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The Scale of Accurate Personality Prediction (SAPP): Predicting Low, Medium, or High SAPP Scores from the 16PF Primary and Global Factors

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by

Cayleigh Katherine Reeder, M.S.

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We the undersigned committee hereby approve the attached doctoral research project in partial fulfillment for the degree of Doctor of Clinical Psychology.

The Scale of Accurate Personality Prediction (SAPP): Predicting Low, Medium, or High SAPP Scores from the 16PF Primary and Global Factors

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Abstract

The Scale of Accurate Personality Prediction (SAPP): Predicting Low, Medium, or High SAPP Scores from the 16PF Primary and Global Factors

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To measure a person's self-knowledge, Miller (2000) created the Scale of Accurate Personality Prediction (SAPP), a measure derived by comparing subjects' obtained and self-predicted scores across the 21 scales of the Sixteen Personality Factor Questionnaire (16PF). Most recently, DiLullo (2018) assessed which of the 21 16PF primary and global factors would best predict subjects' SAPP scores, allowing for the derivation of SAPP scores directly from the existing 16PF factors. Due to the significant variability found across the results in DiLullo's study, this study adjusted the methodology to encourage greater consistency across samples. To do so, categorical SAPP scores were utilized instead of continuous SAPP scores. Therefore, each respondent's SAPP score was first converted to a categorized score of either low (STEN scores of 1-4), medium (STEN scores of 5 or 6), or high (STEN scores of 7-10). Then, a series of multinomial logistic regression analyses were conducted across the total sample and two odd/even samples drawn from an archival database of 688 participants. What resulted was that in all three of the samples, Emotional Stability (C+), Tough-Mindedness (TM-), and Tension (Q4+) emerged as the strongest predictors of self-knowledge, while Vigilance (L-) appeared as an additional predictor in two of the three samples. The consistency amongst the samples' results suggests that a subject's level of self-knowledge is able to be identified from the existing 16PF scales, and more specifically, from the aforementioned four factors.

iii

Table of Contents

List of Tables

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Review of Literature

The Self

A variety of definitions can be applied to the concept of "self." According to the Merriam-Webster dictionary, the self is defined as "the union of elements (such as body, emotions, thoughts, and sensations) that constitute the individuality and identity of a person" (Merriam-Webster dictionary online, n.d.). The English Oxford dictionary defines self as "a person's essential being that distinguishes them from others, especially considered as the object of introspection or reflexive action" (English Oxford dictionary online, n.d.). The Cambridge dictionary refers to self as "who a person is, including qualities such as personality and ability that make one person different from another" (Cambridge dictionary online, n.d.). While there may be a common theme regarding the self being an entity that differentiates one person from another, even amongst dictionaries, there is no consensus as to how to define the self.

There is a lack of consensus among researchers and theorists, as well. Leary and Tangney (2003) determined the self to be "the psychological apparatus that allows organisms to think consciously about themselves" (p. 8) that involves the three psychological processes of attention, cognition, and regulation. Oysterman, Elmore, & Smith (2003) postulate that the self includes three aspects: the person who thinks, the object of thinking (self), and an awareness of doing so. Another theory states the self encompasses physical attributes (e.g. "I am female"), social identities (or roles, or statuses; e.g. "I am a mother"), and personal identities, such as traits, abilities, attitudes, values, and interests (e.g. "I am a feminist;" Gordon, 1968; Rosenberg, 1979). This

difficulty and diversity in defining and conceptualizing the self is seen throughout history.

According to Leary and Tangney (2003), the concept of the self was first recognized thousands of years ago by intellectuals in India and China, as seen in their ancient texts, the Indian *Upanishads* (circa 600 B.C.E) and Chinese *Tao te Ching* (circa 500 B.C.E). There was also much philosophical discussion regarding the self in Ancient Greece (circa 428 – 347 B.C.E). Plato is credited with the first acknowledgment of the self and is one of three possible authors of the phrase "know thyself" that is famously inscribed above the Oracle at Delphi, a sacred site in Greece (Vazire & Wilson, 2012). Socrates, another possible author of the proverbs at Delphi, also believed the "unexamined life is not worth living." The ancient Greeks recognized the importance of the self, particularly concerning self-awareness and self-reflection, or so it seems.

For centuries afterward, references to the self were mostly found in religious writings that taught about the immorality of human self-related characteristics, such as pride and selfishness (Leary & Tangney, 2003). Philosophers such as Descartes, Locke, Butler, and Kant of the Enlightenment period also addressed concepts relating to the self. For instance, Locke postulated that one's identity is created by their memories, while Butler declared that the fluctuating states of consciousness reflect an equally dynamic and changeable nature of the self (Vazire & Wilson, 2012). The first time the self was mentioned in reference to psychology was in William James' 1890 book *Principles of Psychology*, which included a chapter titled "The Consciousness of Self" (Leary & Tangney, 2003). This work initiated the now fundamental belief that acknowledging the self is essential for understanding human behavior.

2

Following James' significant work, the field of psychology diverted from the topic of the self in light of behaviorism and Freudian psychoanalysis (Leary & Tangney, 2003). However, throughout the early to mid-twentieth century, several theorists from various fields furthered the intellectual exploration of the self. Overall, neo-Freudians brought the world the topic areas of ego psychology, self-psychology, and object relations theory (Kurzweil, 1989). Humanists such as Carl Rogers and Abraham Maslow introduced new ideas on the self's personality and "self-actualization," respectively (Leary & Tangney, 2003). Yet, despite continued musings regarding the self, very little empirical research had been generated on the topic before the 20th century.

According to Leary and Tangney (2003), three developments ultimately led to increased emphasis on the self, starting with the self-esteem era of the 1950s and 60s. This work not only led to the establishment of self-esteem as a construct but also the creation of self-report measures that allowed for research on the topic. The second development was the cognitive revolution in psychology, which honed in on thoughts and internal processes and ultimately led to increased interest in self-awareness and identity. Lastly, throughout the 1960s and 70s, research interest in the self amplified as measures were developed to capture additional attributes of the self, including measures of self-monitoring, self-consciousness, and self-concept. Since the 1980's and still today, the self has become a focal point of study.

As is evident by the various definitions of the "self," and the continued questions and studies regarding the self despite millennia of musings, psychology has found it a particularly difficult construct to conceptualize. Leary and Tangney (2003) suggest part of this difficulty is due to the many different features and dimensions of the self,

including self-awareness, ideal self, self-control, self-disclosure, self-efficacy, self-perception, self-esteem, and many others. Leary and Tangney stated that when all of the abstracts in *PsycInfo* up through 2001 were searched for self-related terms (excluding "self-report"), there were over 150,000 hits. This plethora of self-related phenomena illustrates the complexity of the self and the many attempts of researchers to define and conceptualize it. To help simplify matters, Leary and Tangney identified five primary uses of the term "self."

The first is the "self as the total person," referring to the self as the totality of what constitutes the individual (Leary & Tangney, 2003). Through this use, "self" is essentially a synonym for "person" and it is typically used by people in everyday language as they refer to their own person and/or body. However, Leary and Tangney point out that while this use is not inaccurate, it is not psychological in nature and is not commensurate with the field's view of the self. Within psychology, the self is regarded not as a person itself, but rather as an entity or quality that each person possesses.

The second use of the word self is the "self as personality", which encompasses all or part of a person's personality (Leary & Tangney, 2003). Theorists have equated the self to personality in the past, such as Tesser, who referred to the self as an individual's characteristics that differentiate him/her from others, and Maslow, whose term "self-actualization" referred to a personality that was fully integrated and functioning. While this is also not an inaccurate use of the word, Leary and Tangney suggest that the self as personality is perhaps too narrow a definition.

Thirdly, there is the "self as experiencing subject," which is based on William James' construction of the self (Leary & Tangney, 2003). According to James, the self

has two dimensions – the self as subject, and the self as object. This use of the term is the self as subject, also known as the self as "I." This "I" is the cognitive process that allows for self-awareness and is referred to as the subjective experience of an individual. To explain this more simply, Leary and Tangney state that the subjective self, the "I," is what people think of as "the 'thing' inside their heads that registers their experiences, thinks their thoughts and feels their feelings" (p. 7). It is the indivisible essence of who they are.

The fourth use of the word self is "self as beliefs about oneself," or James' self as object, which contrasts with the previously described self as subject (Leary & Tangney, 2003). This is the "me" self, which encompasses all the various aspects of the self, such as thoughts, emotions, and beliefs about oneself. Like with the self as personality, Leary and Tangney believe this to be too narrow a definition, and that terms such as self-concept and self-schema better capture one's self-beliefs.

The fifth and final conceptualization of the self identified by Leary and Tangney (2003) is "self as executive agent." This use of the word refers to the self as a decision-maker and action-taker, the thing that controls one's behavior. More specific self-related constructs, such as self-control and self-regulation better encapsulate this executive agent self.

In this study, the type of self to be considered will be James' self as "me," or the "self-as-known." Leary and Tangney (2003) describe the self as "me" as the thoughts, feelings, and perceptions about oneself and how people respond to questions such as, "What am I like?" and "Who am I?" Another way to view the self as "me" is to see it as people's conceptualizations or beliefs about themselves. William James described it as

"an empirical aggregate of things objectively known" (as cited in Vazire & Wilson, p. 67). Two terms that have been used historically to conceptualize and understand the self as "me" include the constructs of self-concept and identity. While some scholars and researchers often consider the terms of self-concept, and identity to be synonymous (Swann & Bosson, 2010), others (see Oysterman, Elmore, and Smith, 2003 as an example) consider them to be "nested elements" within the facets of the self as "me" (p. 74).

Self- Concept

Self-concepts are defined as "cognitive structures that can include content, attitudes, or evaluative judgments…used to make sense of the world, focus attention on one's goals, and protect one's sense of basic worth" (Oysterman, Elmore, & Smith, 2003, p. 72). More simply, people's mental constructs of who they are and what they believe to be true about themselves make up their self-concepts. In terms of determining and assembling the content of one's self-concept, people can gather information about themselves from a variety of perspectives.

First, people can view themselves from the temporally near perspective: the "now" self, or the temporally distal perspective: the "future" self (Oysterman, Elmore, & Smith, 2003). As the names indicate, the temporally near self is oneself in the current moment, while the temporally distal self is who one will be or desires to be in the future. There is also the immersed-self versus the distal-self (Kross, 2009; Kross, Ayduk, & Mischel, 2005), also called the field self versus the observer self (Nigro & Neisser, 1983). The immersed (field) self captures who one is up close, looking out from one's own eyes; it is the original perspective of the actor. The distal (observer) self is how one may look

6

from a distance, through the eyes of others. In this case, the actor takes the perspective of an observer and sees himself/herself from the outside.

In addition, Oysterman, Elmore, and Smith (2003) point out that cultural and clinical psychologists recognize an individualistic versus collectivistic sense of self or the "me" perspective versus the "us" perspective. The individualistic perspective of the self focuses on how one is different and unique from other individuals, while the collectivistic point of view concentrates on how one is similar to and associated with other people. While these are two different points of view any individual can take, there is significant evidence indicating these points of view are culture-dependent. For example, Americans typically have an individualistic view of the self, while cultures in East Asia typically hold a more collectivistic angle (Markus & Kitayama, 1991). However, Hogg (2003, 2006) has suggested that the lens through which one views the self is more heavily influenced by immediate context than culture.

Cohen and Gunz (2002) point out that some of these perspectives are innately related. For instance, the collectivistic perspective may overlap with the distal perspective, as they both consider the self through other people's points of view. Moreover, people can choose to view themselves from any combination of these perspectives (Oysterman, Elmore, & Smith, 2003), such as using an individualistic distal perspective to explore what other people may find unique about them. Alternating between and combining these perspectives is consequential, as it determines what information is gathered and what conclusions are drawn regarding the self. While the literature may use the aforementioned perspectives to refer to different forms of "self," Oysterman, Elmore, and Smith (2003) propose considering them as different structures or

domains of one's self-concept. So rather than multiple selves, there are multiple facets of oneself that when aggregated create the self-concepts that make up the self as "me".

Identity

Identity, another term cited as a component of the self as "me," is composed of *distinct* parts of one's self-concept specifically associated with positions in social networks and the social roles one enacts (Oysterman, Elmore, & Smith, 2003; Stryker, 1980; Stryker & Burke, 2000). Oysterman, Elmore, and Smith (2003) referred to identity as "the social relations, roles, and social group memberships that define who one is" (p. 69). People refer to and utilize their respective identity to guide them through life – it directs their choices, makes sense of their experiences, and even makes meaning of their self-concepts (Hogg, 2003; Stryker & Burke, 2000; Tajfel & Turner, 2004). For instance, one can have a religious identity that significantly influences the content of his/her self-concept (e.g., values, attitudes, behavior). Oysterman, Elmore, and Smith (2003) indicate that the identities individuals possess are typically based on the groups with which they align (e.g., gender, nationality, race/ethnicity, college major, religion, sports teams, etc.). More specifically, an identity is determined by the similarities shared with ingroup members, and the distinctions that set them apart from outgroup members. Scholars differ regarding the number of identities any one person may hold, with many believing that the number is one, and others suggesting one's identity can be as numerous as the number of social interactions they experience (Owens et al., 2010). Overall, a person's identity is an important facet of self-concept, and one's self-concepts/beliefs, when assembled, form the self as "me."

One of the most important components of the self as "me" is the construct of self-knowledge. This construct will be the focus of the remaining sections of this introduction and will form the basis of the sections to follow.

Self-Knowledge

It was previously addressed that the self as "me," the preferred conceptualization of the self for this study, is defined by Leary and Tangney (2003) as the thoughts, feelings, and perceptions about oneself, or the conceptualizations and beliefs about oneself. Self-knowledge, a yet unaddressed construct, shares similarities with the conceptualization of the self as "me". Self-knowledge is defined as "the true beliefs one has about one's self" (Hart & Matsuba, 2012, p. 8) and "accurate perceptions of the self" (Vogt & Colvin, 2005, p. 240). As evidenced by these definitions, there is one feature that sets self-knowledge apart from related areas of research and takes it one step farther than the self as "me"; namely its emphasis on the *accuracy* of one's self-views.

The concept of self-knowledge has been considered a fundamental virtue since the days of the ancient Greeks, evidenced by their credence to the philosophy of "know thyself" (Hart & Matsuba, 2012). Since then, the importance of it has been stressed by various religions, philosophies, and even the more recent self-help industry (Vazire & Wilson, 2012). Contemporary Western cultures consider self-knowledge as an essential factor in living a meaningful life (Williams, 1995).

The value of self-knowledge stems from its influence on important outcomes, such as happiness, relationships, and achievement (Vazire & Wilson, 2012). Possessing an accurate understanding and awareness of one's self equips the individual to make decisions that serve his/her interests and values. This allows them to select careers,

9

friends, spouses, and even weekend restaurants congruent with their preferences, talents, qualities, and aspirations, increasing the likelihood they will achieve contentment and satisfaction. It is also relevant for self-regulation and moral responsibility; that is, knowing one's emotions allows for better regulation of his/herself, and awareness of one's values allows for behavior congruent with those beliefs. If self-knowledge is lacking, it is difficult to exert control over one's life, make good decisions, exercise values, and take responsibility for his/her actions.

There is even evidence that accurate perceptions of the self are one of the defining characteristics of mental health, while a distorted sense of self is a key feature of various mental disorders, such as psychosis, severe depression, and schizophrenia (Jahoda, 1958; Brown, 1991). For instance, Freud was adamant that self-deception would often lead to neurosis, and consequently, the goal of psychoanalysis was to minimize one's self distortions (Sackheim, 1983). Other psychologists, such as Allport, Erikson, Fromm, and Rogers have also suggested that emotional well-being is highly correlated with accurate self-perception, hence the development of insight-oriented therapies (Brown, 1991).

According to Vazire and Wilson (2012), domains of self-knowledge include people's knowledge of their traits, attitudes, thoughts, emotions, desires, relationships, reputations, and pathologies. As indicated by the inclusion of "traits", knowing one's own personality is an important facet of self-knowledge. As Leary and Tangney (2003) described, the "self as personality" is one of the five primary uses of the term "self" throughout literature. While they concluded that personality is perhaps too narrow a definition for the self, it remained clear that personality is a central aspect of the self, and thus something of which it is worth having awareness. Not only does self-knowledge of

one's own personality allow individuals to describe themselves to others (Back & Vazire, 2012), it also increases the previously mentioned ability to make decisions compatible with whom one is, and encourage one's mental health (Hart & Matsuba, 2012; Vazire & Wilson, 2012; Jahoda, 1958; Brown, 1991).

Measures of Accurate Personality Prediction

Given the importance placed on accurate self-knowledge, Back and Vazire (2012) explored this phenomenon in regards to personality and even endowed it with the official title of "personality self-knowledge," or PSK. They define PSK as "the agreement between people's self-views of their personality and their real personality" (p. 132). This suggests that the accuracy of one's PSK is reflected through congruency between their *perceived* personality and their *real* personality. However, empirically determining this accuracy presents significant challenges, and is thus accompanied by limited empirical research (Back & Vazire, 2012; Hart & Matsuba, 2012; Vogt & Colvin, 2005; Schriber & Robins, 2012).

The first of these challenges is how the presence of bias in personality self-reports might distort the respondents' true personality (Back & Vazire, 2012). The potential impact of bias is important to consider, as self-report is the primary method of measuring personality. These potential biases include introspective limits, or ignorance of one's traits due to inability to self-reflect, as well as self-enhancement and socially desirable responding, which is when respondents intentionally or unintentionally skew their traits to appear more positive than what might be true.

Determining accurate personality self-knowledge often appears simple on the surface; i.e., simply compare someone's beliefs of his/her personality traits to that which

11

is true (Schriber & Robins, 2012). While measuring one's self-views is relatively simple (conducting self-reports of their personality traits while being mindful of bias), the primary challenge in empirically analyzing PSK lies in obtaining objective and valid measures of the "reality" of one's personality traits (Back & Vazire, 2012). Thus, the process requires a criterion measure of true personality against which individuals' self-views can be appraised. It is these "accuracy criteria" that have been difficult to identify, and at this point, there is still no "gold standard" for measuring objective personality traits (Schriber & Robins, 2012). However, despite the difficulties and continued lack of an ideal measure of PSK, several reasonable measures of "real" personality have been developed (Back & Vazire, 2012).

To assist with empirically evaluating PSK, Schriber and Robins (2012) identified three types of accuracy criteria researchers may utilize social consensus, pragmatic criteria, and objective criteria. They regarded social consensus as the correspondence between people's self-views and how they are viewed by others. This criterion is operationalized by aggregating the views of multiple observers, such as friends, family, coworkers, experts, and other lab experiment participants.

However, a problematic aspect of this criterion is possible variability in its validity due to several factors. First, each informant likely has a different perspective of the individual in question, which may limit the validity of informant perspectives. In response, Kenny (2004) advised researchers to conceptualize social consensus as a measure that encompasses all of an individual's possible behaviors observed by all possible informants. Another problem related to this criterion is that findings indicate the validity of observer reports will vary depending on the trait in question (Schriber &

Robins, 2012). For instance, attributes that are difficult to observe, such as neuroticism, will result in less valid observer reports (Back & Vazire, 2012).

Schriber and Robins (2012) described pragmatic accuracy as whether a person's appraisal is predictive of his/her actual behavior and functional in regards to achieving an individual's needs. For instance, if a school teacher judges a student to be intelligent, his/her appraisal would be considered accurate if the student then displayed advanced responses and high grades as it is predictive of behavior. In regards to being functional in meeting needs, an appraisal is considered accurate if it leads to positive outcomes and goal achievement.

Objective criteria of accuracy are obtained through comparing an individual's self-views to the data of standardized measures, such as test scores or laboratory results (Schriber & Robins, 2012). For instance, if an individual perceives him/herself as intelligent, this appraisal would be compared against IQ test scores or direct measures of relevant task performance where correspondence between the two is evidence for accuracy. However, several problems coexist with this accuracy criteria. Firstly, not all of a person's qualities are measurable through observable behavior. Also, even when objective external criteria are successfully devised, the behavior captured should accurately represent real-life behavior, which is difficult to achieve in a contrived laboratory environment.

Comparable with Schriber and Robins' (2012) suggestions regarding evaluating personality self-knowledge, Back and Vazire (2012) have presented four domains as reasonable measures of people's "real" personality. The criteria involved in these domains include implicit self-concept of personality (measured by implicit personality

tests), explicit self-concept of personality (measured by self-report), actual behavior (measured by direct behavioral observation), and people's reputations (measured by reports of knowledgeable informants; Back & Vazire, 2012). The first three domains (or measurements) of PSK are fashioned by comparing explicit self-concept with each of the three "real" personality criteria, while the last domain is referred to as "meta-accuracy," or how well subjects know others' perspectives of their personality. PSK can be measured by deriving correlations within the various domains.

Studies have revealed that among these correlations, subjects' explicit self-views of their personality (self-report) moderately predict their actual behavior and reputations, with the explicit-behavior domain being the strongest predictor of high PSK. However, explicit self-views do not significantly predict implicit self-views or meta-accuracy. As a result, it can be determined that actual behavior and knowledgeable informants are reasonable criteria for measuring PSK, while implicit self-views and meta-accuracy are often not.

In line with these findings, Vogt and Colvin (2005) utilized constructs similar to the aforementioned criteria to measure accurate personality self-knowledge, and their constructs included actual behavior and reputations, but not implicit self-views or meta-accuracy. Vogt and Colvin (2005) defined accurate self-knowledge as "knowledge of one's personality traits as they are exhibited in behavior," which is essentially the same definition proposed by Back and Vazire (2012): namely, accurate self-knowledge is when one's personality is displayed in reality (Vogt & Colvin, 2005, p. 240). Vogt and Colvin conducted a study that evaluated the effectiveness of these self-knowledge criteria.

Vogt and Colvin (2005) endorsed measuring personality self-knowledge through a multimethod approach that incorporated several different sources of information, including subject self-report, the reports of others who witness the subject's behavior, and laboratory observations (actual behavior). This multimethod procedure of using several accuracy criteria was determined to provide the advantage of aggregating the criterions' strengths while canceling out their weaknesses. This method of determining accurate self-knowledge consisted of evaluating the consistency (statistical correlation) between subject self-reports, others' reports, and actual behavior (measured in lab), all while controlling for social desirability. Their study did not explore the actual accuracy of individuals' self-knowledge; rather, it simply provided empirical evidence for the efficacy of this method as an assessment of accurate self-knowledge.

Once appropriate accuracy criteria have been established, the next challenge lies in how to measure the difference between the criterion and explicit self-views to determine their accuracy (Schriber & Robins, 2012). While deriving correlations between criterion and self-perceptions is useful, this procedure does not account for the possible biases mentioned previously. As a result, Schriber and Robins (2012) suggest several alternative procedures that account for bias.

The first possibility they discuss is to calculate a simple difference score, which consists of subtracting the criterion measures from the self-view scores. To create this simple difference score, both factors must be measured in the same way. A second option is to calculate a residualized difference score by using the criterion measures to predict the self-views through the application of multiple regression while maintaining the residuals. These residuals indicate the strength and direction of a subject's bias with self-

enhancement being signified through positive residuals and self-diminishment being reflected through negative residuals.

While several researchers have provided thorough and systematic methods for measuring the accuracy of personality self-knowledge, their approaches are labor-intensive and time-consuming and not yet practical in clinical settings. As a result, an alternative method, which is the focus of this study, is to use an existing measure of personality to create an additional scale to measure self-knowledge. What follows is a description of one such measure of self-knowledge that has been developed and studied over the last 20 years.

Miller (2000) attempted to develop a measure that would capture one's level of self-knowledge. In particular, she aimed to assess individuals' ability to predict their personalities. This study had 196 participants complete the 16PF Fifth Edition personality test, as well as predict their scores according to the 16PF profile sheet (see Appendix). Before Miller's study can be expanded upon, an overview of the 16PF is in order.

The 16PF

The 16PF is an objective personality measure that was created by Raymond B. Cattell and first published in 1949 (Cattell, 1994). Unlike most measures of its day, which were developed to measure a set of previously selected traits, Cattell used factor analysis to determine the fundamental aspects of personality. To do so, he analyzed the English language for all personality descriptors, starting with Allport & Odbert's (1936) collection of 17, 953 dictionary-based trait words. Through a series of factor analysis studies, Cattell gradually reduced his collection of trait descriptors to 15 basic personality

dimensions, and along with a rough measure of one's intellectual status, these factors made up, and continue to makeup, the 16 primary factor scales of the 16PF.

Each of the personality domains represented by the 16 primary factor scales is bipolar in nature, with the scale forming a continuum of the trait (Cattell, 1994). Each scale has a minimum score of one and a maximum score of 10. In addition, each scale has a mean of 5.5 and a standard deviation of 2. Scores ranging from one to three represent clinically significant low scores, while scores ranging from eight to 10 signify clinically significant high scores. Scores ranging from four to seven are considered to be in the average range. Also, the 16 primary factor scales were assigned an alphabetical letter to represent its personality domain (e.g., Factor A for the Warmth scale). The 16 primary factors within the 16PF, listed in Appendix, include the following: Warmth (A), Reasoning (B), Emotional Stability (C), Dominance (E), Liveliness (F), Rule-Consciousness (G), Social Boldness (H), Sensitivity (I), Vigilance (L), Abstractedness (M), Privateness (N), Apprehension (O), Openness to Change (Q1), Self-Reliance (Q2), Perfectionism (Q3), and Tension (Q4).

The first primary factor scale A, Warmth, refers to the degree to which a person is emotionally oriented towards others (Cattell, 1994). Individuals with high degrees of warmth are generally seen as warm, outgoing, and attentive to others, while those with low scores tend to be more reserved, impersonal, and distant. Factor (B), Reasoning, represents an individual's capacity to process and understand abstract material. Individuals with high reasoning scores are capable of thinking in the abstract, while those with low scores tend to engage in more concrete thinking. Factor C, Emotional Stability,

refers to one's ability to cope with the daily challenges of life. Respondents with high degrees of emotional stability are considered more emotionally stable, adaptive, and mature, while those with low degrees of emotional stability are seen as more reactive and emotionally changeable. Dominance (Factor E) refers to how individuals express themselves within an interpersonal context. People who obtain high scores are considered more dominant, forceful, and assertive with others, while those with low scores tend to be more cooperative and conflict-avoidant. Factor F is referred to as the Liveliness scale, which captures one's general self-expression and related level of self-control; high scorers are lively, animated, and spontaneous, while low scorers tend to be serious, restrained, and careful. Factor G, Rule-Consciousness represents an individual's level of conformity to societal standards and ideals, with high scorers being described as rule-conscious and dutiful, and low scorers being more expedient and non-conforming. The Social Boldness scale (Factor H) is one's level of sensation-seeking, with the ability to better handle the more stressful aspects of living. Individuals who score high on this scale are socially bold and venturesome, while those with low scores are timid, shy, and more threat-sensitive overall. Factor I, Sensitivity, refers to a person's emotional sensitivity, with high scorers being characterized as sensitive, aesthetic, and sentimental (more stereotyped feminine), and low scorers being more utilitarian, objective, and unsentimental (more stereotyped masculine). The Vigilance scale (Factor L) represents an individual's level of trust in others and their surroundings. Those who score high on this scale are seen as more vigilant, suspicious, skeptical, and wary, while those who score low are generally more trusting, unsuspecting, and accepting. Factor M, Abstractness, captures one's problem-solving style and one's level of incorporating

details. High scorers are described as abstracted, imaginative, and idea-oriented, while low scorers are grounded, practical, and solution-oriented. Privateness (Factor N) indicates one's level of openness or discretion, with high scorers being seen as more private, discreet, and non-disclosing, and low scorers being more forthright, genuine, and artless. An individual's apprehensiveness is captured by the Apprehension scale (Factor O). Respondents who obtain high scores are apprehensive, self-doubting, and worried, while respondents with low scores are self-assured, unworried, and complacent. The final four scales are Factors Q1, Q2, Q3, and Q4, which represent Openness to Change, Self-Reliance, Perfectionism, and Tension, respectively. High scorers on the Openness to Change scale are described as open to new events in their lives and more experimenting in general, while low scorers tend to be drawn to the more traditional and familiar aspects of life. Those high on the Self-Reliance scale are self-reliant, solitary, and individualistic, while those low on this scale are more group-oriented and affiliative. Factor Q3's Perfectionism scale is comprised of high scorers who are perfectionistic, organized, and self-disciplined, and low scorers tend to tolerate disorder more and are more unexacting and flexible. High scoring respondents on the Tension scale are tense, high energy, impatient, and driven, while low scoring respondents lean toward being more relaxed, placid, and patient.

From these 16 basic personality dimensions, Cattell also factor analyzed the 16 factors, which led to the identification of five global factor scales (Cattell, 1994). These five "second-order" personality factors are generally seen to represent the broader personality domains. These five global factor scales include Extraversion, Anxiety,

Tough-mindedness, Independence, and Self-Control. The primary factor scales that contributed to extraversion were Warmth (A), Liveliness (F), Social Boldness (H), Privateness (N), and Self-Reliance (Q2), while the primary factor scales that load onto Anxiety are Emotional Stability (C), Vigilance (L), Apprehension (O), and Tension (Q4). Primary factor scales contributing to the Tough-mindedness global factor are Warmth (A), Sensitivity (I), Abstractedness (M), and Openness to Change (Q1), while Dominance (E), Social Boldness (H), Vigilance (L), and Openness to Change (Q1) contributed to the Independence global factor. Lastly, the primary factor scales that have high loadings on the Self-Control global factor are Liveliness (F), Rule-Consciousness (G), Abstractedness (M), and Perfectionism (Q3).

The first global factor, Extraversion, measures an individual's degree of extraversion or introversion; high scorers are described as extraverted and socially participating, while low scorers are introverted and socially inhibited (Cattell, 1994). Five primary factor scales load onto the Extraversion scale (Factors A+, F+, H+, N-, and Q2-), and those respondents who obtain high Warmth, Liveliness, and Social Boldness scores, along with low Privateness and Self-Reliance scores, are likely to display qualities consistent with an extraverted personality. The second global factor, Anxiety, represents one's level of experienced anxiety, with high scorers being highly anxious and perturbable, and low scorers being unperturbable with low anxiety. Respondents high on Vigilance (L+), Apprehension (0 +), and Tension (Q4+), and low on Emotional Stability (A-) are likely high on the Anxiety global factor scale. The third extracted global factor is Tough-Mindedness, which encompasses an individual's manner of approaching problems

20

and his/her ability to set aside emotions while doing so. Individuals who obtain high scores on this global factor scale are tough-minded, resolute, and unempathetic, while those with low scores are more receptive, open-minded, and intuitive. In terms of the primary factor scales that load onto this third global factor, respondents low in Warmth (A-), Sensitivity (I-), Abstractedness M-), and Openness to Change (Q4-) are likely tough-minded individuals. Independence, the fourth global factor, measures one's level of self-determination regarding their thoughts and behaviors. Those high on this global factor are independent, persuasive, and willful, while those low on this global factor are accommodating, agreeable, and selfless. High scores on the primary factor scales of Dominance (E+), Social Boldness H+), Vigilance (L+), and Openness to Change (Q1+) suggest a person who displays high independence. Lastly, the fifth global factor, Self-Control assesses an individual's ability to resist the desire for satisfying one's immediate desires and needs. High scorers on this global factor are thus seen as more self-controlled and successful in inhibiting urges, while those who obtain low scores are unrestrained and tend to follow their urges. In terms of the primary factor scales that load onto this global factor, high scores on Rule-Consciousness (G+) and Perfectionism (Q3+) combined with low scores on Liveliness (F-) and Abstractedness (M-) are likely to indicate a respondent who is high in self-control.

The 16PF also contains three validity scales that are designed to identify and measure those potentially confounding response styles which might jeopardize the validity of a respondent's test scores (Cattell, 1994). Response style refers to how an individual might react to a test and the test-taking setting. Examples of confounded

response styles include respondents who select socially desirable, acquiescent, critical, extreme, or random answers irrespective of item content. The 16PF's three validity scales are as follows: Impression Management (IM), Acquiescence (ACQ), and Infrequency (INF). The IM scale was created using a rational-intuitive approach and captures social desirability. The ACQ and INF scales were developed through an empirical approach; the ACQ scale measures a respondent's tendency to answer questions in the true direction regardless of item content, while the INF scale evaluates test scores for random responding.

After four revisions, the 16PF is currently in its 5th edition (Cattell, 1994). The test's latest revision was aimed at re-standardizing the 16PF based on a more current population sample and refining the item content. To refine the item content, eight criteria were created to function as the threshold for the 5th edition's items. These eight criteria included: items should correlate more highly to their own scale than other scales, items should be simple and clear, dated (or datable) content should be avoided, items suggesting bias should not be used, items not easily translated into other languages should be avoided, material that could be offensive in an industrial setting should be avoided, socially desirable or undesirable content should be left out to reduce distortion, and items with previous extreme endorsements should be avoided. These efforts resulted in the creation of 10-15 items per primary factor scales.

Development of the SAPP

The SAPP measure had its inception in the clinical arena, where clients, after completing the 16PF, were asked to predict their scores on a blank 16PF blank profile

sheet (see Appendix). After numerous clients did so, it was observed that some of them seemed to do quite well in predicting their scores, and others much less well. Miller's (2000) study used this information to more formally study this observed difference in how well or not well one was able to accurately predict their scores. The outcome of her work led to the creation of the Scale of Accurate Personality Prediction (SAPP), using data from a convenience sample of 196 subjects from a private college and its surrounding community. More specifically, these subjects completed the objective 16PF Fifth Edition personality assessment, then subjectively filled out a blank 16PF profile sheet (see Appendix) by predicting, utilizing the descriptive adjectives given for each scale, where they would score on bipolar continuums (with scores of 1-10) for each of the sixteen primary and five global personality factors. Next, the SAPP was created by summing the absolute difference between the obtained score (OS) and the predicted score (PS) for each of the 21 scales. This can be better seen in the following formula:

SAPP = [OSA-PSA] + [OSB-PSB] + [OSC-PSC] + [OSE-PSE] +

      [OSF-PSF] + [OSG-PSG] + [OSH – PSH] + [OSI-PSI] +

      [OSL-PSL] + [OSM-PSM] + [OSN-PSN] + [OSO-PSO] +

      [OSQ1-PSQ1] + [OSQ2-PSQ2] + [OSQ3-PSQ3] +

      [OSQ4-PSQ4] + [OSEX-PSEX] + [OSAX-PSAX] +

      [OSTM-PSTM] + [OSIN-PSIN] + [OSSC-PSSC]

When interpreting the results of one's SAPP score, low scores correspond to higher accuracy in self-prediction (as they result from a minimal difference between the predicted and obtained score), while high scores reflect lower accuracy in self-prediction

(as they result from a large difference between the predicted and obtained score; Miller, 2000). The lowest possible SAPP score is 0, which reflects optimum accuracy, while the highest possible SAPP score is 189, indicating the poorest degree of accuracy. In Miller's study, scores on the SAPP scales ranged from 18 to 79, with a mean score of 42.07 (SD = 11.74).

As a result of this procedure, two sub-samples were created: those who received SAPP scores one standard deviation below the SAPP mean (subjects with higher self-prediction abilities) and those with SAPP scores one standard deviation above the SAPP mean (subjects with poorer self-prediction; Miller, 2000). Mean scores were created for each of the two sub-groups and the two means compared to each other. When the scores for each of these groups were compared, significant differences were found between the high and low scorer groups on the following nine (of 21) factors: Tough-Mindedness (-), Openness to Change (-), Sensitivity (-), Reasoning (-), Extraversion (-), Privateness (+), Vigilance (+), Warmth (-), and Liveliness (-). Therefore, these nine scales represent the nine 16PF personality factors that were the best predictors of high and low scores. It is important to remember here that lower SAPP scores indicate more accurate levels of self-prediction and therefore higher hypothesized levels of self-knowledge.

In particular, Miller was interested in identifying which 16PF scales would be the best predictors of an individual's ability to accurately predict their personality traits (indicated by low SAPP scores; Miller, 2000). After conducting a regression analysis, five 16PF personality factors were identified as the best predictors of personality self-

knowledge; Tough-Mindedness (-) was the highest predictor, followed by Reasoning (+), Independence (-), Tension (+), and Anxiety (-), respectively. According to these results, individuals who complete the 16PF and obtain low Tough-Mindedness scores, high Reasoning scores, low Independence scores, high Tension scores, and low Anxiety scores are more likely to generate low SAPP scores, and thus are more likely to possess higher personality self-knowledge.

Validity of the SAPP

The validity of a measure refers to its legitimacy and overall ability to carry out its intended purpose (American Psychological Association [APA], 1985). For a measure to be useful, adequate validity is essential. There are various types of validity, starting with construct validity, which is the extent to which a measure is capable of capturing the construct it was designed to assess. For instance, the SAPP of the 16PF is intended to measure a subject's level of self-knowledge, but is the SAPP capable of accurately capturing self-knowledge as a construct? Construct validity is established through two more specific types of validity – convergent validity and discriminant validity.

Convergent validity is established when there is a significant correlation between two separate measures that are intended to capture the same construct, while discriminant validity is shown when a measure is *not* correlated to measures that assess a dissimilar construct (APA, 1985). Hood (2001) examined the construct validity of Miller's SAPP by assessing the convergent and discriminant validity of the SAPP. To assess for convergent validity, Hood tried to find a positive correlation between SAPP scores and the Private

self-consciousness factor of the Self-Consciousness Scale (1975), hypothesizing these two measures would have a significant relationship as they measure similar constructs. To determine discriminant validity, Hood compared the SAPP to the Tennessee Self-Concept Scale (1964) and predicted it would not be significantly related to the SAPP, as it is a measure designed to capture one's level of self-esteem. The results revealed the SAPP was not significantly correlated with either of the two measures, thus discriminant validity was supported (r=.188, p>.05), but convergent validity was not supported (r= -.30, p>.05). When this study was replicated by Glywasky (2003) with a larger sample size, no significant results were found for either convergent validity (r = -.026, p>.05) nor discriminant validity (r = -.03, p>.05).

Anderson (2002) also attempted to establish convergent validity for the SAPP by assessing for a significant correlation between SAPP scores and the Self-Monitoring Scale, which measured people's ability to regulate their behavior using the social cues of others. The results of this study failed to provide support for the convergent validity of the SAPP as there was no significant correlation between the two measures (r=.001, p>.05). Pass (2013) conducted a similar study whereby subjects' SAPP scores were compared to their scores on the Integrative Self-Knowledge Scale (ISKS), an assessment that measures components of self-knowledge. It was predicted there would be a strong correlation between the two scales, but the study's results produced no significant findings (r = -.122, p>.05), thus no evidence of construct validity.

Taking a different approach, Winter (2002) deduced *a priori* that graduate psychology students should possess greater self-knowledge than graduate engineering

students, she used both groups to evaluate the construct validity of the SAPP, with the prediction that graduate psychology students would have lower SAPP scores (indicating higher self-knowledge) than graduate engineering students. This study failed to provide evidence for construct validity as no significant difference was found between the mean SAPP scores for the two groups $t(29) = .68$, $p \geq .05$. Winter's study was replicated by Grossenbacher (2006) with a larger sample size that included additional participants with completed degrees and current employment in either psychology or engineering. The results of this study revealed a significant difference between the mean SAPP scores for the two groups ($t = -4.247$, $p \leq .01$), providing some evidence to support construct validity for the SAPP.

To further investigate the SAPP's construct validity, Layton (2005) compared subjects' perceptions of themselves to their peers' perceptions of the same subjects. To do so, Layton had target subjects predict their personality traits on a blank 16PF profile sheet (as Miller did) and then had two significant others rate these subjects on the same traits. She then compared the self-ratings to the peer ratings, hypothesizing that congruency between self and peer ratings would indicate an accuracy of personality prediction. While the data did produce a correlation in the predicted direction, it was not statistically significant. As a result, this study fell short of providing strong evidence of construct validity for the SAPP. However, when Wolf (2006) replicated Layton's study, with a larger sample size, the correlation between subjects' SAPP scores and their peers' predictions was found to be statistically significant, suggesting evidence for the validity of the SAPP.

Hickey (2005) continued utilizing this method to evaluate the SAPP's convergent validity by having the target subjects' personality traits predicted by the target subjects themselves, in addition to two of their family members. From these personality predictions, she developed a measure of concordance to denote the degree of agreement between each test subject and their family members. She then compared the SAPP scores to the concordance measures to directly assess for convergent validity. Though the resulting correlation displayed the predicted direction, it was not statistically significant ($r=.302$, $p<.09$). However, Blankemeier (2007) replicated this study using again a larger sample size and found a significant correlation between the SAPP scores and the concordance measure ($r=.283$, $p<.05$), evidencing convergent validity of the SAPP.

In 2006, the method begun by Layton (2005) of comparing test subjects' SAPP scores to their significant others' (partners, friends, family) perceptions of them was slightly altered. Afandor (2006) took the SAPP scores of individuals currently engaging in psychotherapy and compared them to their therapist's rating of their level of self-knowledge. To do so, target subjects predicted their personality traits according to the 16PF profile sheet (as was done in the previous 3 studies), while the clinicians rated their clients' level of self-knowledge on a scale of 1 to 10 (with 0 being none, 5 being average, and 10 being a very high degree of self-knowledge). When a correlation was derived between SAPP scores and therapist self-knowledge ratings, no significant results were found ($r=.258$, $p>.05$). Again the limited sample size was noted to be a restricting variable in this study.

Overall, several of these validation studies (particularly the replication studies with larger sample sizes) resulted in statistically significant results, suggesting some evidence for the validity of the SAPP.

Reliability of the SAPP

One common method of testing a measure's reliability is to determine its consistency when repeated with the same individual or group of individuals (APA, 1985). More specifically, test-retest reliability is the ability of a measurement to generate consistent results when administered to the same participants on separate occasions. When conducting studies that assess for test-retest reliability, the time interval between testing trials can vary, such as the three different time intervals utilized throughout test-retest reliability studies completed for the SAPP: two weeks, four weeks, and six weeks.

Silva (2011) conducted the first reliability study for the SAPP. She assessed for test-retest reliability by having a group of 62 volunteers participate in two separate testing sessions conducted two weeks apart. On each occasion, the subjects completed the 16PF and predicted their personality traits according to the 16PF profile sheet. SAPP scores were generated for trial one and trial two, then the SAPP scores from both dates were compared. While the resulting correlation was statistically significant, its magnitude did not meet the threshold of what is typically acceptable for test-retest reliability ($r^2 = .397$, $p<.05$). However, this study was replicated by Hirsch (2012) with a slightly smaller sample size (58 participants) and resulted in a significant moderate correlation between the SAPP scores ($r^2 = .566$, $p<.01$). Through further replication with an even smaller

sample size, Stewart (2017) generated a significant moderate correlation between the SAPP scores ($r^2 = .584$, p<.01), suggesting reliability for the SAPP.

Evaluation of test-retest reliability for the SAPP was continued with studies that utilized a four-week interval between test trials. Similar to the results from the Silva (2011) study, Sverdlova (2012) obtained a significant correlation that fell below the desired threshold for test-retest reliability ($r^2 = .466$, p<.05). However, Anderson (2019) completed a similar study that resulted in a significant strong correlation ($r^2 = .584$, p<.01), evidencing reliability for the SAPP.

Several rest-retest reliability studies whose methodology applied a six-week interval between testing trials also revealed statistically significant results. With a sample size of 47 subjects, Elghossain (2012) obtained a significant strong correlation ($r^2 = .772$, p<.01). Barrow (2018) conducted another six-week interval study that yielded a significant moderate correlation between the SAPP scores ($r^2 = .572$, p<.01). Overall, the aforementioned test-retest reliability studies collectively provide significant evidence that the SAPP is a reliable measure, meaning its results are consistent over time.

It should be noted that in the above test-retest reliability studies, the significant reliability results found are generally lower than what would often be expected. This is the case because each of the 21 16PF variables has its own test-retest reliability values that are less than the perfect 1.00 value. Consequently, the cumulative effect of utilizing each of the 21 scales will no doubt lower the SAPP test-retest outcomes found.

Generalizability of the SAPP

Beyond the studies conducted to establish validity and reliability for the SAPP, several studies were also completed to evaluate for the SAPP's ability to generalize across diverse populations. Rodriguez (2011) evaluated the generalizability of the SAPP to the Hispanic population by applying Miller's original methodology to a sample of 50 Hispanic/Latino subjects and comparing their SAPP scores to previously collected scores. When a t-test was employed to compare the mean SAPP scores from both Miller and Rodriguez's samples, no significant difference was found (t=.420, p<.05), indicating the SAPP is likely generalizable to the Hispanic/Latino population.

Similarly, Zeng (2015) investigated the SAPP's ability to generalize to the Asian population. To do so, SAPP scores were generated from a sample of 36 Asian participants and compared to scores from three random samples pulled from an archival database. The results of this study revealed that for two of the three random samples, there was not a significant difference between the SAPP scores [$t\ (70) = .992, p = .324$; $t\ (70) = 1.852, p = .068$]. Though a significant difference was found between the second random sample and Zeng's Asian sample [$t\ (70) = 2.5, p = .015$], the overall results suggest the SAPP can be generalized to the Asian population.

Other SAPP-Related Studies

In addition to the previously cited studies regarding validity, reliability, and generalizability, several studies made novel contributions to the development of the SAPP. VanSickle (2003) evaluated for the impact of response bias on personality self-

prediction. In addition to having a sample of 219 respondents follow Miller's original

methodology, VanSickle also had approximately half of these subjects complete a

counterbalanced 16PF profile sheet to assess for a tendency to endorse higher numbers on

the bipolar personality trait scales. The results revealed a lack of this response bias in

personality prediction. McElligott (2014) undertook standardizing the SAPP by creating

standard ten (STEN) scores from a normative database of 688 respondents. Using a

simple linear transformation, McElligott adjusted SAPP scores to reverse their direction;

Essentially, obtained SAPP scores were subtracted from the highest possible score of 189

to create logical results where high scores reflect accurate personality prediction and

vice-versa for low scores. The development of these STEN scores enables this measure to

be more easily compared to other psychological measures.

DiLullo (2018) completed one of the most recent SAPP-related studies to determine

which of the 21 16PF primary and global factors would best predict respondents' SAPP

scores. Ascertaining these predictor variables would allow for SAPP scores to be

generated from the existing 16PF scales, potentially eliminating the need for respondents

to predict their personality traits. A series of various regression analyses were conducted

across four random samples drawn from an archival database of 645 participants. What

emerged was that in three of the four samples, Tough Mindedness (-) and Tension (+)

were the strongest predictors of SAPP scores. Furthermore, Emotional Control Stability

(+), Dominance (-), Apprehension (+), and Vigilance (L+) served as strong predictive

factors in two of the four samples. However, due to the variability amongst the results of

32

these regression analyses, it was concluded that the 16PF scales would be potentially

limited in their ability to predict a meaningful numerical self-knowledge score.

Statement of Purpose and Hypothesis

The present study aimed to further DiLullo's (2018) analyses by generating more consistency amongst the results across several samples. Due to the variability in the identified best 16PF predictor variables which emerged from her study, it was speculated that it might be best to use a <u>categorical</u> SAPP score instead of the <u>continuous</u> one used in her study. The overall goal of this present study is the same as DiLullo's (2018), which was to identify which of the 21 primary and global factors of the 16PF would best predict subjects' SAPP scores or self-knowledge. However, to encourage more consistency, the methodology has been changed from regression analyses (continuous dependent variable) to multinomial logistic regression analyses (categorical dependent variable). Therefore, each respondent's SAPP score will first be converted to a categorized score of either low (e.g., STEN scores of 1-4), medium (STEN scores of 5 or 6) or high (STEN scores of 7 – 10) STEN scores, then the multinomial logistic regression analyses will use this group placement variable as the dependent variable. It was hoped that such a conversion will allow for slightly more "leniency" in the accuracy of the now categorical placement, thus increasing consistency across samples.

Method

Subjects

Participants for this study were derived from previous SAPP studies whose data were collected and placed into one extensive database. These participants include mostly college students, as well as professionals and other people from the community. The database consists of 688 subjects whose data was derived over the last 15-20 years in a typically non-randomized manner.

Procedure

In all the previous studies, participants were given a 16PF Fifth Edition test to complete, in addition to a 16PF profile sheet (see Appendix). Subjects were asked to subjectively fill out the profile sheet by predicting where they would score on bipolar continua (with scores of 1-10) for each of the sixteen primary and five global personality factors of the 16PF. These self-ratings were then compared to their objectively obtained 16PF scores and using the formula noted in the literature review, SAPP scores were generated for each subject.

Analysis

Because of the variability in the identified best 16PF predictor variables that emerged from the DiLullo study, it was hypothesized that it would be best and most useful to use a more categorical SAPP score instead of the continuous one used in her study. Therefore, for this study, each respondent's SAPP score was first converted to a score of either low (STEN scores of 1-4), medium (STEN scores of 5 or 6), or high (STEN scores of 7-10) STEN scores, and subsequently, the multinomial logistic regression analyses then utilized this group placement variable as the dependent variable.

It was hoped that such a conversion will allow for slightly more "leniency" in the accuracy of the now categorical rather than continuous placement. More specifically, two samples (odd and even subject identification numbers) were extracted from the 688-subject database, creating half-samples, and multinomial logistic regression analyses were run across each sub-sample to explore the consistency of the results. In the multinomial logistic regression analyses, the 21 variables of the 16PF functioned as the independent variables (continuous) and three newly-created categorical SAPP groups (i.e., low, medium, and high SAPP scores) as the categorical dependent variable.

Hypothesis

It is hypothesized that the general predictor variables across the whole sample and two sub-samples will be quite similar to those identified by DiLullo (2018) in her study. Specifically, that the 16PF factors of Toughmindedness (TM-) and Tension (Q4+) will be the best predictors of one's categorical SAPP score, closely followed by Emotional Stability (C+), Dominance (E-), Apprehension (O+), and Vigilance (L-). Overall, given the change in methodology to multinomial logistic regression analyses, it is hypothesized that compared to DiLullo (2018), there will be more consistency across the results of the two sub-samples.

Results

Demographic Results

   Specific demographic results for the total sample can be found in Table 1, while

the demographic results for each of the half-samples can be found in Tables 2 and 3,

respectively. Across the whole sample, subjects ranged in age from 16 to 81 years old.

The age with the highest frequency was 23 years old (9.3% of subjects), while the age

range with the highest frequency was 18-29 (74.1% of subjects). Regarding gender,

57.4% of subjects were female, while 42.6% were male. Referencing education, 0.1% of

subjects did not complete a high school education, 4.6% graduated from high school,

32.2% completed some college, 22.2% completed four years of college, and 40.5% had

completed between 1-7 years of graduate-level training. Occupationally, 61.2% of

subjects were students, 21.6% considered themselves to have white-collar employment,

1.6% identified as having blue-collar employment, 3.4% were retired, 4.3% were

unemployed or homemakers, and 8.0% identified as having "other" employment. Among

the subjects who were students, 42.7% were psychology graduate students. In terms of

marital status, 72.5% of subjects were single, 21.1% were married, 4.8% divorced, 1.0%

separated, and 0.6% widowed. When looking at ethnicity, 70.3% of subjects were

Caucasian, 2.8% were African American, 9.6% Asian, 11.5% Hispanic, 0.1% Indian

American, and 5.5% of subjects considered their ethnicity to be "other." When observing

the geographical locations or origins of the subject pool, 77.7% of subjects were from the

Southeast United States, 4.0% from the Southwest, 13.9% from the Northeast, and 3.8%

from the Midwest. Moreover, 0.6% of subjects were from other countries, with 0.2% of

subjects being from Canada and 0.4% from the Caribbean.

Multinomial Logistic Regression Analyses

To establish the best 16PF predictor variables of categorical SAPP scores, a series of multinomial logistic regression analyses were conducted – first, on the sample as a whole, then on the two half-samples; the results from these analyses can be found in Tables 4-6.

When looking at the results from the statistical analyses, several 16PF factors were able to predict an individual's categorical SAPP level to a statistically significant degree. Within the total sample, Emotional Stability (C+), Tough-Mindedness (TM-), Vigilance (L-), and Tension (Q4+) were the best predictors of an individual's level of self-knowledge, as can be seen in Table 4. Within the first half-sample, Emotional Stability (C+), Tough-Mindedness (TM-), and Tension (Q4+) were again the best predictors, minus the inclusion of Vigilance (L-) as a statistically significant predictor variable. Table 5 displays the results from the first half-sample. For the second half-sample, Emotional Stability (C+), Tough-Mindedness (TM-), Vigilance (L-), and Tension (Q4+) proved to be the best predictors. As can be seen, these results align precisely with those of the total sample. Table 6 illustrates the results of the second random half-sample.

Overall, the results of the three samples were highly consistent. The main commonalities among the samples were Emotional Stability (C+), Tough-Mindedness (TM-), and Tension (Q4+); the results of all three samples revealed these variables as statistically significant predictors of an individual's level of self-knowledge. Vigilance (L-) was also evident in the total sample and second random half-sample, though not in the first random half-sample.

Discussion

The primary objective of this study was to identify which of the 16PF primary and global factors would best predict one's categorical SAPP score or level of self-knowledge. If these factors could be identified, it would allow for the generation of one's level of self-knowledge directly from the existing 16PF scales, without respondents having to first predict their scores. When interpreting the results, a mildly liberal adjustment was made to allow for statistically significant p-values to include p-values less than, *or equal to,* .05.

In assessing the results, Emotional Stability (C+), Tough-Mindedness (TM-), and Tension (Q4+) emerged as predictive factors in all three of the samples, while Vigilance (L-) appeared in two of the three samples. The significant consistency amongst the results of the three samples indicates that a subject's level of self-knowledge could be produced from the existing 16PF scales. Overall, these results suggest that individuals who are more emotionally stable and adaptive (C+), more tough-minded and resolute (TM-), more driven and have higher energy (Q4+), and more trusting and accepting (L-), are more likely to have a higher degree of self-knowledge.

When these results are compared to those of DiLullo (2018), it can be seen that four of the identified predictors (TM-, Q4+, C+, and L-) found in the present study also emerged in DiLullo's work. However, the results from DiLullo's statistical analyses further identified Dominance (E-) and Apprehension (O+) as statistically significant predictors. Furthermore, there was considerable variability within the results from DiLullo's random quarter-samples, while the variability among the results from the present study's random half-samples was minimal. Overall, these findings align with the

hypothesis of the present study, which indicated that the results of the present study

would be similar to DiLullo (2018), except with more consistency across the sub-

samples.

       The primary limitation of this study is the lack of a significantly diverse sample,

as the majority of the subjects are Caucasian, young adults, students, single, and from the

Southeast United States. Any future research should attempt to better diversify the

sample.

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Table 1
Summary of Demographic Statistics, Total Sample

Demographic Variable	Frequency	Valid Percent
GENDER		
Female	383	57.4%
Male	284	42.6%
AGE		
16-18	42	6.2%
19-24	300	43.6%
25-39	224	32.5%
40-60	73	10.5%
61-81	28	3.9%
MARITAL STATUS		
Single	361	72.5%
Married	105	21.1%
Divorced	24	4.8%
Separated	5	1.0%
Widowed	3	0.6%
RACE		
Caucasian	469	70.3%
African American	19	2.8%
Asian	64	9.6%
Hispanic	77	11.5%
Indian American	1	0.1%
Other	37	5.5%
OCCUPATION		
Student	345	61.2%
White Collar	122	21.6%
Blue Collar	9	1.6%
Retired	19	3.4%
Unemployed/Homemaker	24	4.3%
Other	45	8.0%
GEOGRAPHY		
Southeast	386	77.7%
Southwest	20	4.0%
Northeast	69	13.9%
Midwest	19	3.8%
Canada	1	0.2%
Caribbean	2	0.4%

EDUCATION

Less Than 12 Years	1	0.1%
High School Completed	31	4.6%
Some College	216	32.2%
College Degree	148	22.2%
Graduate of Professional Training	271	40.5%

Table 2
Summary of Demographic Statistics, Random Sample 1

Demographic Variable	Frequency	Valid Percent
GENDER		
Female	178	55.1%
Male	145	44.9%
AGE		
16-18	20	6.2%
19-24	152	46.9%
25-39	106	32.8%
40-60	33	9.9%
61-81	12	3.6%
MARITAL STATUS		
Single	170	71.4%
Married	51	21.4%
Divorced	12	5.0%
Separated	3	1.3%
Widowed	2	0.8%
RACE		
Caucasian	227	70.3%
African American	8	2.5%
Asian	31	9.6%
Hispanic	40	12.4%
Indian American	0	0%
Other	17	5.3%
OCCUPATION		
Student	168	59.6%
White Collar	64	22.7%
Blue Collar	6	2.1%
Retired	8	2.8%
Unemployed/Homemaker	11	3.9%
Other	25	8.9%
GEOGRAPHY		
Southeast	188	79.0%
Southwest	9	3.8%
Northeast	31	13.0%
Midwest	9	3.8%
Canada	1	0.4%
Caribbean	0	0.0%

EDUCATION

Less Than 12 Years	1	0.3%
High School Completed	14	4.3%
Some College	112	34.6%
College Degree	75	23.2%
Graduate of Professional Training	121	37.3%

Table 3

Summary of Demographic Statistics, Random Sample 2

Demographic Variable	Frequency	Valid Percent
GENDER		
Female	196	60.9%
Male	126	39.1%
AGE		
16-18	22	6.8%
19-24	145	45.0%
25-39	106	33.0%
40-60	34	10.4%
61-81	0	0.0%
MARITAL STATUS		
Single	177	74.4%
Married	47	19.7%
Divorced	11	4.6%
Separated	2	0.8%
Widowed	1	0.4%
RACE		
Caucasian	231	71.7%
African American	7	2.2%
Asian	29	9.0%
Hispanic	37	11.5%
Indian American	1	0.3%
Other	17	5.3%
OCCUPATION		
Student	177	62.8%
White Collar	58	20.6%
Blue Collar	3	1.1%
Retired	11	3.9%
Unemployed/Homemaker	13	4.6%
Other	20	7.1%
GEOGRAPHY		
Southeast	187	78.9%
Southwest	9	3.8%
Northeast	31	13.1%
Midwest	10	4.2%
Canada	0	0.0%

Caribbean	0	0.0%

EDUCATION

Less Than 12 Years	0	0.0%
High School Completed	17	5.3%
Some College	102	31.7%
College Degree	71	22.0%
Graduate of Professional Training	132	40.8%

Table 4
Multinomial Logistic Regression Analysis, Total Sample

Variable	B	WALD	Correlation with SAPP Level (p)
Primary Factor C+	1.39	40.61	0.00
Primary Factor L-	-0.71	7.38	0.03
Primary Factor Q4+	0.65	4.12	0.05
Global Factor TM-	-0.93	15.23	0.01

Table 5
Multinomial Logistic Regression Analysis, Random Sample 1

Variable	B	WALD	Correlation with SAPP Level (p)
Primary Factor C+	1.99	70.65	0.00
Primary Factor Q4+	0.93	8.92	0.03
Global Factor TM-	-0.75	3.05	0.05

Table 6
Multinomial Logistic Regression Analysis, Random Sample 2

Variable	B	WALD	Correlation with SAPP Level (p)
Primary Factor C+	1.61	50.13	0.00
Primary Factor L-	-0.84	7.11	0.03
Primary Factor Q4+	0.61	4.30	0.05
Global Factor TM-	-0.58	5.97	0.05

Appendix

16PF Profile Sheet

PRIMARY FACTORS

Factor	Left Meaning	Standard Ten Score (STEN)	Right Meaning
A: Warmth	Reserved, Impersonal, Distant	1...2...3...4...5...6...7...8...9...10	Warm Outgoing, Attentive to Others
B: Reasoning	Concrete	1...2...3...4...5...6...7...8...9...10	Abstract
C: Emotional Stability	Reactive, Emotionally Changeable	1...2...3...4...5...6...7...8...9...10	Emotionally Stable, Adaptive, Mature
E: Dominance	Deferential, Cooperative, Avoids conflict	1...2...3...4...5...6...7...8...9...10	Dominant, Forceful, Assertive
F: Liveliness	Serious, Restrained, Careful	1...2...3...4...5...6...7...8...9...10	Lively, Animated, Spontaneous
G: Rule-Consciousness	Expedient, Non-Conforming	1...2...3...4...5...6...7...8...9...10	Rule-Conscious, Dutiful

H: Social Boldness	Shy, Threat-Sensitive, Timid	1...2...3...4...5...6...7...8...9...10	Socially Bold, Venturesome Thick-Skinned
I: Sensitivity	Utilitarian, Objective, Unsentimental	1...2...3...4...5...6...7...8...9...10	Sensitive, Aesthetic, Sentimental
L: Vigilance	Trusting, Unsuspecting, Accepting	1...2...3...4...5...6...7...8...9...10	Vigilant, Suspicious, Skeptical, Wary
M: Abstactedness	Grounded, Practical, Solution-Oriented	1...2...3...4...5...6...7...8...9...10	Abstracted, Imaginative Idea-Oriented
N: Privateness	Forthright, Genuine, Artless	1...2...3...4...5...6...7...8...9...10	Private, Discreet, Non-Disclosing
O: Apprehension	Self-Assured, Unworried, Complacent	1...2...3...4...5...6...7...8...9...10	Apprehensive, Self-Doubting, Worried
Q1: Openness to Change	Traditional, Attached to Familiar	1...2...3...4...5...6...7...8...9...10	Open to Change, Experimenting
Q2: Self-Reliance	Group-Oriented, Affiliative	1...2...3...4...5...6...7...8...9...10	Self-Reliant, Solitary, Individualistic
Q3: Perfectionism	Tolerates Disorder,	1...2...3...4...5...6...7...8...9...10	Perfectionistic, Organized,

	Unexacting		Self-Disciplined
Q4: Tension	Relaxed, Placid, Patient	1...2...3...4...5...6...7...8...9...10	Tense, High Energy, Driven

GLOBAL FACTORS

Factor	**Left Meaning**	**Standard Ten Score (STEN)**	**Right Meaning**
EX: Extraversion	Introverted, Socially Inhibited	1...2...3...4...5...6...7...8...9...10	Extraverted, Socially-Participating
AX: Anxiety	Low Anxiety, Unperturbed	1...2...3...4...5...6...7...8...9...10	High-Anxiety, Perturbable
TM: Tough-Mindedness	Receptive, Open-Minded Intuitive	1...2...3...4...5...6...7...8...9...10	Tough-Minded, Resolute, Unempathetic
IN: Independence	Accommodating, Agreeable Selfless	1...2...3...4...5...6...7...8...9...10	Independent, Persuasive Willful
SC: Self-Control	Unrestrained, Follows Urges	1...2...3...4...5...6...7...8...9...10	Self-Controlled, Inhibits Urges