen, with a representative number of items from each section. This assessment has a total of four sections, and approximately half the items were selected from each section. This measure contains three types of questions, including questions that asked participants to choose a description of a person that best matched certain traits or behaviors; questions that asked participants to match traits with various adjectives; and questions that asked participants

to match traits with various situations, and vice versa. For the current study, a questionable internal reliability was found ($\alpha = .60$).¹

Attributional complexity was measured using the Attributional Complexity Questionnaire (ACQ; Fletcher, Danilovics, Fernandez, Peterson, & Reeder, 1986). The ACQ is a 28-item measure of cognitive complexity specific to the domain of attributional schemas. Participants answer questions based on a 7-point scale, ranging from *strongly agree* to *strongly disagree*. Individuals who score higher on this measure find it easier to attribute causal reasons to behavior by differentiating between various potential causes and assimilating them together. The ACQ has both acceptable internal reliability ($\alpha = .85$) and good test-retest reliability over a period of 18-days ($r = .80$). For the current study, a good internal reliability was found ($\alpha = .82$).

Fluid intelligence was measured using a partial-version of the Raven's Advanced Progressive Matrices (RAPM; Raven, Court, & Raven, 1983). The original RAPM is a 36-item, non-verbal, abstract test of reasoning. For the purposes of this study, only odd numbered items were used, for a total of 18-items, to lower the total time required to complete the test. Participants were presented with a series of patterns made up of various intersecting shapes and lines that are based on principles of logic. Participants attempt to choose the correct matrix from eight possible choices that fit within the paradigm of the presented pattern. Questions increase in difficulty as the test progresses. Participants had 15 minutes to complete as many questions as they could, at which time the test ended. The score for each participant was the total number of correctly answered items. The

¹ Due to the low internal reliability found for this measure, Cronbach's Alpha was run with each item missing to determine if certain items were contributing to a low alpha level. Alpha was raised to .64 with four items removed. Due to this relatively low increase, all 22 items were kept.

RAPM has an adequate split-half reliability ($r = .85$) for a U.S. sample (Raven, Raven, & Court, 1998). For the current study, an adequate internal reliability was found ($\alpha = .72$).

Lastly, a basic test of memory was developed based on information gathered from each of the six videos that were used for the personality judgment task. The memory test was comprised of three questions per video, and assessed participant's memory for verbal and behavioral information about the targets. Examples of questions include, *what sort of behavior did this individual exhibit*, and *how did this individual describe him or herself*? Each question had five multiple choice answers to select from, the last of which was always, *I don't remember*. Three questions followed the personality ratings for each video that corresponded to the specific video of interest. While this is not a formalized assessment of memory, it provides information on participant's ability to remember information about the targets in the videos following a short delay. The overall internal reliability for this measure was extremely low ($\alpha = .29$).

Physical Fitness. The International Physical Activity Questionnaire Short-Form (IPAQ-SF) was used to measure self-reported physical activity level (Craig et al., 2003). This is a 7-item measure that is used to assess physical activity across domains for the last seven days. The IPAQ-SF is one of the most widely used self-report assessments of physical activity throughout the world, and has been found to have good test-retest reliability and acceptable criterion validity compared with more objective measures of physical fitness ($r = .80$; $p < .001$; Craig et al., 2003). The IPAQ includes questions regarding frequency and intensity of various activities, and is reported as metabolic equivalent minutes per week (MET-min-week).

Physical fitness level was also assessed with the Astrand-Rhyming cycle ergometer test (ARCET; Astrand & Rhyming, 1954). The ARCET has been found to be a valid tool for use within a college-aged population for both males and females, with an adequate test-retest reliability ($r = .78 - .85$; Hoehn, Mullenbach, & Fountaine, 2015; Wisen & Wohlfart, 1995). In addition, the estimated VO_2 max predicted by this submaximal test is strongly correlated with a direct measurement ($r = .84$). This test is a commonly used submaximal aerobic test, and provides an estimate of cardiovascular fitness, also commonly known as VO_{2max} . VO_{2max} describes the maximum amount of oxygen that an individual is capable of using, and is measured in milliliters per kilogram of weight per minute. A submaximal aerobic test is a test of physical fitness that requires participants to engage in some form of physical activity, such as walking, running, or biking, usually while heart rate is monitored. Submaximal field tests provide an estimate of VO_2^{max} , but not an exact measurement. Direct tests of VO_2^{max} provide an exact measurement due to more extensive monitoring of vital signs, but such tests are considered intrusive to participants and require expensive equipment to perform. It was determined that a submaximal test of VO_2^{max} would be more appropriate for this study than a direct maximal test, due to the large sample size and need for a non-intrusive testing procedure for the comfort of participants. The ARCET requires that participants engage in approximately 12-15 minutes of physical activity through the use of a specialized exercise cycle, while having heart rate and blood pressure monitored throughout the procedure. Details of this test are described further in the Procedures.

Personality Judgment. Participants watched six, three-minute videos and completed other-report versions of one person in each video using the Big Five Inventory

(BFI; John, Donahue, & Kentle, 1991) or the International Personality Item Pool version of the IPIP-NEO-PI-R (IPIP-NEO; Goldberg, 1999), depending on the accuracy criteria that was available for the video. The six videos were drawn from three separate data sets to save time and resources. Two videos contain footage of three, unacquainted individuals who are getting to know each another. Another two videos include footage of a mock job interview guided by a research assistant. The last two videos contain footage of two individuals discussing their behaviors, emotions, and thoughts in different scenarios. For each video, only one individual was the focal point for personality assessment by the participant, and participants received instructions as to which individual was the focus of each video.

The BFI (John, et al., 1991) is a 44-item measure that assesses personality over five main dimensions, which include Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. The BFI is a widely used personality inventory, and has good internal reliability (α 's = .75-.80) and test-retest reliability for a 3-month period (r 's = .80-.90). A good internal reliability was found for the self-report version for the current study (α = .74-.86). A 60-item version of the IPIP-NEO (Goldberg, 1999) assesses personality along these same five dimensions, with the original 300-item version having high reliability on average across dimensions (α = .90). For this measure, 60 items were chosen as a representation of the facets for each trait, with two items per facet, for the purpose of reducing the length of time needed to make judgments of targets. For both assessments, participants answer based on a 5-point scale, ranging from *disagree strongly* to *agree strongly*, which allowed for both measures to be represented on the same scale and more streamlined data combination Measures for

psychological well-being, cognitive functioning, physical fitness, and personality can be found in the Appendix.

Social Desirability. The Marlowe-Crowne Social Desirability Scale (MCSD; Crowne & Marlowe, 1960) was used to assess social desirability, and whether or not participants are representing themselves honestly. The MCSD is a 33-item measure on a 7-point scale, from *not true* to *very true*. The MCSD shows acceptable internal reliability as well as test-retest reliability ($r = .88$; $r = .89$). For the current study, an adequate internal reliability was found ($\alpha = .82$). Compared with the Balanced Inventory of Desirable Responding, the MCSD has been found to be a more sensitive measure of desirable responding (Lambert, Arbuckle, & Holden, 2016). Social desirability was found to be related to psychological well-being as a composite score ($r = .40$, $p < .001$), as well as satisfaction with life ($r = .26$, $p < .001$), emotional intelligence ($r = .36$, $p < .001$), and affect balance ($r = .35$, $p < .001$). Social desirability was not significantly related to any other variables. Because of the significant relationships between social desirability and various aspects of psychological well-being, separate analyses will be run to control for social desirability when psychological well-being is a variable of interest.

Procedures

This was a two-part study in which participants were required to sign up for both Session 1 and 2 simultaneously. Session 1 required participants to complete a series of self-report measures, cognitive tests, and target ratings based on video observations, as well as a medical history form to determine eligibility for Session 2. Session 2 included the ARCET. The second part was completed within 14 days of the first for all participants. Participants who completed Session 2 also had their physical fitness score

and classification sent to them within 2-4 weeks of the session (for a visual representation of the procedure, see Figure 1).

The first part of the study took place in a personality judgment and accuracy lab on the Idaho State University campus, and was set up with all necessary equipment prior to the participants' arrival. Up to four participants were able to take the study at the same time and place. A trained research assistant was present throughout the study to provide directions and answer questions.

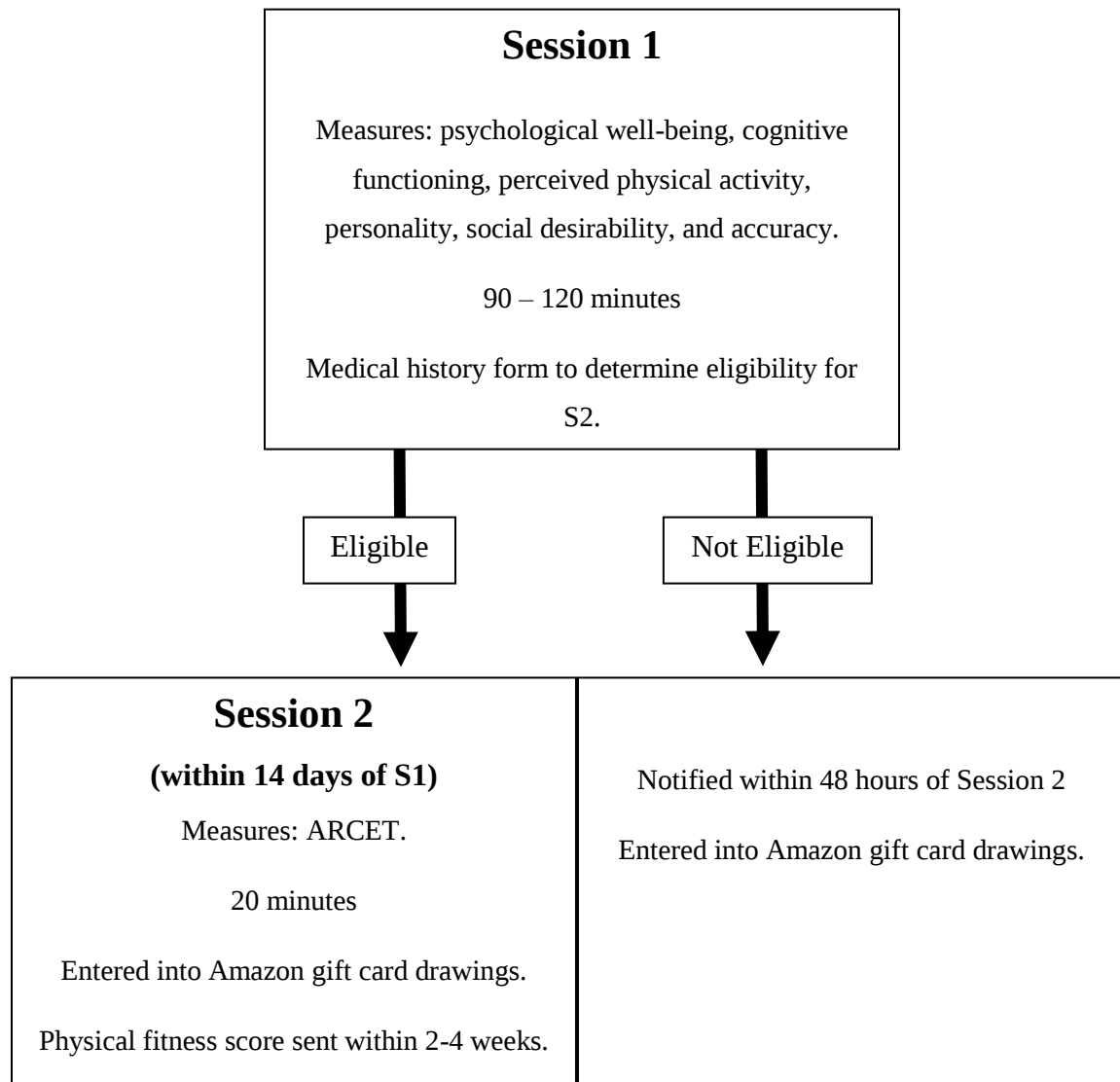


Figure 1. Illustration of the procedure for Sessions 1 and 2.

Upon arrival, participants were greeted by a research assistant and asked to provide their SONA ID number or other form of identification in order to gain class credit or extra credit for participating. Participants were seated at a desk with a laptop, computer mouse, and headphones, and were given spoken directions from the research assistant. These directions were read verbatim from a script, to keep the experience consistent for all participants. After completion of the consent form, participants completed the RAPM. This was completed first to allow the RA to track the time for all participants, with participants having 15-minutes to complete as many questions as they could. Next, participants watched six videos of target individuals, each three-minutes in length. Upon completion of each video, participants completed an other-report version of the BFI or the IPIP-NEO (based on the accuracy criteria) to rate each target's personality, as well as a brief 3-question memory test based on information from the video of interest. Next, participants completed the remaining measures of cognitive functioning, which included the ACQ and the measure of dispositional intelligence. Participants then filled out a self-report measure of the BFI, followed by all measures of psychological well-being which included the PWB, SWLS, PANAS, WLEIS, and MPSS. The final self-reports included the MCSDS, IPAQ, and a basic demographic questionnaire. Lastly, participants filled out a medical history form to determine eligibility for Session 2. The first part of the study took between 90 and 120 minutes.

After completion of the first session, participants were notified of eligibility for Session 2 via email within 48 hours of the second session. If deemed eligible, participants were invited to participate in the ARCET within two weeks of the first session.

The ARCET took place in an exercise science laboratory on the Idaho State University campus. Participants were run individually using one set of equipment to keep measurements consistent. The primary investigator was present to set up for and run each participant. If a research assistant assisted with the test, he or she was trained in the protocol of the test and supervised by the primary investigator at all times. Equipment and space for the test was provided by qualified lab personnel at the Sport Science and Physical Education department, along with the basic protocol and procedure of the test, as outlined by Astrand and Rhyning (1954).

Upon arrival, participants had the opportunity to review the informed consent document before continuing with the test. Weight (kg) was recorded with shoes on, and participants were asked briefly about activity level in order for the researchers to get a starting baseline for cycle resistance for pedaling. A heart rate monitor was worn around the chest for the duration of the test. A cycle ergometer was used for each participant. Seat height was adjusted accordingly, to obtain a 15-20° knee inflection at maximum extension of the cycle rotation. Resting heart rate and blood pressure were recorded before the test, and continuously monitored and recorded throughout the test. Participants first engaged in a warmup of pedaling for 4-5 minutes (timed with a stopwatch), with no resistance at 50-55 rpm. Upon completion of the warmup, resistance was added based on gender and level of fitness (1 or 2 kg for unconditioned men; 2 or 3 kg for conditioned men; 1 or 1.5 kg for unconditioned women; and 1.5 or 2 kg for conditioned women).

Once resistance was added, participants were reminded to continue pedaling at 50-55 rpm for the duration of the test. Heart rate was recorded every minute, and blood pressure was obtained during the last 30-seconds of every two-minutes. If at any point a

participant reached their maximum heart rate ($220 - \text{age}$), or if blood pressure exceeded a healthy range, the test was terminated. The test was also terminated if a participant exceeded 170 beats/minute for at least one minute. Resistance was either lowered, increased, or kept stable at minute three, based on heart rate. If the participant reached a heart rate of 125-170 beats/minute within the fifth and sixth minutes of testing, the test concluded. The goal was to increase, decrease, or keep resistance stable in an effort to have the participant reach this goal within the fifth and sixth minutes. If the participant did not reach this target range within both the fifth and sixth minutes of work, the test continued, with resistance being increased by 0.5 kg each minute until the last two heart rates fell within the desired range. Upon completion of the test, participants had a cool down period for 4-5 minutes with no resistance until heart rate and blood pressure were significantly reduced. Participants were sent their results for the ARCET through email within 2-4 weeks after completion. The second session typically took 20 minutes. Scores were calculated based on participants' average heart rate during the last two minutes of testing, bike resistance in kilograms, body weight in kilograms, gender, and age. Lower heart rate, higher bike resistance, and lower body weight factor into higher scores on the ARCET.

Data Preparation

All data for Session 1 was collected using Media Lab, a data collection software. Session 2 data was collected via pencil and paper and was manually calculated and entered throughout data collection. Participants who failed more than 20% of the embedded attention checks during Session 1 were removed from the final data analysis. No participants failed to answer under 80% of the questions presented in Session 1.

Variables were scored based on the criteria presented for that measure, which included reverse scoring for certain measures, followed by combination of all items for that variable. In the case of multiple-choice measures, answers were coded as “1” for correct answers and “0” for incorrect answers before all items were combined. All final scores were transformed into z-scores to keep variability consistent and interpretation more straightforward across variables. Finally, composite scores for psychological well-being and cognitive functioning were formed after all sub-measures were z-score transformed. Internal reliability of the composite scores for psychological well-being and cognitive functioning (based on scores for the individual measures) was fairly low (α s = .29 and .56, respectively), which was in line with the goal of assessing different aspects of each construct. To assess the distribution of each measure, histograms and q-q plots were examined. Variables that were deemed to be moderately to severely skewed (as in the case of self-reported physical activity) were square root and log transformed and the transformation that best fit a normal distribution was chosen. Measures that were normally distributed or only slightly skewed were not transformed.

Accuracy Criterion

The accuracy criterion was determined through multiple validation measures for each target, which included a self-report assessment of personality and other-report assessments from two acquaintances who had known the target for at least six months. This criteria was determined using the BFI as for the accuracy criterion for five targets, and the IPIP-NEO for one target. The two acquaintance ratings were averaged first, and then averaged with the self-report rating. Normative and distinctive accuracy were both normally distributed variables.

Psychological Well-Being and Cognitive Functioning

No significant relationship was found between composite scores for psychological well-being and cognitive functioning, $r = .07 [-.06, .19]^2$, $p = .26$. Relationships between the individual components of psychological well-being and cognitive functioning can be found in Table 1. For measures of psychological well-being: psychological well-being as a composite score, Ryff's psychological well-being, satisfaction with life, and affect balance were all normally distributed. Perceived social support and emotional intelligence were only slightly skewed, and since there was not much noticeable improvement from transformation, the original scores were kept. All measures of cognitive functioning (including the composite score) were normally distributed.

Physical Fitness

Of the full sample, 54% of participants completed both Session 1 and 2, 27% were excluded from Session 2 but participated in Session 1, and 19% were eligible for Session 2 but dropped out after completion of Session 1. Of the 134 participants who completed Session 2, 69% were classified as "Low" in physical fitness level, 13% were classified as "Somewhat Low," 10% were classified as "Average", 3% were classified as "High", and 2% were classified as "Very High" based on ARCET criteria. Due to the low sample sizes in many of these groups, the "Somewhat Low" and "Average" groups were combined, as well as the "High" and "Very High" groups, to make a total of three physical fitness groups. A small correlation was found between self-reported physical activity and the continuous measure of objective physical fitness, $r = .26 [.09, .41]$, $p =$

² Numbers in brackets denote 95% confidence intervals.

.002. Objective physical fitness was normally distributed, while self-reported physical activity was moderately skewed and thus log-transformed (see Figures 2 and 3).

Table 1

Correlations between the individual components of psychological well-being and cognitive functioning

Variable	Emotional intelligence	Perceived social support	Satisfaction with life	Affect balance
Ryff's PWB	.62***	.18**	.67***	.73***
Emotional intelligence		.01	.45***	.51***
Perceived social support			.05	-.08
Satisfaction with life				.66***
	Attributional complexity	Memory	Fluid Intelligence	
Dispositional intelligence	.10	.24***		-.05
Attributional complexity		.22***		.01
Memory				.04
	Dispositional Intelligence	Attributional Complexity	Memory	Fluid Intelligence
Ryff's PWB	.04	.20**	.15*	-.07
Emotional intelligence	.11	.14*	.11	-.12
Perceived social support	-.46***	.08	.09	.35***
Satisfaction with life	.09	.04	.04	-.20**
Affect balance	.22**	.05	.04	-.21**

Note. * $p < .05$, ** = $p < .01$, *** $p = .001$

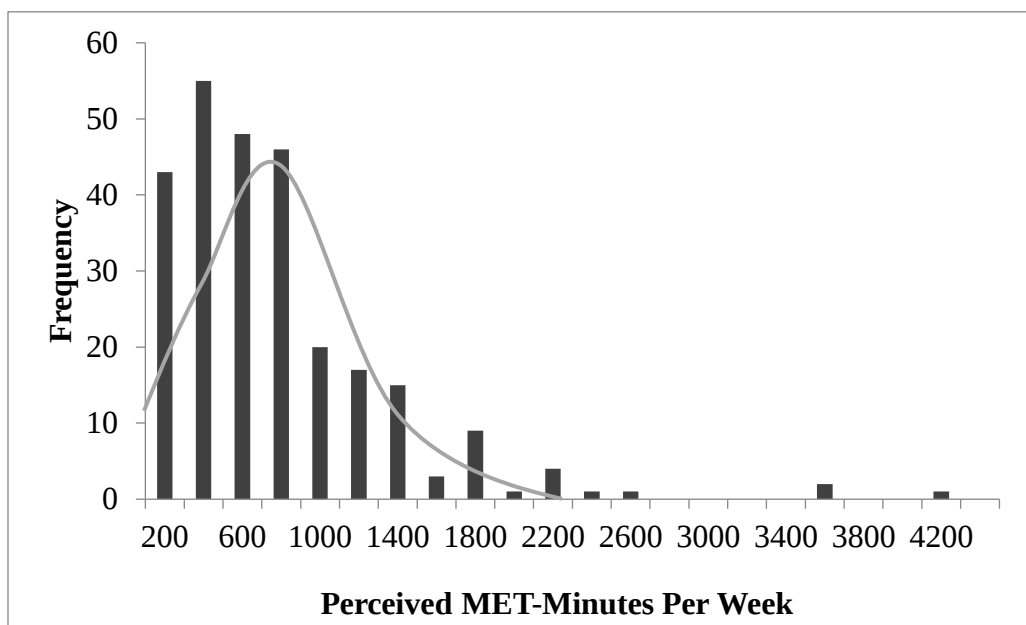


Figure 2. Histogram for self-reported physical activity with a normal curve. This variable was moderately to severely positively skewed.

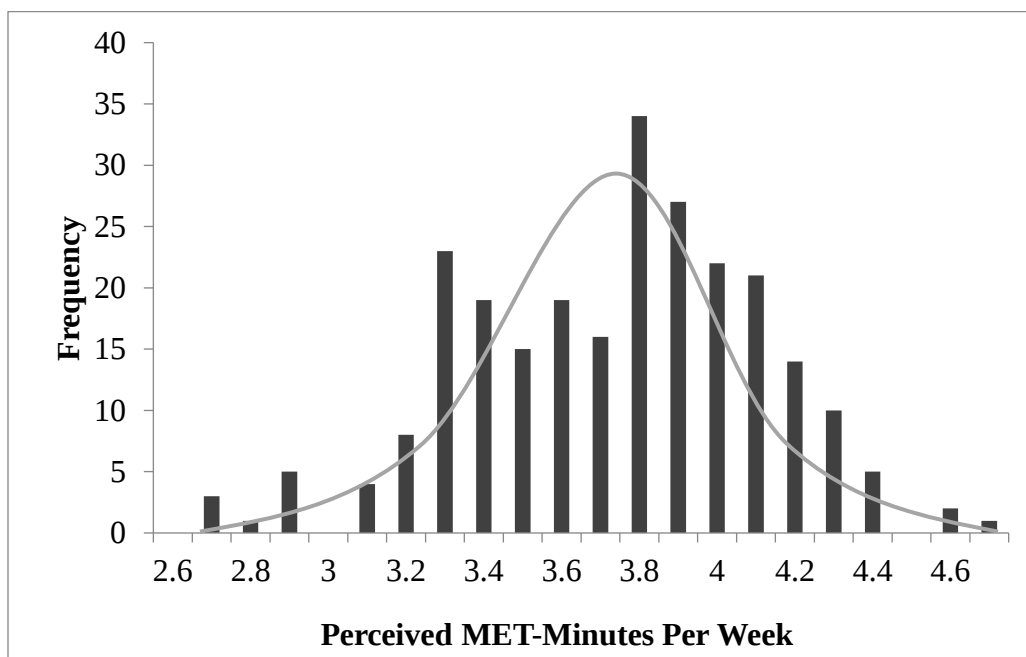


Figure 3. Histogram of self-reported physical activity after log-transformation with a normal curve.

Chapter 4: Results

Hypothesis 1

It was hypothesized that physical fitness would be positively related to both psychological well-being and cognitive functioning.³ For the purpose of analyzing the role of separate measures in Hypothesis 1, scores were standardized to keep variability consistent across variables. Hypothesis 1 was assessed through two sets of basic regression analyses and two sets of multiple regression analyses with the two measures of physical fitness or activity acting as the criterion in each model. These analyses consisted of the following: 1. Psychological well-being predicting self-reported physical fitness; 2. cognitive functioning predicting self-reported physical fitness; 3. psychological well-being predicting objective physical fitness; and 4. cognitive functioning predicting objective physical fitness.

Results for the basic regressions will be discussed first, followed by the multiple regressions with individual scores. Next, one-way ANOVAs will be discussed, and finally MANOVAs examining the individual scores will be reported. Psychological well-being as a composite score did not significantly predict self-reported physical activity level or objective physical fitness level. Cognitive functioning as a composite score also did not significantly predict either self-reported physical activity level or objective fitness level (see Tables 2 and 3).⁴

³ All analyses were run separately for males, females, Caucasians, and other ethnicities to test for differences among demographic groups. Differences in direction compared to the main findings will be mentioned in footnotes, where applicable.

⁴ Social desirability was correlated with psychological well-being ($r = .40, p = .001$). In order to control for this variable, separate analyses were run with social desirability as a predictor. No differences were found in the results for psychological well-being for either analysis, and social desirability was not a predictor of either self-reported physical activity ($B = .04 [-.01, .17], SE = .07, p = .60$) or objective physical fitness ($B = .011 [-.07, .30], SE = .09, p = .23$).

In order to more fully understand the role of psychological well-being and cognitive functioning in relation to physical fitness, additional multiple regression analyses were run to examine the unique variance in physical fitness or physical activity explained by each individual measure of psychological well-being and cognitive functioning. These individual components of psychological well-being included Ryff's psychological well-being, emotional intelligence, perceived social support, satisfaction with life, and affect balance (see Table 2). When each of these components was simultaneously entered into a multiple regression model, they did not significantly predict self-reported physical activity. For the second multiple regression, each of these components was simultaneously entered into a multiple regression model and they were found to significantly predict objective physical fitness. Ryff's psychological well-being, affect balance, and perceived social support⁵ were significant predictors of higher objective physical fitness level. No other individual component was a significant predictor.⁶

The individual components of cognitive functioning included dispositional intelligence, attributional complexity, memory of the targets, and fluid intelligence (see Table 4). When each of these components was simultaneously entered into a multiple regression model, they were not found to significantly predict self-reported physical activity. For the final multiple regression, each of these components was simultaneously

⁵ For males, this predictor was non-significant and in a negative direction, $B = -.10 [-.54, .34]$, $SE = .22$, $p = .66$.

⁶ Each of these analyses was also run while controlling for social desirability. For both objective physical fitness and self-reported physical activity, no differences were found from the analyses that did not control of social desirability. Social desirability was not a significant predictor of either self-reported physical activity ($B = .04 [-.10, .18]$, $SE = .07$, $p = .60$) or objective physical fitness ($B = .12 [-.06, .29]$, $SE = .09$, $p = .20$).

entered into a multiple regression model, and they were found to significantly predict objective physical fitness. Dispositional intelligence and attributional complexity were both found to predict a significant amount of variance in objective physical fitness level, with dispositional intelligence as a negative predictor and attributional complexity as a positive predictor. No other individual component was a significant predictor.

Table 2

Basic and multiple regressions between components of psychological well-being and self-reported physical activity or objective physical fitness level

Variable	Self-Reported Physical Activity				
	<i>B (SE)</i>	<i>CI</i>	<i>F</i>	<i>R</i>	<i>p</i>
Psychological Well-Being (composite)	.15 (.09)	-.03, .32	2.72	.10	.10
			.662	.12	.65
Ryff's PWB	-.11 (.12)	-.33, .12			.35
Emotional intelligence	.02 (.08)	-.14, .18			.80
Perceived social support	.11 (.07)	-.03, .24			.12
Satisfaction with life	.01 (.09)	-.17, .19			.90
Affect Balance	.18 (.10)	-.02, .38			.08
Variable	Objective Physical Fitness				
	<i>B (SE)</i>	<i>CI</i>	<i>F</i>	<i>R</i>	<i>p</i>
Psychological Well-Being (composite)	.20 (.13)	-.07, .46	2.12	.13	.15
			4.17***	.40	<.001
Ryff's PWB	.36 (.16)*	.06, .67			.02
Emotional Intelligence	.04 (.11)	-.18, .25			.73
Perceived social support	.23 (.09)*	.05, .41			.01
Satisfaction with life	-.07 (.12)	-.31, .17			.56
Affect Balance	-.29 (.14)*	-.56, -.01			.04

Note. * $p < .05$, *** $p < .001$.

Table 3

Basic and multiple regressions between components of cognitive functioning and self-reported physical activity or objective physical fitness level

Variable	Self-Reported Physical Activity				
	<i>B (SE)</i>	<i>CI</i>	<i>F</i>	<i>R</i>	<i>p</i>
Cognitive Functioning (composite)	-.14 (.11)	-.36, .09	1.47	.08	.23
			.54	.09	.71
Dispositional Intelligence	-.08 (.07)	-.21, .05			.20
Attributional complexity	-.02 (.07)	-.15, .11			.72
Memory	-.01 (.07)	-.14, .13			.94
Fluid Intelligence	-.03 (.07)	-.15, .10			.68
Variable	Objective Physical Fitness				
	<i>B (SE)</i>	<i>CI</i>	<i>F</i>	<i>R</i>	<i>p</i>
Cognitive Functioning (composite)	.11 (.15)	-.19, .40	.48	.06	.49
			5.10***	.37	<.001
Dispositional Intelligence	-.28 (.08)***	-.44, -.12			<.001
Attributional complexity	.22 (.09)*	.04, .39			.01
Memory	.11 (.09)	-.06, .28			.20
Fluid Intelligence	.07 (.08)	-.09, .23			.41

Note. * $p < .05$; *** $p < .001$.

Hypothesis 1 was also analyzed through one-way ANOVAs and MANOVAs. Composite scores for cognitive functioning or psychological well-being were compared across scores on the ARCET that were divided into five categories based on fitness level, with separate groups for excluded and attrition participants. While the ARCET categorizes individuals into five physical fitness groups (low, somewhat low, average,

high, and very high), these groups were consolidated into three groups to try and improve the sample size within the smaller groups.⁷ These analyses included the following criterion variables compared across levels of objective physical fitness: 1. psychological well-being as a composite score; 2. cognitive functioning as a composite score; 3. individual measures of psychological well-being; and 4. individual measures of cognitive functioning. This made for a total of four ANOVAs.

For the first analysis, psychological well-being as a composite score was compared across levels of objective physical fitness. A significant difference was found between groups, $F(4, 243) = 3.46$, partial $\eta^2 = .05$, $p = .009$ ⁸ (see Figure 4). To further examine the differences between groups, Tukey post-hoc tests were conducted to compare means of psychological well-being between objective physical fitness groups. The excluded group had a significantly lower mean compared with the highest physical fitness group ($M_{\text{difference}} = -.59$ [-1.15, -.03], $SE = .20$, $p = .03$), as well as the average physical fitness group ($M_{\text{difference}} = -.45$ [-.89, -.02], $SE = .16$, $p = .04$). No other significant differences were found (all p 's > .27). When cognitive functioning as a composite score was compared across levels, no significant differences between groups were found, $F(4, 243) = .74$, partial $\eta^2 = .009$, $p = .68$ (see Figure 5).⁹

⁷ When these analyses were run with no groups combined or only the “somewhat low” and “average” groups combined, fewer significant results were found, specifically for the groups with lower sample sizes. This may be indicative of a power issue, thus combination of the “somewhat low” and “average” groups, and the “high” and “very high” groups were kept for the reported analyses.

⁸ These findings did not change when social desirability was included as a covariate. Social desirability was a significant predictor of psychological well-being, $F(1, 242) = 47.63$, partial $\eta^2 = .16$, $p < .001$.

⁹ Objective physical fitness was also examined with six physical fitness groups instead of five (“somewhat low” and “average” were not combined). When these groupings were examined, only the excluded and high physical fitness groups differed, $M_{\text{difference}} = -.59$ [-1.18, -.001], $SE = .21$, $p = .05$.

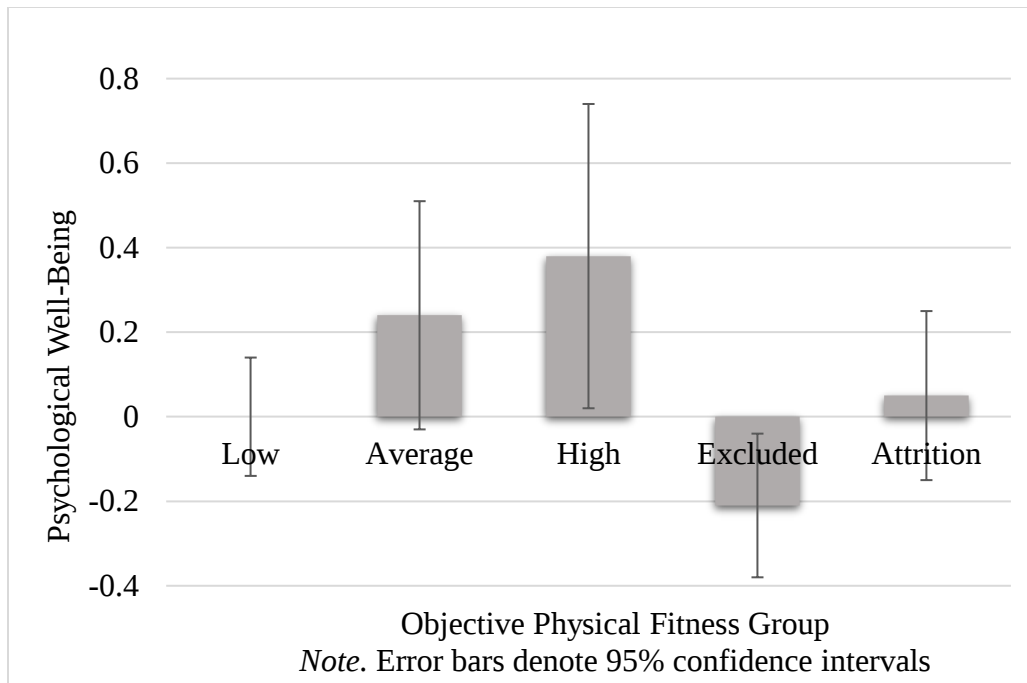


Figure 4. Comparison of means for psychological well-being as a composite score across physical fitness groupings.

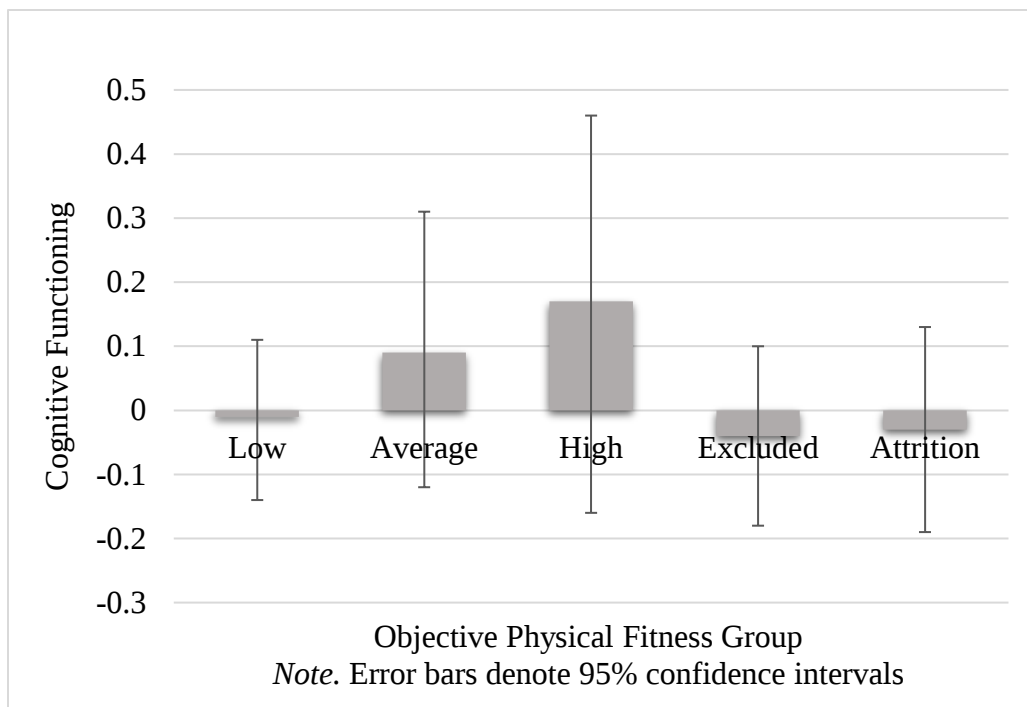


Figure 5. Comparison of means for cognitive functioning as a composite score across physical fitness groupings.

When individual components of psychological well-being were compared across levels, a significant difference was found, $F(20, 794) = 2.49$, Wilk's $\Lambda = 0.82$, partial $\eta^2 = .05$, $p < .001$. More specifically, Ryff's psychological well-being ($F(4, 243) = 3.02$, partial $\eta^2 = .05$, $p = .02$; see Figure 6) and perceived social support ($F(4, 243) = 5.69$, partial $\eta^2 = .09$, $p < .001$; see Figure 7) significantly differed across levels. Differences between means were not found for the other components of psychological well-being (all p 's $> .06$).¹⁰

Tukey post-hoc tests were conducted to compare means for Ryff's psychological well-being and perceived social support across groups. For Ryff's psychological well-being, the excluded group had a significantly lower mean compared with the average physical fitness group ($M_{\text{difference}} = -.63$ [-.12, -.01], $SE = .22$, $p = .05$). For perceived social support, the highest physical fitness group had a significantly higher mean compared with the lowest physical fitness group ($M_{\text{difference}} = 1.28$ [.52, 2.04], $SE = .28$, $p < .001$), the medium-level physical fitness group ($M_{\text{difference}} = 1.01$ [.14, 1.88], $SE = .32$, $p = .01$), excluded participants ($M_{\text{difference}} = 1.29$ [.51, 2.06], $SE = .28$, $p < .001$), and participants lost due to attrition ($M_{\text{difference}} = 1.31$ [.51, 2.11], $SE = .29$, $p < .001$). This indicates that the highest physical fitness group differed from every other group for perceived social support.¹¹

¹⁰ These results did not differ when social desirability was included as a covariate. Social desirability was a significant predictor of the individual aspects of psychological well-being, partial η^2 's = .15 - .17, all p 's $< .001$.

¹¹ When these results were examined with 6 physical fitness groups instead of 5, findings were consistent, except the highest physical fitness group did not differ from the average physical fitness group, $M_{\text{difference}} = .71$ [-.43, 1.85], $SE = .40$, $p = .48$.

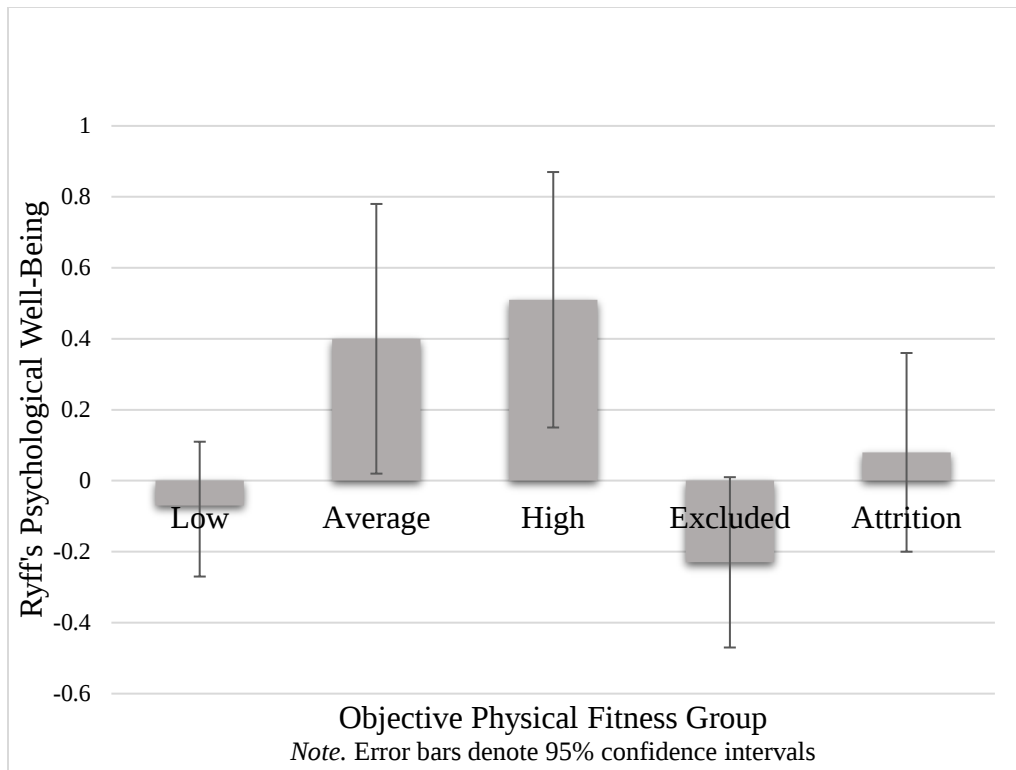


Figure 6. Comparison of means for Ryff's psychological well-being across physical fitness groupings.

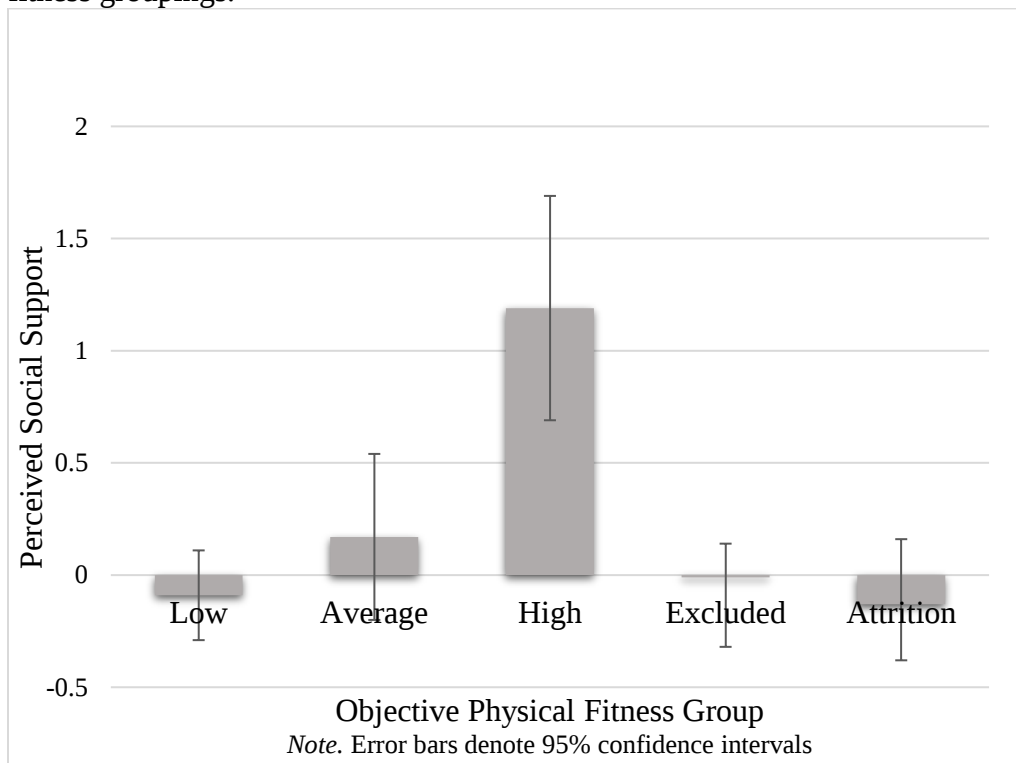


Figure 7. Comparison of means for perceived social support across physical fitness groupings.

When individual components of cognitive functioning were compared across levels, a significant difference was found, $F(16, 734) = 2.73$, Wilk's $\Lambda = 0.34$, partial $\eta^2 = .04$, $p < .001$. More specifically, attributional complexity ($F(4, 243) = 2.68$, partial $\eta^2 = .04$, $p = .03$; see Figure 8) and dispositional intelligence ($F(4, 243) = 4.55$, partial $\eta^2 = .07$, $p = .001$; see Figure 9) differed across levels of objective physical fitness. Differences between means were not found for the other components of cognitive functioning (all p 's $> .08$).

Tukey post-hoc tests were conducted to compare means for attributional complexity and dispositional intelligence across groups. For attributional complexity, the highest physical fitness group had a significantly higher mean compared with the lowest physical fitness group, $M_{\text{difference}} = .80$ [.02, 1.57], $SE = .28$, $p = .04$. For dispositional intelligence, the highest physical fitness group had a significantly lower mean compared with the lowest physical fitness group ($M_{\text{difference}} = -1.05$ [-1.81, -.28], $SE = .28$, $p = .002$), the medium-level physical fitness group ($M_{\text{difference}} = -.96$ [-1.84, -.08], $SE = .32$, $p = .02$), and participants lost due to attrition ($M_{\text{difference}} = -.96$ [-1.77, -.15], $SE = .30$, $p = .01$).

Hypothesis 2

Secondly, it was hypothesized that psychological well-being and cognitive functioning would positively predict both normative and distinctive accuracy. In order to assess this hypothesis, composite scores for psychological well-being and cognitive functioning, as well as each individual component, were entered into SAM as moderators with a separate analysis for each moderator. This type of analysis assessed the degree to which these variables moderate accuracy levels independently of one another. Usage of

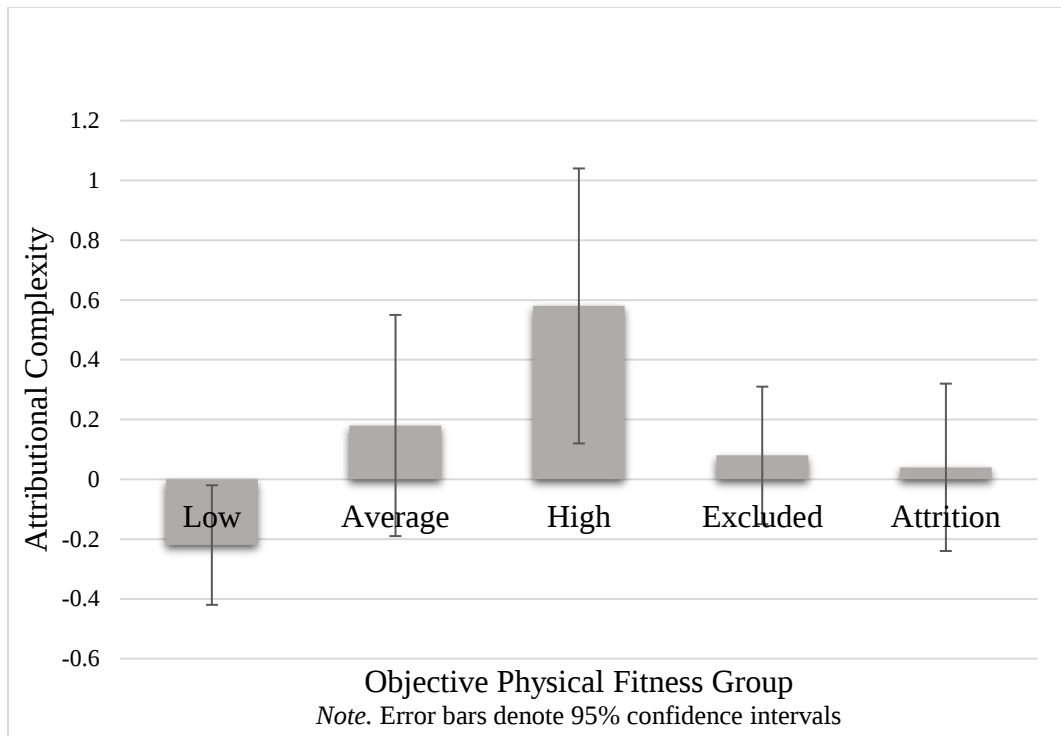


Figure 8. Comparison of means for attributional complexity across physical fitness groupings.

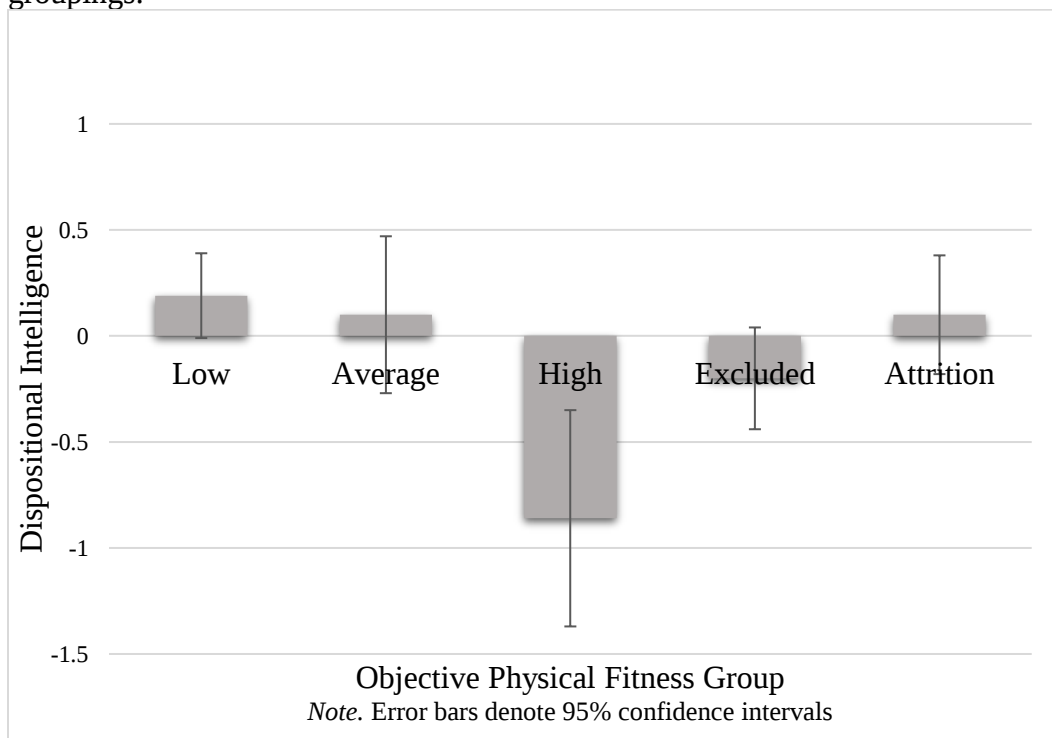


Figure 9. Comparison of means for dispositional intelligence across physical fitness groupings.

this method is consistent with similar hypotheses throughout the personality judgment literature, and is becoming a more commonly used method when assessing variables associated with personality judgment accuracy (Biesanz, 2010; Letzring, 2015). The nested models of the multilevel equations are demonstrated in equations 1.1 and 1.2. Within this model, the normative profile is mean centered, and the normative profile is subtracted from the distinctive profile to ensure the variables are orthogonal.

$$Y_{jti} = \beta_{0jt} + \beta_{1jt} \text{TCrit}_{ti} + \beta_{2jt} \text{AP}_i + \varepsilon_{jti} \quad (1.1)$$

$$\beta_{0jt} = \gamma_{00} + \gamma_{01} \text{MOD}_j + u_{0j} + u_{0t} \quad (1.2)$$

$$\beta_{1jt} = \gamma_{10} + \gamma_{11} \text{MOD}_j + u_{1j} + u_{1t}$$

$$\beta_{2jt} = \gamma_{20} + \gamma_{21} \text{MOD}_j + u_{2j} + u_{2t}$$

In equation 1.1, Y_{jti} is the predicted accuracy score for judge j on target t for item i . TCrit_{ti} is the target accuracy criterion (average of self-rating and acquaintance ratings) for target t on item i . AP_i represents the estimate of the average accuracy criteria of item i , which is the estimation of the average person's rating on that item that will be taken from a larger data set to get a more reliable average than would be possible if it was based on only the six targets used in the current study.

In equation 1.2, β_{0jt} represents the predicted accuracy score of judge j on target t for item i when both TCrit_{ti} and AP_i are held constant and at the mean. β_{1jt} is the predicted value of distinctive accuracy when the estimation of the average person on item i is held constant at the mean. β_{2jt} represents the predicted value of normative accuracy when the criterion value for item i is held constant at the mean. γ_{00} is the average intercept, and γ_{10} and γ_{20} are the average intercepts across perceivers and targets for distinctive and normative accuracy, respectively. γ_{11} represents the average slope of the moderator,

which in the current study is either psychological well-being or cognitive functioning. The last three components in each of the 1.2 equations represent the residuals of the model. For the judge, u_{0j} , u_{1j} , and u_{2j} represent the residual variance of the intercept, distinctive accuracy, and normative accuracy, respectively. The combination of u_{0t} , u_{1t} , and u_{2t} describe the same set of residual accuracy for the target. The dyadic random effects of this model did not converge, therefore they were left out of the current model.

For the general model (without moderators), judges achieved a significant level of distinctive accuracy ($B = .29$, $SE = .09$, $p = .02$), but not normative accuracy ($B = .48$, $SE = .24$, $p = .10$). Composite scores for psychological well-being and cognitive functioning were entered in as moderators, as well as each individual component that made up these two constructs. This made for a total of 11 different moderations, as each moderator was entered separately into an equation. For each moderation, d was calculated as the change in slope (γ_{11} or γ_{21}) for a 2 SD change in the associated moderator divided by an estimate of the random effect SD for that slope, following Gelman (2008) and Marsh and colleagues (2009).

Psychological well-being as a composite score was associated with higher normative accuracy, but not distinctive accuracy. When each individual component of psychological well-being was examined separately, Ryff's psychological well-being, emotional intelligence, satisfaction with life, and affect balance were all associated with higher levels of normative accuracy. Perceived social support was the only aspect to not be associated with either type of accuracy (see Table 4).¹²

¹² No changes were found when social desirability was added as a moderator. Social desirability was not a significant moderator of either normative ($B = -.0002$, $SE = .01$, $d = -.001$, $p = .98$) or distinctive accuracy ($B = .007$, $SE = .006$, $d = .05$, $p = .21$) and did not moderate either type of accuracy when examined with aspects of psychological well-being.

Table 4

Psychological well-being and cognitive functioning as moderators of distinctive and normative accuracy

Moderator	Distinctive Accuracy			Normative Accuracy		
	<i>B</i> (<i>SE</i>)	<i>d</i>	<i>p</i>	<i>B</i> (<i>SE</i>)	<i>D</i>	<i>p</i>
Psychological Well-Being (composite)	.017 (.013)	.11	.18	.075 (.030)*	.18	.01
Ryff's PWB	.014 (.009)	.11	.13	.051 (.021)*	.15	.02
Emotional Intelligence	.010 (.008)	.08	.25	.056 (.020)**	.17	.003
Satisfaction with Life	.004 (.010)	.03	.68	.046 (.022)*	.14	.04
Affect Balance	.006 (.009)	.05	.51	.045 (.022)*	.14	.04
Perceived Social Support	.012 (.007)	.09	.11	.006 (.018)	.02	.72
Cognitive Functioning (composite)	.048 (.014)***	.24	.001	.036 (.035)	.07	.30
Dispositional Intelligence	.020 (.008)*	.16	.02	.017 (.020)	.05	.41
Attributional Complexity	.019 (.009)*	.15	.04	.037 (.021)	.11	.08
Memory	.015 (.008)	.12	.07	.009 (.020)	.03	.66
Fluid Intelligence	.013 (.009)	.10	.15	-.011 (.021)	-.03	.60

Note. * $p < .05$, ** $p < .01$, *** $p = .001$

Cognitive functioning as a composite score was associated with higher distinctive accuracy, but not normative accuracy. When each individual component of cognitive functioning was examined separately, dispositional intelligence and attributional complexity were associated with higher levels of distinctive accuracy. No individual aspect of this construct was associated with higher levels of normative accuracy. The

aspects of memory and fluid intelligence were not associated with either type of accuracy (see Table 4).

Hypothesis 3

Lastly, it was hypothesized that psychological well-being and cognitive functioning will mediate the relationship between physical fitness and personality judgment accuracy. For this hypothesis, distinctive and normative accuracy scores were estimated using SAM for each judge, and mediation of psychological well-being and cognitive functioning were examined through a bootstrapping analysis. Bootstrapping is a commonly used resampling method that tests the significance of ab , or the multiplication of the two paths of interest within this specific style of mediation (Montoya & Hayes, 2017). The a path is the relationship between the predictor variable (physical fitness) and the mediator (either psychological well-being or cognitive functioning, depending on the analysis). The b path is the relationship between the mediator and the criterion variable (distinctive or normative accuracy). A visual demonstration of the mediation model and the paths can be seen in Figure 10. Bootstrapping resamples the data by creating new datasets using the original dataset as a reference point for the underlying distribution. This analysis takes values from the original dataset, with no limit on how many times a value can appear in a generated dataset. For each mediator of interest, the analysis was run 1,000 times to get a stable estimate of ab . Confidence intervals (95%) were also estimated based on these generated datasets. Bootstrapping procedures were used to calculate the significance of ab for two different predictor variables (self-reported and objective physical fitness), two different mediators (psychological well-being and cognitive functioning) and two criterion variables (distinctive and normative accuracy).

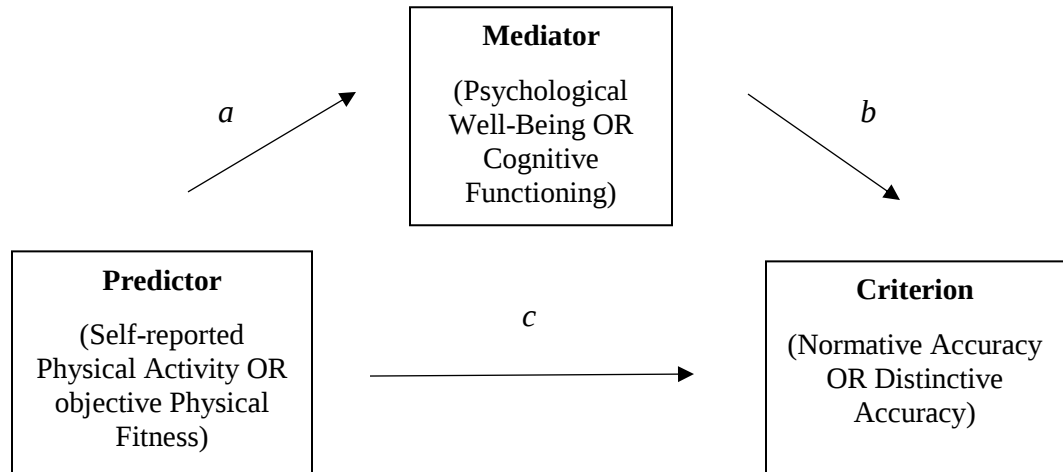


Figure 10. Example of a mediation model. This figure demonstrates the analyses for Hypothesis 3, as well as the *a*, *b* and *c* paths.

When psychological well-being was tested as a mediator between objective physical fitness and normative accuracy, objective physical fitness did not significantly predict psychological well-being, $R = .13 [-.04, .29]$, $p = .15$. In the second step, psychological well-being was found to significantly predict normative accuracy, but physical fitness was not a significant predictor of normative accuracy, $R = .19 [.02, .35]$, $p = .09$. A non-significant direct effect¹³ and indirect effect were found (see Table 5).¹⁴

When cognitive functioning was tested as a mediator between objective physical fitness and normative accuracy, objective physical fitness was not a significant predictor of cognitive functioning, $R = .06 [-.11, .23]$, $p = .49$. In the second step, cognitive functioning and objective physical fitness were both non-significant predictors, $R = .08 [-.09, .25]$, $p = .65$. This resulted in non-significant direct and indirect effects (see Table 5).

¹³ For Caucasians and females, significant negative direct effects were found for the relationship between psychological well-being and normative accuracy ($B = -.16 [-.28, -.05]$, $SE = .06$, $p = .006$ and $B = -.18 [-.29, -.08]$, $SE = .05$, $p = .001$, respectively). This was the case when either psychological well-being or cognitive functioning was the mediator.

¹⁴ These results did not change when social desirability was added as a covariate. Social desirability was a significant predictor of psychological well-being ($B = .26 [.16, .36]$, $SE = .05$, $t = 5.21$, $p < .001$) but not normative accuracy ($B = .14 [-.06, .33]$, $SE = .10$, $t = 1.40$, $p = .33$).

Table 5

Mediation analyses between objective physical fitness as the predictor, psychological well-being or cognitive functioning as the mediator, and normative accuracy as the outcome

	<i>B (SE)</i>	<i>CI</i>	<i>t</i>	<i>p</i>
<i>Mediation 1</i>				
Indirect Effect	.02 (.02)	-.004, .08		
A path Objective physical fitness → psychological well-being	.08 (.06)	-.02, .19	1.5	.14
B path Psychological well-being → normative accuracy	.29 (.14)*	.02, .56	2.09	.04
C path Objective physical fitness → normative accuracy	-.09 (.09)	-.27, .09	-1.00	.32
<i>Mediation 2</i>				
Indirect Effect	.003 (.01)	-.006, .04		
A path Objective physical fitness → cognitive functioning	.03 (.05)	-.06, .13	.69	.13
B path Cognitive functioning → normative accuracy	.09 (.16)	-.22, .40	.57	.40
C path Objective physical fitness → normative accuracy	-.07 (.09)	-.25, .11	-.77	.44

Note. * $p < .05$

When psychological well-being was tested as a mediator between objective physical fitness and distinctive accuracy, physical fitness was not found to significantly predict psychological well-being, $R = .13$ [-0.04, .29], $p = .15$. In the second step,

psychological well-being and objective physical fitness did not significantly predict distinctive accuracy, $R = .08 [-.09, .25]$, $p = .67$. This resulted in non-significant direct and indirect effects (see Table 6).¹⁵

When cognitive functioning was tested as a mediator between objective physical fitness and distinctive accuracy, objective physical fitness did not significantly predict cognitive functioning, $R = .06 [-.11, .23]$, $p = .49$. In the second step, cognitive functioning and objective physical fitness were both non-significant predictors of distinctive accuracy, $R = .16 [-.01, .32]$, $p = .17$. This resulted in non-significant direct and indirect effects (Table 6).

Next, psychological well-being was analyzed as a mediator between self-reported physical activity and normative accuracy. In the first step, self-reported physical activity did not predict psychological well-being, $R = .10 [-.02, .22]$, $p = .10$. In the second step, psychological well-being significantly predicted normative accuracy, but self-reported physical activity did not, $R = .18 [.06, .30]$, $p = .02$. No significant direct or indirect effects were found for this analysis (see Table 7).¹⁶

For the next analysis, cognitive functioning was examined as a mediator between self-reported physical activity and normative accuracy. In the first step, self-reported physical activity was not a significant predictor of cognitive functioning, $R = .08 [-.05, .20]$, $p = .23$. In the second step, cognitive functioning and self-reported physical activity

¹⁵These results did not change when social desirability was added as a covariate. Social desirability was a significant predictor of psychological well-being ($B = .26 [.16, .36]$, $SE = .05$, $t = 5.21$, $p < .001$) but not distinctive accuracy ($B = -.13 [-.32, .06]$, $SE = .10$, $t = -1.34$, $p = .18$).

¹⁶These results did not change when social desirability was added as a covariate. Social desirability was a significant predictor of psychological well-being ($B = .29 [.21, .37]$, $SE = .04$, $t = 7.09$, $p < .001$) but not normative accuracy ($B = -.005 [-.14, .13]$, $SE = .07$, $t = -.06$, $p = .95$).

did not predict normative accuracy ($R = .09 [-.04, .21]$, $p = .37$), which resulted in non-significant direct and indirect effects (see Table 7).

Table 6

Mediation analyses between objective physical fitness as the predictor, psychological well-being or cognitive functioning as the mediator, and distinctive accuracy as the outcome

	<i>B (SE)</i>	<i>CI</i>	<i>t</i>	<i>P</i>
<i>Mediation 1</i>				
Indirect Effect	.0002 (.01)	-.03, .02		
A path Objective physical fitness → psychological well-being	.08 (.06)	-.03, .19	1.46	.15
B path Psychological well-being → distinctive accuracy	.003 (.14)	-.27, .28	.02	.98
C path Objective physical fitness → distinctive accuracy	.08 (.09)	-.10, .25	.88	.38
<i>Mediation 2</i>				
Indirect Effect	.009 (.02)	-.009, .06		
A path Objective physical fitness → cognitive functioning	.03 (.05)	-.06, .13	.69	.49
B path Cognitive functioning → distinctive accuracy	.25 (.15)	-.05, .55	1.66	.10
C path Objective physical fitness → distinctive accuracy	.07 (.09)	-.10, .24	.80	.43

Table 7

Mediation analyses between self-reported physical activity as the predictor, psychological well-being or cognitive functioning as the mediator, and normative accuracy as the outcome

	<i>B (SE)</i>	<i>CI</i>	<i>t</i>	<i>P</i>
<i>Mediation 1</i>				
Indirect Effect	.02 (.01)	-.001, .05		
A path Self-reported physical activity → psychological well-being	.07 (.04)	-.01, .16	1.65	.10
B path Psychological well-being → normative accuracy	.23 (.09)**	.06, .41	2.63	.009
C path Self-reported physical activity → normative accuracy	-.08 (.06)	-.20, .05	-1.19	.23
<i>Mediation 2</i>				
Indirect Effect	.005 (.008)	-.03, .004		
A path Self-reported physical activity → cognitive functioning	-.05 (.04)	-.11, .03	-1.21	.23
B path Cognitive functioning → normative accuracy	.12 (.11)	-.10, .34	1.08	.28
C path Self-reported physical activity → normative accuracy	-.05 (.06)	-.18, .07	-.83	.41

Note. ** $p < .01$

When psychological well-being was examined as a mediator between self-reported physical activity and distinctive accuracy, self-reported physical activity did not significantly predict psychological well-being, $R = .10$ [-0.02, .22], $p = .10$. In the second step, psychological well-being and self-reported physical activity did not predict

distinctive accuracy $R = .10 [-.02, .22]$, $p = .28$. Both the direct and indirect effect were non-significant (see Table 8).¹⁷

Table 8

Mediation analyses between self-reported physical activity as the predictor, psychological well-being or cognitive functioning as the mediator, and distinctive accuracy as the outcome

	<i>B (SE)</i>	<i>CI</i>	<i>t</i>	<i>p</i>
<i>Mediation 1</i>				
Indirect Effect	.01 (.01)	-.002, .04		
A path Self-reported physical activity → psychological well-being	.07 (.04)	-.01, .16	1.65	.10
B path Psychological well-being → distinctive accuracy	.14 (.09)	-.04, .32	1.54	.12
C path Self-reported physical activity → distinctive accuracy	-.02 (.06)	-.11, .14	.25	.80
<i>Mediation 2</i>				
Indirect Effect	-.02 (.02)	-.06, .01		
A path Self-reported physical activity → cognitive functioning	-.04 (.04)	-.11, .03	-1.21	.23
B path Cognitive functioning → distinctive accuracy	.39 (.11)***	.17, .61	3.54	< .001
C path Self-reported physical activity → distinctive accuracy	.04 (.06)	-.08, .17	.70	.49

Note. *** $p < .001$

¹⁷ These results did not change when social desirability was added as a covariate. Social desirability was a significant predictor of psychological well-being ($B = .29 [.21, .37]$, $SE = .04$, $t = 7.09$, $p < .001$) and distinctive accuracy ($B = -.18 [-.32, -.04]$, $SE = .07$, $t = -2.61$, $p = .01$).

Lastly, cognitive functioning was examined as a mediator between self-reported physical activity and distinctive accuracy. In the first step, self-reported physical activity was not a significant predictor of cognitive functioning, $R = .08 [-.05, .20]$, $p = .23$. In the second step, cognitive functioning significantly predicted distinctive accuracy, while self-reported physical activity did not, $R = .22 [.10, .34]$, $p = .002$. Both the direct and indirect effect were not significant (see Table 8).

Chapter 5: Discussion

This study aimed to integrate research from personality judgment accuracy and exercise science to form a better understanding of the psychological, cognitive, and physical characteristics of the judge that are related to different types of accuracy. The relationships between physical fitness and cognitive functioning (Chang et al., 2014; Ratey & Hagerman, 2008) and between physical fitness and psychological well-being (Heinzel et al., 2015; Sothmann, 2006) have been well documented, and previous research has also suggested that accuracy of personality judgment is related to these two constructs (Christiansen et al., 2005; Letzring, 2015). The current study provided new insight into the ways in which an individual's actual physical fitness level and perceptions of physical activity frequency may or may not be related to psychological and cognitive characteristics in a college population, as well as how different judge characteristics predict different types of accuracy. While there does not appear to be a direct relationship between either physical fitness or perceptions of physical activity and either type of accuracy based on this study, the current research was successful in furthering knowledge of how physical fitness is related to psychological well-being and cognitive functioning, and how these two constructs are related to the good judge.

Hypothesis 1 for Psychological Well-Being

The first hypothesis predicted that physical fitness would be positively related to both psychological well-being and cognitive functioning. This hypothesis was tested in a number of ways and was partially supported. The psychological well-being composite did not significantly predict either objective physical fitness or self-reported physical activity. However, when each individual aspect was examined, Ryff's psychological well-being measure, perceived social support, and affect balance predicted a significant amount of unique variance in objective physical fitness. These results indicate that individuals who are more psychologically well-adjusted, particularly in terms of Ryff's psychological well-being and perceived social support, are also more likely to be physically fit, which is in line with previous research (Crone et al., 2005; Stathi et al., 2004). Surprisingly, individuals who reported more negative affect than positive affect were also more likely to be physically fit, which went against previous literature (Li et al., 2009). While this particular finding was unusual in consideration of previous findings, it may be indicative of a few key features of the sample.

This sample may have been too low in physical fitness level to see the expected pattern of results for certain aspects of psychological well-being, as the clearest psychological benefits are typically seen for individuals who are classified as high in physical fitness level (Jayakody et al., 2014; Wipfli, et al., 2008). In addition, this sample was made up of university-students (predominantly Freshmen and Sophomores) rather than a more general community sample, and this finding may be specific to a college-population. It is possible that finding time to exercise regularly or engage in sports actually increases stress levels for college-students because of the increased responsibility

while simultaneously trying to adjust to college life. These findings suggest that specific aspects of psychological well-being are important in understanding physical fitness, and looking at psychological well-being as a unified whole does not tell the whole story. In addition, no aspect of psychological well-being was predictive of self-reported physical activity, which indicates that a more objective analysis of fitness level is necessary to begin to understand the role of psychological well-being.

When objective physical fitness group was used to predict composite scores and individual scores for psychological well-being, individuals who were excluded from the test of physical fitness scored significantly lower in overall psychological well-being compared with individuals classified as high or average in physical fitness. In addition, excluded individuals scored significantly lower on Ryff's psychological well-being compared with individuals classified as average in physical fitness. This result did not hold true compared with individuals classified as high in physical fitness, which may be reflective of the small sample size and a lack of power in the high physical fitness group. Perceived social support was significantly higher for individuals classified as high on physical fitness compared with every other fitness group (medium, low, excluded, and attrition), which highlights that the most impressive psychological benefits in terms of perceived social support are associated with being highly physically fit. In addition, experiencing a psychological or physical health concern (that would exclude someone from participating in Session 2) appears to be related to less psychological benefits in a variety of ways.

Hypothesis 1 for Cognitive Functioning

The cognitive functioning composite also did not significantly predict self-reported physical activity or objective physical fitness, which was not in support of the hypothesis. When each individual component of cognitive functioning was examined, the individual components did not significantly predict self-reported physical activity. However, the objective measure of fitness was positively predicted by attributional complexity and negatively predicted by dispositional intelligence. This pattern indicates that a more objective measure of physical fitness is necessary to better understand the role of cognitive functioning. While previous research has suggested that there are a number of cognitive benefits from exercise and physical fitness (Barenberg et al., 2011; Chang et al., 2012; Chang et al., 2014), the current study did not find support for this idea in terms of overall cognitive functioning, which once again may be indicative of the restrictions within the sample's overall physical fitness level and the greatest benefits being seen in a higher fitness population (Chang et al., 2012). The findings indicate that within a predominantly lower fitness-level college-population, participants higher in physical fitness are more likely to be motivated to attribute complex explanations to behavior and are thus more socially motivated, but do not necessarily understand how behavior is related to traits.

When objective physical fitness group was used to predict differences in cognitive functioning, no differences were found for overall cognitive functioning. When each individual component of cognitive functioning was investigated, differences were found across groups for attributional complexity and dispositional intelligence. Highly fit individuals achieved significantly higher scores in attributional complexity compared with individuals low in physical fitness. In contrast, highly fit individuals received

significantly lower scores in dispositional intelligence compared with individuals classified as average-fitness, low-fitness, and participants lost due to attrition. This was in line with the results from the regression analyses and suggests that dispositional intelligence taps into an aspect of cognitive functioning that is not benefitted by physical fitness, and that individuals who are high in physical fitness are less likely to understand how behavior is reflective of traits. This finding could indicate that individuals who are more motivated to understand others and have good experiences with others (as indicated by the results for perceived social support) but not necessarily a skill for inferring traits from behavior, are also more likely to be physically active.

Hypothesis 2

The second hypothesis predicted that psychological well-being and cognitive functioning would positively moderate both distinctive and normative accuracy. Once again, this hypothesis was partially supported. Psychological well-being as a composite score was a significant positive moderator of normative accuracy, but not distinctive, and the individual components of Ryff's psychological well-being, emotional intelligence, satisfaction with life, and affect balance followed this same trend. Based on these results, individuals who are more psychologically well-adjusted both overall and in a number of specific ways are more likely to be normatively accurate when perceiving other people, and this is in line with previous research (Letzring, 2015). Previous research has also suggested that the normative profile is viewed favorably, and that individuals who are judged as being more like the average person are viewed more positively. Therefore, it is plausible that individuals who are more psychological well-adjusted are more likely to view others in more positive ways and see the best in people.

The results for cognitive functioning followed a different pattern than the findings for psychological well-being. Cognitive functioning as a composite score significantly positively moderated distinctive accuracy, but not normative. In addition, the individual components of attributional complexity and dispositional intelligence followed this same trend, while memory and fluid intelligence did not moderate either type of accuracy. These findings demonstrate that individuals with greater cognitive functioning capabilities both overall and in a number of specific ways are more adept at distinguishing amongst targets and evaluating how a target is different compared to the average person and compared to other targets. This type of accuracy is not indicative of a negative social perspective, but rather reflects a type of accuracy that has a more neutral basis. When looked at in conjunction, the results from this hypothesis suggest that psychological well-being and cognitive functioning play different roles in how we understand accuracy, and that individuals high in these different judge characteristics may perceive people differently and thus be accurate in different ways. More specifically, judges high in psychological well-being may be more adept at seeing targets in more positive ways, while judges high in cognitive functioning may be more adept at seeing targets for who they actually are.

Hypothesis 3

Hypothesis 3 predicted that psychological well-being and cognitive functioning would mediate the relationship between objective physical fitness level or perceived physical activity and distinctive or normative accuracy. For all eight mediations, at no point was a significant direct or indirect effect found, indicating that objective physical fitness and perceived physical activity do not predict either distinctive or normative

accuracy on their own, nor can a possible relationship be explained by either psychological well-being or cognitive functioning. These findings were consistent with results for Hypotheses 1 and 2, specifically in terms of the composite scores for psychological well-being and cognitive functioning. When individual components of psychological well-being and cognitive functioning were examined, it became clear that certain components were positive predictors of physical fitness while others were negative, which was thought to be problematic when results were analyzed using the composite scores. To test this idea, the individual components of psychological well-being and cognitive functioning that significantly predicted physical fitness (Ryff's psychological well-being, perceived social support, attributional complexity, and dispositional intelligence) were also analyzed as potential mediators, but once again no significant direct or indirect effects were found. It is possible that other forms of psychological well-being and cognitive functioning are more influential than the ones chosen for this study, or that psychological well-being and cognitive functioning explain the relationships between physical fitness and accuracy but only under specific conditions that were not examined here (such as during or after exercise or in specific populations).

Limitations

There were a number of limitations with the current study that should be addressed. Firstly, power was an issue for the analyses involving objective physical fitness. While the total sample size comprised of 248 individuals, only 134 of these individuals successfully completed the test of physical fitness. For all analyses involving the continuous score of objective physical fitness, only 134 data points were used. While analyses that examined differences across physical fitness groups utilized the full 248

within its sample size, groups varied dramatically in size with the largest group (low fitness) comprising of 93 participants and the smallest groups (average and high fitness) comprising of 27 and 14 participants each. This discrepancy in sample size also reveals that the sample is mostly comprised of individuals low in physical fitness level. This lack of consistency in sample size across groups, as well as the low level of average fitness across participants, means that results should be interpreted with a fair amount of caution and that the findings may not be generalizable to a higher fitness level population.

Other issues of concern included the measures chosen to represent each construct. For psychological well-being, several measures were chosen to represent various aspects of this construct, but all measures were strictly self-report and thus socially desirable responding had to be taken into account and controlled for, although at no point did controlling for social desirability change the outcome of the analyses. For cognitive functioning, the aspects of dispositional intelligence and attributional complexity were measures based around social perceptions, while memory was based on the targets that were concurrently being judged on personality. With the exception of fluid intelligence, the measures chosen were closely intertwined with some aspect of person perception, which may have made finding relationships to personality judgment accuracy more likely. Other issues with cognitive functioning involved the memory measure that was developed specifically for this study which did not undergo evaluation beforehand, and the low internal reliability of this measure indicated that the items chosen were not ideal to represent a unified construct. A similar issue occurred with the measure of dispositional intelligence, in that the items chosen from each category (in an attempt to

shorten the measure) were subjectively selected, and this resulted in an inadequate internal reliability.

Another issue of concern was the use of only six targets, and while questions that focus on the judge typically utilize only a few targets, there are potential issues in assuming that the results for accuracy are generalizable across a wider population of targets. To address this concern, targets were purposefully chosen to vary from one another on personality traits to increase generalizability to a larger population. Finally, while the use of an objective test of physical fitness was certainly a strength of this study, it is possible that certain types of athletic participants will perform better on bike tests compared with other forms (running, etc.), and that some bias existed within the test itself. Ideally, multiple submax tests (or one maximal test) would have been utilized to get the best estimate of VO_2max .

Possibly the main concern within this study was the time constraint. The first session ran two hours without breaks, which could have resulted in fatigue. Ideally, this study would have been divided into multiple studies with more focused research questions to both shorten the length of time required to complete Session 1, and to strengthen the measures utilized for each study such as additional measures of psychological well-being and cognitive functioning, a validated measure of memory, the full dispositional intelligence scale, and multiple tests of physical fitness. Finally, the current study investigated a strictly college population of primarily Caucasian females with most participants falling between the ages of 18-25, therefore there was a general lack of diversity within the sample that makes generalizability to other populations difficult.

Implications and Future Research

Physical activity levels are a growing concern within college-populations. The entrance to college can present new challenges as young adults face higher academic expectations and growing independence (Buckworth & Nigg, 2004). Over half of college-students report engaging in less physical activity after entering college, despite having access to gyms and being aware of the benefits of exercise. This was certainly the case within the current sample, as 70% of participants who completed Session 2 were categorized within the lowest physical fitness category as outlined for the ARCET (Astrand & Rhymin, 1954). This is not only a limitation of the current study, but is also an indicator that the average college student is not engaged in enough physical activity. It is also concerning that higher physical fitness levels were associated with higher negative affect, which suggests that the time requirement of regular physical activity is related to additional stress on the already challenged college-student, perhaps because the time commitment seems overwhelming in the face of a multitude of new responsibilities. This speaks to a much larger issue than the current study can address, in that today's college students are leading unhealthy physical lifestyles, which is a leading contributor of chronic disease (World Health Organization, 2010). It is of vital importance for future research to address these concerns in college students, to help them adjust to college life in healthier and more adaptive ways that promote overall social, psychological, and physical health.

Physical Fitness and Psychological Well-Being. Despite the concerning average level of physical fitness within the current sample, there were a number of strengths of the current study that point to interesting avenues for future research. Based on the

current study, it is still unclear whether physical fitness and accuracy are related in some way through the constructs of psychological well-being and cognitive functioning, therefore future research will need to attempt to answer this question in different ways before firm conclusions can be drawn. Despite this, the current research did build upon previous research in both exercise science and personality judgment accuracy and provide support demonstrating that physical fitness is related to psychological well-being and cognitive functioning, and that psychological well-being and cognitive functioning are related to accuracy. Perceptions of physical fitness were not related to either psychological well-being or cognitive functioning, which indicates that future research should focus on objective measures of fitness when doing this type of research.

Psychological well-being is a well-known outcome of physical activity, in that more physically fit individuals report better social, emotional, and mental outcomes (Lubans & Morgan, 2009). The current study built upon this research by examining multiple aspects of psychological well-being to provide a more comprehensive understanding of the role of different types of psychological well-being. Ryff's psychological well-being and perceived social support were both positive predictors of physical fitness level, which shows that individuals who are more psychologically well-adjusted as defined by Ryff (Ryff 1989; Ryff & Keyes, 1995) and who feel more support from loved ones, are more likely to engage in regular physical activity during college. Certain forms of psychological well-being could serve as protective factors in staying active during this transitory stage of life, and future research should aim to better understand how to promote this well-being in college students.

Reporting more negative affect than positive affect was also found to predict physical fitness, which was a surprising finding and may indicate that regular exercise may also be related to some negative outcomes within a college-student population. While previous research in exercise science has found that regular exercise provides benefits to psychological issues such as clinical anxiety and depression (Heinzel et al., 2015), the current study cannot speak to these types of outcomes as participants were not required to engage in any type of exercise program. Future research should aim to address whether exercise has benefits on psychological issues such as anxiety and depression in a college-student population, especially given that the transition to college is known to be a stressful period (Buckworth & Nigg, 2004).

Physical Fitness and Cognitive Functioning. Previous research has examined the effects of exercise on a variety of cognitive functioning tasks, as well as the role of physical fitness within that relationship (Phillips et al., 2015). To the researchers' knowledge, this project examined some aspects of cognitive functioning that have not been addressed as outcomes of exercise in previous literature. Dispositional intelligence and attributional complexity refer to an individual's understanding of personality traits and motivation to provide complex explanations of behavior, with both attributes involving social perceptions of others. While the majority of cognitive tasks examined in exercise science literature have involved executive functioning, information processing, attention, memory, as well as other cognitions that are not socially-specific (Chang, 2012), the current study took a slightly different approach in that a combination of more traditional cognitive-tasks and more social-cognitive tasks and attributes were examined. The only significant predictors of physical fitness within the current sample were the two

social-cognitive aspects examined (attributional complexity and dispositional intelligence), which point to the idea that within a lower-fitness sample, social-cognitive aspects may be related to engagement in regular physical activity over more traditional cognitive outcomes.

It is also important to note that a large body of previous research investigating cognitive outcomes has utilized an exercise-component, in which participants engage in physical activity before performing a cognitive-task (Barenberg et al., 2011; Howie & Pate, 2012; Phillips et al., 2011). This is when the greatest cognitive outcomes are typically seen, specifically for individuals high in physical fitness. As the current study only investigated fitness-level and perceptions of physical activity and did not have participants exercise before any task, the current study cannot speak to the effects of exercise on various cognitive outcomes, and this may explain why more traditional aspects of cognitive functioning (such as memory and fluid intelligence) were not related to physical fitness level in any analysis. Future research should continue to examine the role of social-cognitive tasks within exercise and physical fitness, to further decipher if these types of cognitions are predictive of engagement in physical fitness and whether they are direct outcomes of exercise in certain fitness populations. Future research should also aim to further understand the personality and social profile of physically fit individuals, and build on the findings that physically fit individuals are more likely to prefer complex explanations of behavior but are less adept at understanding how behaviors relate to personality traits.

Psychological Well-Being, Cognitive Functioning, and Accuracy. The role of psychological well-being and cognitive functioning in understanding the good judge has

been investigated through previous research in a number of ways. This research suggests that individuals who are more psychologically well-adjusted (Human & Biesanz, 2011; Letzring, 2015) and more cognitively adept (Christiansen et al., 2005; Lippa & Dietz, 2002) are more accurate, but most research has focused on accuracy through the use of profile-correlations that assess the similarity between a target's accuracy criterion and a judge's perceptions across a set of items for each target (Letzring, Wells, & Funder, 2006; Christiansen et al., 2005). While this research has been influential in understanding characteristics of the good judge, more recent research has begun using an approach that acknowledges that there are multiple ways to be accurate. The current study investigated multiple components of accuracy through the use of SAM (Biesanz, 2010) and examined various aspects of both psychological well-being and cognitive functioning.

Findings indicated that the good normative judge of personality possesses different characteristics compared to the good distinctive judge of personality, and that the good normative judge is more likely to be psychologically well-adjusted while the good distinctive judge is more likely to be cognitively adept. These findings highlight the importance of investigating multiple components of accuracy, and that different judge characteristics are important in understanding different types of accuracy. Future research should continue to investigate distinctive and normative accuracy (in addition to overall accuracy) to better understand the role of various judge characteristics. Future research should also aim to expand the theoretical model of RAM to include the stages that lead to different types of accurate judgment (such as distinctive and normative judgments), and whether different moderators are more important for certain types of accuracy. Finally, future research should investigate whether there is some combination of distinctive and

normative accuracy or combination of judge characteristics that is the most socially adaptive for different situations, such as the workplace, clinical settings, and in everyday social interactions.

Chapter 6: Conclusion

Based on the results of all three hypotheses, the relationships between physical fitness, psychological well-being, cognitive functioning, and accuracy may be more complex than previously theorized. The current study suggests that more physically fit individuals are also more psychologically well-adjusted and more cognitively adept, but only in specific ways, and that perceptions of physical fitness are not indicative of any psychological or cognitive aspect. It was also found that individuals who are more psychologically well-adjusted are more normatively accurate and thus better at seeing targets in positive ways, while individuals who are more cognitively adept are more distinctively accurate and thus better at seeing targets for how they actually are. Findings did not support the notion that psychological well-being and cognitive functioning explain the relationships between physical fitness and accuracy. This may have been indicative of the method of analysis chosen for the final hypothesis (combining scores instead of examining them separately), as well as the ways psychological well-being and cognitive functioning were measured.

The results may have differed for a sample more diverse in physical fitness level, as well as within a more general community sample. It is unclear whether these findings would generalize to other age ranges or other cultures, and additional research should attempt to understand whether gender or ethnic differences exist. It is important that future studies aim to understand why certain psychological and cognitive characteristics

are indicative of physical fitness over others, and why social tasks such as personality judgment accuracy may or may not be related to physical fitness. Future research will need to examine different aspects of physical fitness, psychological well-being, and cognitive functioning in a variety of populations to more thoroughly answer these questions.

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Appendix

Psychological Well-Being Scale: 84-item version

Please select how strongly you agree or disagree with the following statements, in regards to your own life:

- | | | |
|-----------------------|-------------------------|-----------------------|
| 1 - Strongly Disagree | 2 - Moderately Disagree | 3 - Slightly Disagree |
| 4 - Slightly Agree | 5 - Moderately Agree | 6 - Strongly Agree |

Autonomy:

- ___ 1. Sometimes I change the way I act or think to be more like those around me.
- ___ 2. I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people.
- ___ 3. My decisions are not usually influenced by what everyone else is doing.
- ___ 4. I tend to worry about what other people think of me.
- ___ 5. Being happy with myself is more important to me than having others approve of me.
- ___ 6. I tend to be influenced by people with strong opinions.
- ___ 7. People rarely talk me into doing things I don't want to do.
- ___ 8. It is more important to me to "fit in" with others than to stand alone on my principles.
- ___ 9. I have confidence in my opinions, even if they are contrary to the general consensus.
- ___ 10. It's difficult for me to voice my own opinions on controversial matters.
- ___ 11. I often change my mind about decisions if my friends or family disagree.
- ___ 12. I am not the kind of person who gives in to social pressures to think or act in certain ways.
- ___ 13. I am concerned about how other people evaluate the choices I have made in my life.
- ___ 14. I judge myself by what I think is important, not by the values of what others think is important.

Environmental Mastery:

- ___ 1. In general, I feel I am in charge of the situation in which I live.

- ___ 2. The demands of everyday life often get me down.
- ___ 3. I do not fit very well with the people and the community around me.
- ___ 4. I am quite good at managing the many responsibilities of my daily life.
- ___ 5. I often feel overwhelmed by my responsibilities.
- ___ 6. If I were unhappy with my living situation, I would take effective steps to change it.
- ___ 7. I generally do a good job of taking care of my personal finances and affairs.
- ___ 8. I find it stressful that I can't keep up with all of the things I have to do each day.
- ___ 9. I am good at juggling my time so that I can fit everything in that needs to get done.
- ___ 10. My daily life is busy, but I derive a sense of satisfaction from keeping up with everything.
- ___ 11. I get frustrated when trying to plan my daily activities because I never accomplish the things I set out to do.
- ___ 12. My efforts to find the kinds of activities and relationships that I need have been quite successful.
- ___ 13. I have difficulty arranging my life in a way that is satisfying to me.
- ___ 14. I have been able to build a home and a lifestyle for myself that is much to my liking.

Personal Growth:

- ___ 1. I am not interested in activities that will expand my horizons.
- ___ 2. In general, I feel that I continue to learn more about myself as time goes by.
- ___ 3. I am the kind of person who likes to give new things a try.
- ___ 4. I don't want to try new ways of doing things--my life is fine the way it is.
- ___ 5. I think it is important to have new experiences that challenge how you think about yourself and the world.
- ___ 6. When I think about it, I haven't really improved much as a person over the years.
- ___ 7. In my view, people of every age are able to continue growing and developing.
- ___ 8. With time, I have gained a lot of insight about life that has made me a stronger, more capable person.

- ___ 9. I have the sense that I have developed a lot as a person over time.
- ___ 10. I do not enjoy being in new situations that require me to change my old familiar ways of doing things.
- ___ 11. For me, life has been a continuous process of learning, changing, and growth.
- ___ 12. I enjoy seeing how my views have changed and matured over the years.
- ___ 13. I gave up trying to make big improvements or changes in my life a long time ago.
- ___ 14. There is truth to the saying you can't teach an old dog new tricks.

Positive Relations with Others:

- ___ 1. Most people see me as loving and affectionate.
- ___ 2. Maintaining close relationships has been difficult and frustrating for me
- ___ 3. I often feel lonely because I have few close friends with whom to share my concerns.
- ___ 4. I enjoy personal and mutual conversations with family members or friends.
- ___ 5. It is important to me to be a good listener when close friends talk to me about their problems.
- ___ 6. I don't have many people who want to listen when I need to talk.
- ___ 7. I feel like I get a lot out of my friendships.
- ___ 8. It seems to me that most other people have more friends than I do.
- ___ 9. People would describe me as a giving person, willing to share my time with others.
- ___ 10. I have not experienced many warm and trusting relationships with others.
- ___ 11. I often feel like I'm on the outside looking in when it comes to friendships.
- ___ 12. I know that I can trust my friends, and they know they can trust me.
- ___ 13. I find it difficult to really open up when I talk with others.
- ___ 14. My friends and I sympathize with each other's problems.

Purpose in Life:

- ___ 1. I feel good when I think of what I've done in the past and what I hope to do in the future.
- ___ 2. I live life one day at a time and don't really think about the future.
- ___ 3. I tend to focus on the present, because the future nearly always brings me problems.
- ___ 4. I have a sense of direction and purpose in life.
- ___ 5. My daily activities often seem trivial and unimportant to me.
- ___ 6. I don't have a good sense of what it is I'm trying to accomplish in life.
- ___ 7. I used to set goals for myself, but that now seems like a waste of time.
- ___ 8. I enjoy making plans for the future and working to make them a reality.
- ___ 9. I am an active person in carrying out the plans I set for myself.
- ___ 10. Some people wander aimlessly through life, but I am not one of them.
- ___ 11. I sometimes feel as if I've done all there is to do in life.
- ___ 12. My aims in life have been more a source of satisfaction than frustration to me.
- ___ 13. I find it satisfying to think about what I have accomplished in life.
- ___ 14. In the final analysis, I'm not so sure that my life adds up to much.

Self-Acceptance:

- ___ 1. When I look at the story of my life, I am pleased with how things have turned out.
- ___ 2. In general, I feel confident and positive about myself.
- ___ 3. I feel like many of the people I know have gotten more out of life than I have.
- ___ 4. Given the opportunity, there are many things about myself that I would change.
- ___ 5. I like most aspects of my personality.
- ___ 6. I made some mistakes in the past, but I feel that all in all everything has worked out for the best.
- ___ 7. In many ways, I feel disappointed about my achievements in life.

- ____ 8. For the most part, I am proud of who I am and the life I lead.
- ____ 9. I envy many people for the lives they lead.
- ____ 10. My attitude about myself is probably not as positive as most people feel about themselves.
- ____ 11. Many days I wake up feeling discouraged about how I have lived my life.
- ____ 12. The past had its ups and downs, but in general, I wouldn't want to change it.
- ____ 13. When I compare myself to friends and acquaintances, it makes me feel good about who I am.
- ____ 14. Everyone has their weaknesses, but I seem to have more than my share.

Reverse coded items:

Autonomy – 1, 4, 6, 8, 10, 11, and 13

Environmental Mastery – 2, 3, 5, 8, 11, and 13

Personal Growth – 1, 4, 6, 10, 13, and 14

Positive Relations with Others - 2, 3, 6, 8, 10, 11, and 13

Purpose in Life – 2, 3, 5, 6, 7, 11, and 14

Self-Acceptance – 3, 4, 7, 9, 10, 11 and 14

Items were presented in a randomized order, with the same order for each participant.

Positive and Negative Affect Scale

This scale consists of a number of words that describe different feelings and emotions.

Read each item and then list the number from the scale below next to each word. Indicate to what extent you feel this way on average, in your day-to-day life.

1 - Very Slightly 2 - A Little 3 - Moderately 4 - Quite a Bit 5 –
Extremely

- | | |
|-----------------------|----------------------|
| _____ 1. Interested | _____ 11. Irritable |
| _____ 2. Distressed | _____ 12. Alert |
| _____ 3. Excited | _____ 13. Ashamed |
| _____ 4. Upset | _____ 14. Inspired |
| _____ 5. Strong | _____ 15. Nervous |
| _____ 6. Guilty | _____ 16. Determined |
| _____ 7. Scared | _____ 17. Attentive |
| _____ 8. Hostile | _____ 18. Jittery |
| _____ 9. Enthusiastic | _____ 19. Active |
| _____ 10. Proud | _____ 20. Afraid |

Satisfaction with Life Scale

Instructions: Below are five statements that you may agree or disagree with. Indicate your agreement with each item by selecting the appropriate number. Please be open and honest in your responding.

7 - Strongly agree 6 – Agree 5 - Slightly agree 4 - Neither agree nor disagree
3 - Slightly disagree 2 – Disagree 1 - Strongly disagree

- ___ In most ways my life is close to my ideal.
- ___ The conditions of my life are excellent.
- ___ I am satisfied with my life.
- ___ So far I have gotten the important things I want in life.
- ___ If I could live my life over, I would change almost nothing.

Wong and Law Emotional Intelligence Scale

Please indicate how much you agree or disagree with the following statements, in regards to your own life:

7 - Strongly agree 6 – Agree 5 - Slightly agree 4 - Neither agree nor disagree
3 - Slightly disagree 2 – Disagree 1 - Strongly disagree

Self-Emotions Appraisal (SEA)

- ___ 1. I have a good sense of why I have certain feelings most of the time.
- ___ 2. I have good understanding of my own emotions.
- ___ 3. I really understand what I feel.
- ___ 4. I always know whether or not I am happy.

Others-Emotions Appraisal (OEA)

- ___ 5. I always know my friends' emotions from their behavior.
- ___ 6. I am a good observer of others' emotions.
- ___ 7. I am sensitive to the feelings and emotions of others.
- ___ 8. I have good understanding of the emotions of people around me.

Use of Emotion (UOE)

- ___ 9. I always set goals for myself and then try my best to achieve them.
- ___ 10. I always tell myself I am a competent person.
- ___ 11. I am a self-motivating person.
- ___ 12. I would always encourage myself to try my best.

Regulation of Emotion (ROE)

- ___ 13. I am able to control my temper so that I can handle difficulties rationally.
- ___ 14. I am quite capable of controlling my own emotions.
- ___ 15. I can always calm down quickly when I am very angry.
- ___ 16. I have good control of my own emotions.

Items will be presented in a randomized order, with the same order for each participant.

Multidimensional Scale of Perceived Social Support

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

1 - Very Strongly Disagree 2 - Strongly Disagree 3 - Mildly Disagree 4 – Neutral
 5 - Mildly Agree 6 - Strongly Agree 7 - Very Strongly Agree

- ___ 1. There is a special person who is around when I am in need.
- ___ 2. There is a special person with whom I can share joys and sorrows.
- ___ 3. My family really tries to help me.
- ___ 4. I get the emotional help & support I need from my family.
- ___ 5. I have a special person who is a real source of comfort to me.
- ___ 6. My friends really try to help me.
- ___ 7. I can count on my friends when things go wrong.
- ___ 8. I can talk about my problems with my family.
- ___ 9. I have friends with whom I can share my joys and sorrows.
- ___ 10. There is a special person in my life who cares about my feelings.
- ___ 11. My family is willing to help me make decisions.
- ___ 12. I can talk about my problems with my friends.

IPIP-NEO facets shortened and matched with 300 item version

Instructions: On the following pages, there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes *the person you just watched in the video*. Describe him or her honestly, in relation to other people you know of the same sex and roughly the same age. Please read each statement carefully, and then indicate the number that corresponds to how accurately the statement describes that person.

1 – Very Inaccurate 2 – Moderately Inaccurate
 3 – Neither Accurate nor Inaccurate 4 – Moderately Accurate 5 – Very Accurate

- ___ 1. Do things according to a plan.
- ___ 2. Am always prepared.
- ___ 3. Get angry easily.
- ___ 4. Am relaxed most of the time. R
- ___ 5. Make myself the center of attention. R
- ___ 6. Postpone decisions.
- ___ 7. Complete tasks successfully.
- ___ 8. Love to help others.
- ___ 9. Have little to contribute.
- ___ 10. Remain calm under pressure. R
- ___ 11. Don't like to draw attention to myself. R
- ___ 12. Have a lot of fun.
- ___ 13. Consider myself an average person.
- ___ 14. Rarely complain. R
- ___ 15. Worry about things
- ___ 16. Believe that there is no absolute right and wrong.

- ___17. Seldom get lost in thought. R
- ___18. Take advantage of others. R
- ___19. Get others to do my duties.
- ___20. Tell the truth.
- ___21. Am hard to get to know. R
- ___22. Trust others.
- ___23. Feel comfortable with myself. R
- ___24. Prefer to be alone. R
- ___25. Like to solve complex problems.
- ___26. Believe in one true religion. R
- ___27. Work hard.
- ___28. Suspect hidden motives in others. R
- ___29. Panic easily.
- ___30. Believe in the importance of art.
- ___31. Do not like poetry. R
- ___32. Have difficulty understanding abstract ideas. R
- ___33. Often eat too much.
- ___34. Stick to the rules.
- ___35. Choose my words with care.
- ___36. Make people feel uncomfortable. R
- ___37. Easily resist temptations. R
- ___38. Believe people should fend for themselves.
- ___39. Rush into things.
- ___40. Am not embarrassed easily. R
- ___41. Am always busy.
- ___42. Put little time and effort into my work. R
- ___43. Prefer variety to routine.
- ___44. Am easy to satisfy.
- ___45. Experience my emotions intensely.
- ___46. Am afraid that I will do the wrong thing.
- ___47. Make friends easily.
- ___48. Take charge.
- ___49. Have a vivid imagination.
- ___50. Love large parties.
- ___51. Dislike loud music. R
- ___52. Contradict others.
- ___53. Feel sympathy for those who are worse off than myself.
- ___54. Dislike myself
- ___55. Like to take my time. R
- ___56. Love excitement.
- ___57. Prefer to stick with things that I know.
- ___58. Experience very few emotional highs and lows. R
- ___59. Often forget to put things back in their proper place.
- ___60. Am not easily amused. R

R denotes reverse scored.

The Big Five Inventory

Instructions: Here are a number of characteristics that may or may not apply to the *person you just observed in the video*. For example, do you agree that this person is someone who likes to spend time with others? Please select a number for each statement to indicate the extent to which you agree or disagree with that statement, in regards to the person you observed.

1 - Disagree strongly 2 - Disagree a little 3 - Neither agree nor disagree
4 - Agree a little 5 - Agree Strongly

I see this Person as Someone Who...

- | | |
|--|---|
| ___ 1. Is talkative | ___ 23. Tends to be lazy |
| ___ 2. Tends to find fault with others | ___ 24. Is emotionally stable, not easily upset |
| ___ 3. Does a thorough job | ___ 25. Is inventive |
| ___ 4. Is depressed, blue | ___ 26. Has an assertive personality |
| ___ 5. Is original, comes up with new ideas | ___ 27. Can be cold and aloof |
| ___ 6. Is reserved | ___ 28. Perseveres until the task is finished |
| ___ 7. Is helpful and unselfish with others | ___ 29. Can be moody |
| ___ 8. Can be somewhat careless | ___ 30. Values artistic, aesthetic experiences |
| ___ 9. Is relaxed, handles stress well | ___ 31. Is sometimes shy, inhibited |
| ___ 10. Is curious about many different things | ___ 32. Is considerate and kind to almost everyone |
| ___ 11. Is full of energy | ___ 33. Does things efficiently |
| ___ 12. Starts quarrels with others | ___ 34. Remains calm in tense situations |
| ___ 13. Is a reliable worker | ___ 35. Prefers work that is routine |
| ___ 14. Can be tense | ___ 36. Is outgoing, sociable |
| ___ 15. Is ingenious, a deep thinker | ___ 37. Is sometimes rude to others |
| ___ 16. Generates a lot of enthusiasm | ___ 38. Makes plans and follows through with them |
| ___ 17. Has a forgiving nature | ___ 39. Gets nervous easily |
| ___ 18. Tends to be disorganized | ___ 40. Likes to reflect, play with ideas |
| ___ 19. Worries a lot | ___ 41. Has few artistic interests |
| ___ 20. Has an active imagination | ___ 42. Likes to cooperate with others |
| ___ 21. Tends to be quiet | ___ 43. Is easily distracted |
| ___ 22. Is generally trusting | ___ 44. Is sophisticated in art, music, or literature |

Scoring:

Extraversion: 1, 6R, 11, 16, 21R, 26, 31R, 36

Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42

Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R

Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39

Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44

R denotes reverse scored.

International Physical Activity Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not

consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous and moderate activities that you did in the last 7 days.

Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

Yes

No → *Skip to PART 2: TRANSPORTATION*

The next questions are about all the physical activity you did in the last 7 days as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing up stairs as part of your work? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ days per week

No vigorous job-related physical activity → *Skip to question 4*

3. How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?

_____ hours per day

_____ minutes per day

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads as part of your work? Please do not include walking.

_____ days per week

No moderate job-related physical activity → *Skip to question 6*

5. How much time did you usually spend on one of those days doing moderate physical activities as part of your work?

_____ hours per day

_____ minutes per day

6. During the last 7 days, on how many days did you walk for at least 10 minutes at a time as part of your work? Please do not count any walking you did to travel to or from work.

_____ days per week

No job-related walking → *Skip to PART 2: TRANSPORTATION*

7. How much time did you usually spend on one of those days walking as part of your work?

_____ hours per day

_____ minutes per day

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?

_____ days per week

No traveling in a motor vehicle → *Skip to question 10*

9. How much time did you usually spend on one of those days traveling in a train, bus, car, tram, or other kind of motor vehicle?

_____ hours per day

_____ minutes per day

Now think only about the bicycling and walking you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the last 7 days, on how many days did you bicycle for at least 10 minutes at a time to go from place to place?

_____ days per week

No bicycling from place to place → *Skip to question 12*

11. How much time did you usually spend on one of those days to bicycle from place to place?

_____ hours per day

_____ minutes per day

12. During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place?

_____ days per week

No walking from place to place → *Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY*

13. How much time did you usually spend on one of those days walking from place to place?

_____ hours per day

_____ minutes per day

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the last 7 days in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, chopping wood, shoveling snow, or digging in the garden or yard?

_____ days per week

No vigorous activity in garden or yard → *Skip to question 16*

15. How much time did you usually spend on one of those days doing vigorous physical activities in the garden or yard?

_____ hours per day

_____ minutes per day

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, sweeping, washing windows, and raking in the garden or yard?

_____ days per week

No moderate activity in garden or yard → *Skip to question 18*

17. How much time did you usually spend on one of those days doing moderate physical activities in the garden or yard?

_____ hours per day

_____ minutes per day

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, washing windows, scrubbing floors and sweeping inside your home?

_____ days per week

No moderate activity inside home → *Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY*

19. How much time did you usually spend on one of those days doing moderate physical activities inside your home?

_____ hours per day

_____ minutes per day

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the last 7 days solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?

_____ days per week

No walking in leisure time

→Skip to question 22

21. How much time did you usually spend on one of those days walking in your leisure time?

_____ hours per day

_____ minutes per day

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?

_____ days per week

No vigorous activity in leisure time

→Skip to question 24

23. How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?

_____ hours per day

_____ minutes per day

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?

_____ days per week

No moderate activity in leisure time

→Skip to PART 5: TIME SPENT

SITTING

25. How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?

_____ hours per day

_____ minutes per day

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk,

visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the last 7 days, how much time did you usually spend sitting on a weekday?

_____ hours per day

_____ minutes per day

27. During the last 7 days, how much time did you usually spend sitting on a weekend day?

_____ hours per day

_____ minutes per day

This is the end of the questionnaire, thank you for participating.

Attributional Complexity Scale

For each of the items below, select a number to indicate how much you agree with the item, according to the following scale:

-3 – Strongly Disagree

-2

-1

0 – Neither Agree nor Disagree

+1

+2

+3 – Strongly Agree

____1. I don't usually bother to analyze and explain people's behavior.

____2. Once I have figured out a single cause for a person's behavior I don't usually go any further.

____3. I believe it is important to analyze and understand our own thinking processes.

____4. I think a lot about the influence that I have on people's behavior.

____5. I have found that relationships between a person's attitudes, beliefs, and character traits are usually simple and straightforward.

____6. If I see people behaving in a really strange or unusual manner, I usually put it down to the fact that they are strange or unusual people and don't bother to explain it any further.

____7. I have thought a lot about the family background and personal history of people who are close to me, in order to understand why they are the sort of people they are.

____8. I don't enjoy getting into discussions where the causes for people's behavior are being talked about.

____9. I have found that the causes for people's behavior are usually complex rather than simple.

____10. I am very interested in understanding how my own thinking works when I make judgments about people or attach causes to their behavior.

____11. I think very little about the different ways that people influence each other.

____12. To understand a person's personality/behavior I have found it is important to know how that person's attitudes, beliefs, and character traits fit together.

- ____13. When I try to explain other people's behavior I concentrate on the other person and don't worry too much about all the existing external factors that might be affecting them.
- ____14. I have often found that the basic cause for a person's behavior is located far back in time.
- ____15. I really enjoy analyzing the reasons or causes for people's behavior.
- ____16. I usually find that complicated explanations for people's behavior are confusing rather than helpful.
- ____17. I give little thought to how my thinking works in the process of understanding or explaining people's behavior.
- ____18. I think very little about the influence that other people have on my behavior.
- ____19. I have thought a lot about the way that different parts of my personality influence other parts (e.g., beliefs affecting attitudes or attitudes affecting character traits).
- ____20. I think a lot about the influence that society has on other people.
- ____21. When I analyze a person's behavior I often find the causes form a chain that goes back in time, sometimes for years.
- ____22. I am not really curious about human behavior.
- ____23. I prefer simple rather than complex explanations for people's behavior.
- ____24. When the reasons I give for my own behavior are different from someone else's, this often makes me think about the thinking processes that lead to my explanations.
- ____25. I believe that to understand a person you need to understand the people who that person has close contact with.
- ____26. I tend to take people's behavior at face value and not worry about the inner causes for their behavior (e.g., attitudes, beliefs, etc.).
- ____27. I think a lot about the influence that society has on my behavior and personality.
- ____28. I have thought very little about my own family background and personal history in order to understand why I am the sort of person I am.

Scoring instructions:

Average the items for each subscale. Higher scores represent a more complex response.

Subscales

Motivational Component: 1, 8R, 15, 22R

Preference for Complex Explanations: 2R, 9, 16R, 23R

Metacognition: 3, 10, 17R, 24

Behavior as a Function of Interaction: 4, 11R, 18R, 25

Complex Internal Explanations: 5R, 12, 19, 26R

Complex Contemporary Explanations: 6, 13R, 20, 27

Use of Temporal Dimension: 7, 14, 21, 28R

R denotes reverse scored.

Dispositional Intelligence Measure

This measure is not available for public use, and will be requested directly from the creators for the purposes of this project. An example question, as provided by Christiansen et al. (2005) is as follows:

Lucy's coworkers all describe her as efficient, thorough, and persistent. Most likely Lucy also:

- a. Feels the need to be around a lot of people
- b. Has a great deal of sympathy for those less fortunate
- c. *Doesn't often give in to her impulses*
- d. Enjoys fantasizing and daydreaming

Correct answer is in italics.

Memory Measure Example Questions

This measure will be developed for the purposes of this project. Some example questions that might be used are as follows:

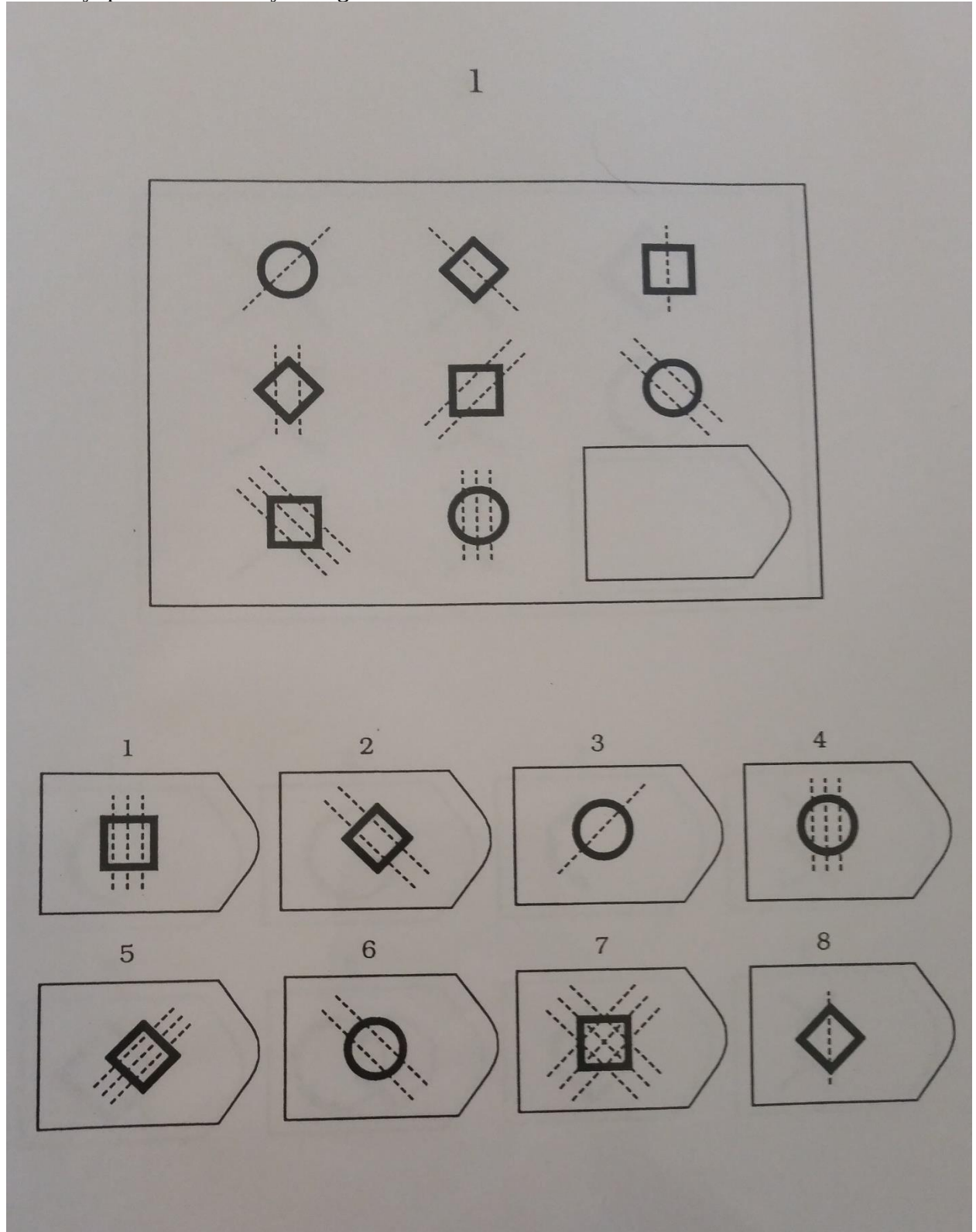
1. What sort of behavior did this individual exhibit?
 - a. Moved around a lot. Seemed restless
 - b. *Didn't move around much. Spoke quietly*
 - c. Laughed a lot and used many hand gestures
 - d. Was leaning back with his arms folded
 - e. I don't remember
2. How did this individual describe himself?
 - a. Outgoing, energetic, and loves to work
 - b. Reserved, a good listener, and a team player
 - c. *Hardworking, clean cut, and well-behaved*
 - d. Experienced, good with people, and an excellent leader
 - e. I don't remember
3. What did this individual say about having friends at his workplace?
 - a. He does not have friends at his workplace, but tends to get along well with everyone
 - b. He will socialize with people at his work from time to time. Has a few people he would consider friends
 - c. Has many friends at his workplace and enjoys socializing with them
 - d. *Has some friends at his work place whom he knew before taking the job*
 - e. I don't remember

Correct answers are in italics.

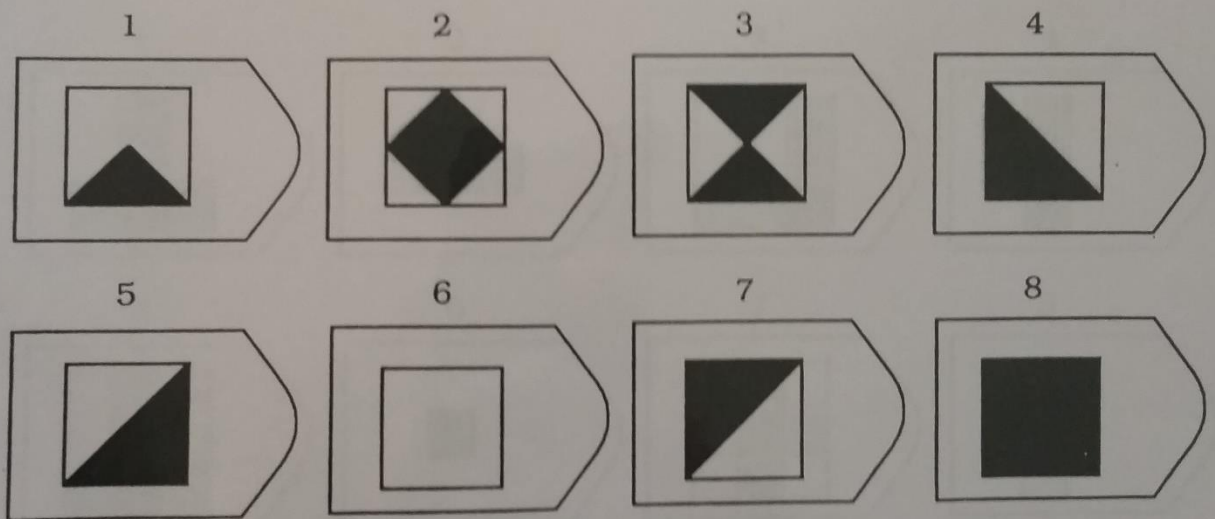
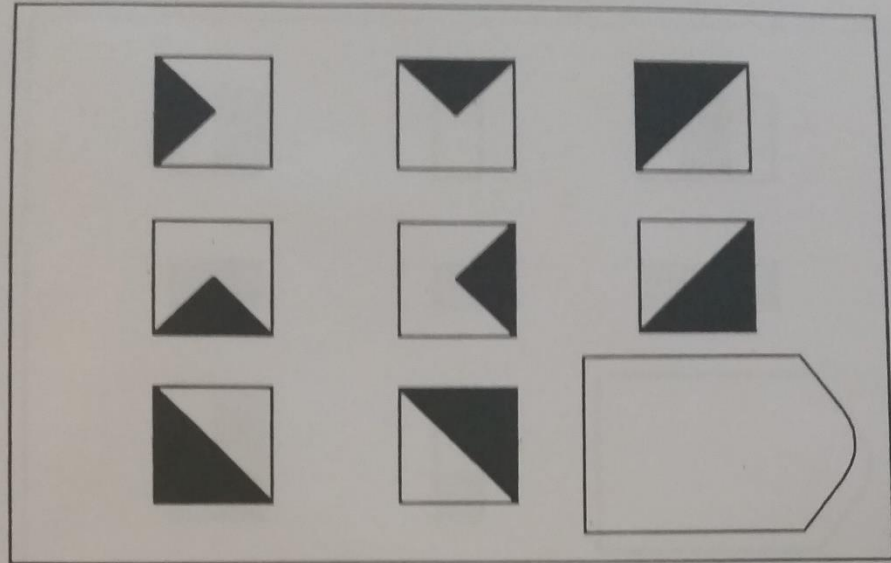
Raven's Standard Progressive Matrices Example Questions

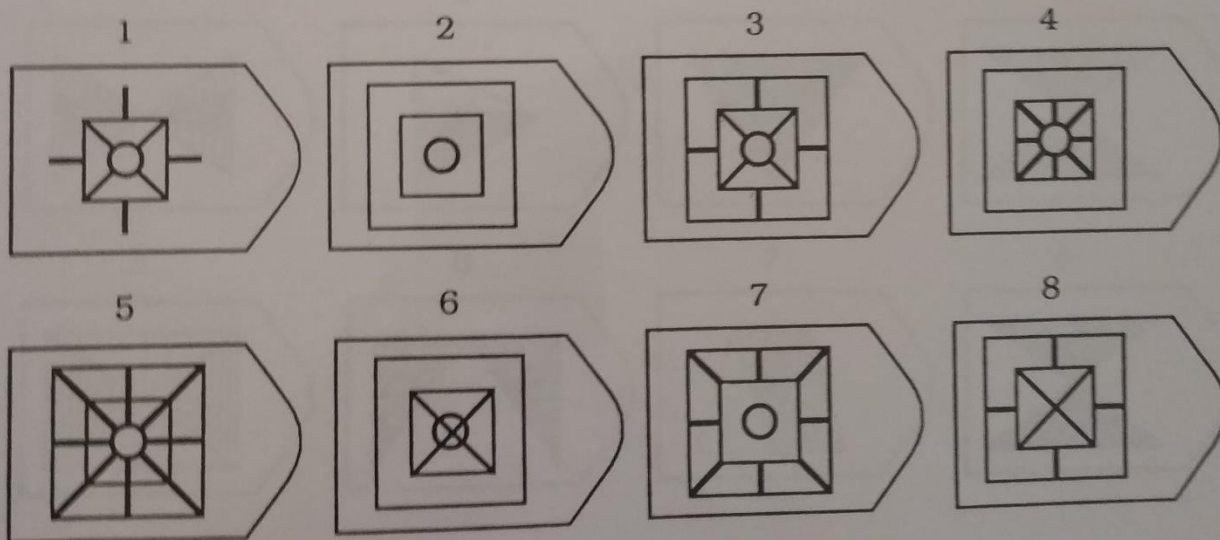
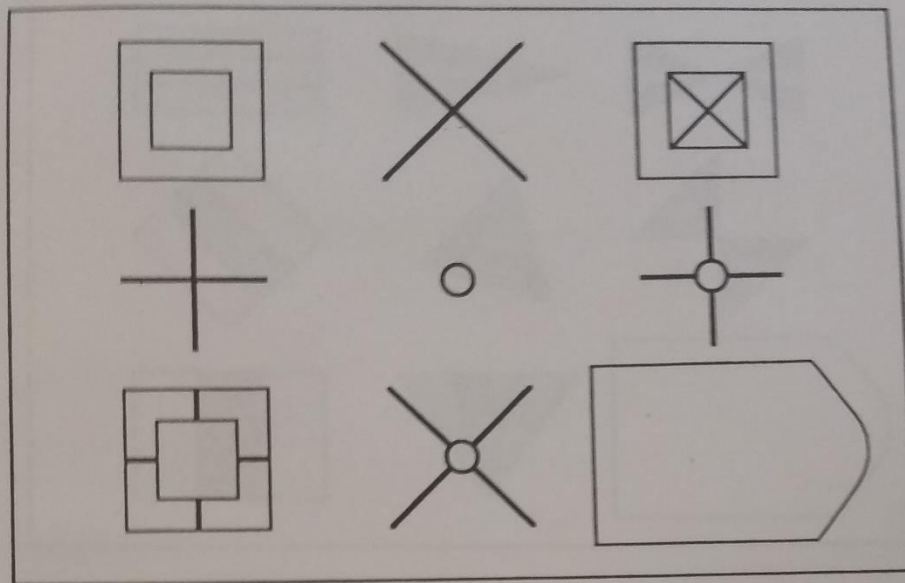
Instructions: For this test you will be solving problems. Each problem includes a nine cell matrix with three rows and three columns. Each cell contains a figure with several features. The bottom right cell is missing in each problem. Your task is to determine which of the eight possible solutions best completes the matrix. By looking at the relations between the figures in a row and in a column, you can think what piece is needed to complete the pattern correctly both along and down. Only one of the possible

solutions is perfectly correct. You will have 15 minutes to complete this task. Do you have any questions before you begin?



9





Demographics

Please answer the following questions for classification purposes.

1. What is your ethnicity?
 - a. White/Caucasian
 - b. Black/African American
 - c. Asian
 - d. Hispanic
 - e. Biracial
 - f. Other
2. What is your age? Please type in a whole number.
(Open-ended question)
3. What is your gender?
 - a. Male
 - b. Female
 - c. Other
4. What is your current class standing?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
 - e. Other
5. What is your cumulative GPA?
(Open-ended question)