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DIFFERENTIATING DARK TRIAD TRAITS WITHIN AND ACROSS INTERPERSONAL  
CIRCUMPLEX SURFACES

A Thesis in

Psychology

by

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## **ABSTRACT**

Interpersonal theory provides an explicit and conceptually driven framework for integrating information from a number of disciplines. The interpersonal circumplex (IPC) serves as the foundation for research based on interpersonal theory, describing interpersonal functioning in terms of dominance and affiliation. Until recently, research using the IPC was primarily descriptive in nature. A recently developed bootstrapping methodology that computes confidence intervals around circumplex structural summary parameters associated with the IPC allows researchers to statistically test differences in these parameters for the first time. This study uses the Dark Triad of personality traits to explore potential applications of this methodology. Confidence intervals were used to examine the construct validity of the SD3 scales and 4 measures of psychopathy. Evidence for the discriminant validity of the SD3 scales and convergent validity of the psychopathy scales is discussed. Additionally confidence intervals were used to examine group differences in structural summary parameters, finding that despite mean level differences in Dark Triad traits, the associated structural summary parameters were similar for men and women. Finally, information across IPC surfaces can be integrated to provide profiles associated with Dark Triad traits and more general portraits of their interpersonal dynamics. These findings suggest that the use of this novel bootstrapping methodology is a valuable addition to personality assessment that should be integrated into future work using the IPC.

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CHAPTER 1: INTRODUCTION

This thesis describes a study that demonstrates the use of a new bootstrapping methodology to examine construct validity through an interpersonal lens. Although this study uses the Dark Triad of personality traits to explore the ways in which this methodology could be applied due to its natural grouping of distinct but related constructs, the same methodology could be used to evaluate the validity of constructs across and perhaps even beyond psychological disciplines.

*Construct Validity and the Interpersonal Domain*

In 1955, Cronbach and Meehl highlighted the importance of construct validity in test development. Although the term itself was formally defined a year earlier, Cronbach and Meehl's interpretation provided researchers with a clear explanation that elaborated the implications of construct validity in research more formally. Since then, researchers have examined construct validity through a variety of lenses including the interpersonal paradigm (Gurtman, 1991, 1997; Wiggins & Broughton, 1985, 1991).

The interpersonal paradigm provides an explicit and conceptually driven framework for integrating information from a number of disparate fields, including clinical psychology, personality psychology, and social psychology. This framework serves as a nomological network integrating and organizing both interpersonal variables and novel constructs (Cronbach & Meehl, 1955; Gurtman, 1992; Guttman, 1970; Wiggins & Broughton, 1985). This framework also clarifies the meaning of those constructs by locating them in interpersonal space (Cronbach & Meehl, 1955; Gurtman, 1992; Wiggins & Broughton, 1985). Interpersonal theory has been used in this way to examine the construct

validity of a wide range of measures, including those that assess self-monitoring, self-esteem, sex roles, self-consciousness, personality, personality disorders, aggression, perfectionism, dependence, hostility, temperament, loneliness, depression, anxiety, social competence, and social avoidance (e.g., Gallo & Smith, 1998; Gurtman, 1991, 1992, 1993, 1997, 1999; Hill, Zrull, & Turlington, 1997; Hopwood, Ansell, Pincus, Wright, Lukowitsky, & Roche, 2011; Pincus & Wiggins, 1990; Pincus & Wilson, 2001; Wiggins & Broughton, 1985, 1991; Wright et al., 2012).

*The Interpersonal Circumplex.* The interpersonal circumplex (IPC) serves as the foundation for research using interpersonal theory and capitalizes on geometric properties to quantitatively define the interpersonal domain (Wiggins & Broughton, 1991). The IPC is based upon the assumption that two basic themes underlie social relationships: dominance, which emphasizes autonomy and superiority, and affiliation, which emphasizes helping and forming relationships with others (Bakan, 1966). When affiliation and dominance are used as the x and y-axes respectively in two-dimensional space and the various combinations of interpersonal tendencies are plotted, a circular pattern, or circumplex, emerges (Wiggins, 1979). This is true for a variety of interpersonal domains, including interpersonal problems (Alden, Wiggins, & Pincus, 1990; Soldz, Budman, Semby, & Merry, 1995), sensitivities (Hopwood et al., 2011), values (Locke, 2000) and efficacies (Locke & Sadler, 2007). Each of these domains forms a different interpersonal surface based on themes of dominance and affiliation with distinct interpersonal implications. The interpersonal problems and sensitivities surfaces highlight troublesome self and other behaviors respectively. The problems surface focuses on behaviors that the individual has difficulty enacting or that cause problems for the individual when enacted, while the



sensitivities surface highlights behaviors that the individual finds bothersome when enacted by others. The values and efficacies surfaces focus on the importance that an individual engage in certain behaviors or have certain interpersonal experiences and the ability of the individual to effectively enact certain behaviors respectively. In each case, the circumplex can be subdivided into 8 octants, which each represent a specific interpersonal theme related to blends of dominance and affiliation (See Figure 1).

The circumplex structure dictates that the relationship between octants is inversely proportional to the angular distance between the octants. Thus, scales that are adjacent to one another have content that is conceptually close and are strongly positively correlated. Scales that are orthogonal to one another are conceptually unrelated and correlated near zero, and scales that are diametrically opposed to one another are conceptual opposites and are strongly negatively correlated.

If an external criterion has distinct interpersonal content, the correlations between scores on an external criterion measure and each octant score will form a cosine curve when plotted (Gurtman, 1994). The Structural Summary Method for circumplex data (SSM; Gurtman, 1992, 1994; Gurtman & Pincus, 2003) uses the characteristics of the cosine curve to quantitatively evaluate an external criterion within the nomological network of the IPC, minimizing impressionistic interpretations of the data. The SSM summarizes the profile of 8 correlations between IPC octants and an external criterion into 4 parameters: amplitude, elevation, angular displacement, and  $R^2$  (Gurtman and Pincus, 2003; see Figure 2).

Amplitude ( $a$ ) refers to how differentiated the profile is, that is, to what extent the external construct exhibits distinctive interpersonal content. Elevation ( $e$ ) refers to the average correlation across octants and estimates an external construct's association with

the general factor of a circumplex measure or overall item endorsement. Angular displacement ( $\theta$ ) refers to the location on the IPC associated with the dominant interpersonal theme of the external construct. Finally,  $R^2$  indicates the degree to which a perfect cosine curve fits the profile of correlations between an external criterion and the octant scores and therefore, represents the prototypicality (vs. complexity) of the circular profile. An  $R^2$  value of .80 indicates good fit to a cosine curve while an  $R^2$  value of .70 indicates acceptable fit (Zimmermann & Wright, under review). Amplitude and Angular Displacement values are interpretable only when  $R^2$  is acceptably high. The elevation parameter does not depend on profile prototypicality. Although clear guidelines for interpreting elevation and amplitude are still lacking, heuristic cutoffs of  $> |.15|$  have been proposed by Wright et al. (2012) as constituting an elevated and/or differentiated profile. In addition to the SSM parameters, dominance and affiliation vector scores are typically computed using established weighted combinations of octant correlations (Gurtman & Pincus, 2003; Wiggins, Phillips, & Trapnell, 1989; Wright, Pincus, Conroy, & Hilsenroth, 2009).

*Structural Summary Parameters with Confidence Intervals.* Although the SSM provides a parsimonious summary of a complex profile of correlations, it is predominately descriptive in nature. Recently, however, Zimmermann and Wright (under review) have developed a novel bootstrapping methodology for computing confidence intervals around IPC SSM parameters, allowing researchers, for the first time, to determine whether external measures' profiles are statistically distinct from each other. In bootstrapping, thousands of random resamples the same size as the original sample are generated with replacement from the original sample. The statistic of interest, in this case, the structural summary

parameters, are computed in each generated sample and the distribution across resamples is then used to estimate a confidence interval around the statistic. In this way, researchers can empirically compute confidence intervals when the sampling distribution is unknown as is the case for the SSM parameters. Given that point estimates of SSM parameters may be biased, using confidence intervals may be more appropriate given that they include the population value with a given probability. This method will also allow researchers to address questions that were previously unanswerable such as 1.) Is the elevation of a construct significantly greater than 0?, 2.) Is the value of a SSM parameter associated with one external criterion significantly different from the value of the same parameter associated with a different external criterion?, and 3.) Does the value of a SSM parameter significantly differ between group A and group B? Thus, using bootstrapping to compute confidence intervals is a promising method for moving from pure description to providing a framework for testing inferential questions. The efficacy of this method for establishing construct validity can be illustrated by utilizing a known cluster of personality traits in the literature, the Dark Triad.

### *The Dark Triad of Personality Traits*

In 2002, Paulhus and Williams defined the “Dark Triad” of personality traits, comprised of subclinical narcissism, subclinical psychopathy, and Machiavellianism, as overlapping yet distinct and often socially aversive personality characteristics.

Narcissism can be defined as a person’s ability to maintain a positive view of themselves through the use of regulatory strategies and self-enhancement experiences (Pincus, Ansell, Pimentel, Cain, Wright, & Levy, 2009). Contemporary conceptualizations of narcissism include both narcissistic grandiosity and narcissistic vulnerability,

characteristics that are empirically supported across the clinical, social, and personality psychology literatures (Cain, Pincus, & Ansell, 2008; Dickinson & Pincus, 2003; Miller & Campbell, 2008; Miller, Hoffman, Gaughan, Gentile, Maples, & Campbell, 2011; Pincus et al., 2009; Pincus & Roche, 2011; Wink, 1991). Narcissistic grandiosity can be characterized by both overt and covert expressions of arrogance, entitlement, superiority, and inflated self-image and is associated with aggression, disagreeableness and dominance (Furnham, Richards, & Paulhus, 2013; Miller et al., 2011; Pincus, Cain, & Wright, 2014). Narcissistic grandiosity often results in maladaptive self-enhancement, in which individuals experience difficulty in transforming their needs for recognition and admiration into socially appropriate ambitions and behaviors (Pincus et al., 2014; Roche, Pincus, Lukowitsky, Ménard, & Conroy, 2013). Narcissistic vulnerability is reflected by both overt and covert expressions of defensiveness, anger, envy, incompetence, shame, emptiness, social avoidance, helplessness, and sensitivity to ego threat (Krizan & Johar, 2012; Miller et al., 2011; Pincus et al., 2009; Pincus et al., 2014; Wink, 1991). Although narcissistic grandiosity and vulnerability have been described here separately for clarity, symptoms of grandiosity and vulnerability typically exist in tandem (Pincus et al., 2014). Researchers conceptualize narcissistic grandiosity, however, as being more closely associated with the Dark Triad (Furnham et al., 2013; Miller & Campbell, 2008; Miller et al., 2011).

Psychopathy is a socially aversive personality pathology first operationalized by Hervey Cleckley (1941) using 16 criteria spanning not only antisocial behaviors, but also emotional and interpersonal deficits and resilience to other psychopathologies. Research on measures of psychopathy derived from these 16 criteria consistently finds a two-factor structure (Hare, Harpur, Hakstian, Forth, Hart, & Newman, 1990; Harpur, Hare, & Hakstian,

1989). The first factor, known alternatively as Factor 1, PPI-I, Primary Psychopathy, or Fearless Dominance (FD), reflects the emotional detachment and interpersonal difficulties experienced by those high in psychopathic traits. Factor 1 is characterized by low stress reaction and harm avoidance and high social potency (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005; Benning, Patrick, Hicks, Blonigen, & Krueger, 2003; Verona, Patrick, & Joiner, 2001). Factor 2, also known as PPI-II, Secondary Psychopathy, or Impulsive Antisociality (IA), reflects antisocial deviance and impulsivity. Factor 2 is characterized by high aggression, stress reaction, and alienation and low control (Benning et al. 2003; Harpur et al., 1989; Patrick, 1994; Verona et al., 2001) and is associated with externalizing pathology, specifically symptoms of Antisocial Personality Disorder and drug and alcohol problems (Benning et al., 2003; Hare, 1991; Krueger, Hicks, Patrick, Carlson, Iacono, & McGue, 2002; Patrick, Zempolich & Levenston, 1997; Reardon, Lang, & Patrick, 2002). Of these two factors, Factor 2 is conceptualized as being more closely associated with the construct of the Dark Triad.

The construct of Machiavellianism is based largely on 16<sup>th</sup> Century political strategist Niccolo Machiavelli's work *The Prince* (Christie & Geis, 1970). Christie and Geis distilled Machiavelli's work into 4 defining characteristics: 1) Diminished or absent affect in interpersonal relationships, 2) Amorality, 3) Psychological health, and 4) Little commitment to an ideology (Christie et al., 1970). Together, these characteristics describe an individual who is cynical, proficient at interpersonal manipulation, and lacks morality (Christie et al., 1970; Furnham et al. 2013). More recent conceptualizations of Machiavellianism are also influenced by Sun Tzu's *The Art of War*, written in 500 BC, and include reputation building, planning, and coalition formation as additional components of

Machiavellianism (Furnham et al., 2013; Jones & Paulhus, 2011). For individuals high in Machiavellianism, impulse control, flexibility and adaptation to the current situation, long-term goals, planning, and preparation are important strategies for success (Jones & Paulhus, 2011).

Although, prior to 2002, each of these traits had a well-established literature in its own right, the expanding scope of each trait has resulted in empirical overlap, causing some researchers to conclude that these traits are measuring the same core construct and spurring the creation of composite indices of the Dark Triad that capture an exploitative social style that focuses on short term goal attainment (Baughman, Dearing, Giammarco, & Vernon, 2012; Jonason, Li, & Teicher, 2010; Jonason, Li, Webster, & Schmitt, 2009; McHoskey, Worzel, & Szyarto, 1998; Stead, Fekken, Kay, & McDermott, 2012). Researchers developing and using these composite measures argue that Dark Triad traits share a degree of aggression, self-aggrandizement, and deception, have been shown to load onto a single latent factor, and often correlate more strongly with the Dark Triad composite than with individual Dark Triad traits (Baughman et al., 2012; Glenn & Sellbom, 2014; Jonason et al., 2009; Jonason & Webster, 2010).

Not all researchers, however, agree with the use of composite measures of the Dark Triad. Glenn and Sellbom (2014) note a number of concerns with the use of these composites including the assumption that Machiavellianism, psychopathy, and narcissism are equal contributors to the composite. These researchers suggest that grandiose narcissism and Machiavellianism can be subsumed into most definitions of psychopathy, citing a study by Jones and Figueredo (2013) that identified callousness and manipulation, both features of psychopathy, as necessary conditions for the development of a dark

personality. Although they acknowledge the importance of comparing Dark Triad traits with one another, Glenn and Sellbom (2014) suggest that a Dark Triad composite measure is essentially a psychopathy measure that overemphasizes both grandiose narcissism and Machiavellianism without a strong theoretical rationale for the overemphasis.

Additionally, there is a large body of research (Furnham et al., 2013; Jones & Paulhus, 2011; Paulhus & Williams, 2002) examining the distinctiveness of each of these traits, finding that Dark Triad traits exhibit only moderate, positive, inter-correlations. Furnham et al. (2013) reported that across a number of studies, the magnitude of the correlations is less than .50 in 75 % of cases. Narcissism and Machiavellianism appear to be consistently the least intercorrelated of the Dark Triad traits (Furnham et al., 2013; Lee & Ashton, 2005; Paulhus & Williams, 2002; Rauthmann, 2012)

Dark Triad traits also exhibit differential relationships with certain antisocial behaviors. In particular, psychopathy, but not narcissism or Machiavellianism, is a strong predictor of future delinquent behavior (Williams & Paulhus, 2004). Individuals high in psychopathy are also more likely than those high in narcissism or Machiavellianism to have interacted with the legal system, bully others in adulthood, copy answers on exams, and enact fantasies of revenge (Baughman et al., 2012; DeLongis, Nathanson, & Paulhus, 2011; Nathanson, Paulhus, & Williams, 2006; Williams, McAndrew, Learn, Harms, & Paulhus, 2001). In contrast to those high in psychopathy, who are more likely to respond aggressively to physical threats, those high in narcissism are more likely to demonstrate aggression in situations where their ego is threatened (Jones & Paulhus, 2010). The relationship between aggression and either ego threat or physical threat remains nonsignificant for those high in Machiavellianism (Jones and Paulhus, 2010). Rather,

Machiavellianism has been associated with bullying during adolescence and plagiarizing essays (Nathanson et al., 2006; Peeters, Cillessen, & Scholte, 2010; Stickle, Kirkpatrick, & Brush, 2009).

Although there appears to be moderate overlap in Dark Triad traits, these traits are both conceptualized as being theoretically distinct and are uniquely predictive of different types of antisocial behaviors. Identifying points of similarity and difference among the Dark Triad traits would increase understanding of these subclinical personality dimensions and provide evidence for either the construct validity of the traits individually or for a Dark Triad composite.

*Gender and the Dark Triad.* Gender comparisons of Dark Triad traits typically result in mean level differences between men and women, where men score significantly higher on all three Dark Triad traits (Jonason et al., 2009; Paulhus & Williams, 2002). Despite these mean level differences, correlations between Dark Triad traits and criterion variables, including Big Five personality traits, measures of cognitive ability and self-enhancement, and mate retention and poaching tactics, tend to be very similar, suggesting that although men have higher levels of Dark Triad traits, these traits seem to be functioning in similar ways across genders (Jonason, Li, & Buss, 2010; Jonason et al., 2009; Paulhus & Williams, 2002).

*An Interpersonal Analysis of the Dark Triad of Personality Traits.* Because many of the deficits associated with Dark Triad traits are interpersonal in nature, the IPC is one way that researchers can conceptualize and distinguish these traits. Research suggests that the pattern of associations between traits and interpersonal characteristics can vary depending on the interpersonal surface used (Miller, Price, Gentile, Lynam & Campbell,



2012). Additionally, a multi-surface approach to interpersonal assessment of individual patients provides a rich portrait of personality dynamics (Dawood & Pincus, 2015; Hopwood, Pincus, & Wright, in press; Pincus et al., 2014). Thus, concurrently using multiple interpersonal surfaces would allow researchers to conceptualize Dark Triad traits not only within a surface, but also across surfaces, providing a comprehensive interpersonal analysis examining the distinctiveness of Dark Triad traits and their construct validity from the perspective of interpersonal functioning.

Prior research on the interpersonal nature of Dark Triad traits has typically focused on assessing one trait (e.g., psychopathy) at a time and locating that trait on a single IPC surface (e.g., the traits, values or motives surfaces; Blackburn & Maybury, 1985; Bradlee & Emmons, 1992; Hicklin & Widiger, 2005; Ruiz, Smith, & Rhodewalt, 2001; Salekin, Trobst, & Krioukova, 2001; Wiggins & Broughton, 1985). Although this type of design makes direct comparisons between Dark Triad traits difficult, it does provide information about each Dark Triad trait individually. Self-report measures of subclinical psychopathy given to both adolescents and adults have located psychopathy in quadrant 2, characterized by high dominance and low affiliation, on the traits, values, and motives surfaces (Blackburn & Maybury, 1985; Hicklin & Widiger, 2005; Salekin, Leistico, Trobst, Schrum, & Lochman, 2005; Salekin et al., 2001). Machiavellianism demonstrates similar associations on the traits and values surfaces (Gurtman, 1992; Jones & Paulhus, 2009; Trapnell & Paulhus, 2012; Wiggins & Broughton, 1985). Narcissism, measured using the Narcissistic Personality Inventory (NPI), also projects onto the second quadrant of the IPC, showing a weak negative association with affiliation and a positive association with dominance on the traits and problems surfaces (Bradlee & Emmons, 1992; Hopwood, Pincus, DeMoor, &

Koonce, 2008; Jones & Paulhus, 2011; Locke, 2000; Pincus et al., 2009; Ruiz, Smith, & Rhodewalt, 2001).

Only a handful of studies to date have located all three Dark Triad traits on a single IPC surface simultaneously, most typically in Quadrant 2 (Dowgwillo & Pincus, 2013; Jones & Paulhus, 2011; Paulhus, 2001; Rauthmann & Kolar, 2013). Psychopathy has been consistently associated with hostile dominant traits (Jones & Paulhus, 2011; Rauthmann & Kolar, 2013) while Machiavellianism has been associated with both hostile-dominant traits (Jones & Paulhus, 2011) and hostile-submissive traits (Rauthmann & Kolar, 2013). Compared to Machiavellianism and psychopathy, narcissism has been consistently associated with greater dominance and less hostility (Jones & Paulhus, 2011; Rauthmann & Kolar, 2013). These locations, however, are less consistent when Dark Triad traits are located on different IPC surfaces. A study by Dowgwillo and Pincus (2013) demonstrated that Machiavellianism, IA, FD, and narcissistic grandiosity project onto the BC (Vindictive), BC (Vindictive), NO (Intrusive), and NO (Intrusive) octants of the problems surface respectively, but project onto the LM (Sensitive to Affection), JK (Sensitive to Dependence), FG (Sensitive to Timidity), and DE (Sensitive to Remoteness) octants respectively on the sensitivities surface. These findings indicate that the surface under consideration matters and that Dark Triad traits are not exclusively related to hostile-dominance across surfaces.

### *Current Study*

The purpose of this study is to examine the utility of a new bootstrapping methodology for computing SSM confidence intervals. This will be accomplished with the following 5 steps: 1) Computing and locating the CIs for narcissism, psychopathy, and Machiavellianism on the interpersonal problems, interpersonal sensitivities, interpersonal

values, and interpersonal efficacies surfaces, 2) Examining gender differences in associations across measures and surfaces, 3) Determining whether the structural summary parameters for SD3 narcissism, psychopathy, and Machiavellianism are statistically distinct within each surface providing evidence of discriminant validity, 4) Determining whether the structural summary parameters for 4 measures of psychopathic traits are statistically distinct within each surface providing evidence of convergent validity, and 5) Substantively integrating the information across IPC surfaces to examine the personality dynamics associated with each Dark Triad trait.

Based on previous research and theory, I put forth the following hypotheses: 1) Machiavellianism, psychopathy, and narcissism will have statistically distinct angular displacement parameters within each surface, 2) The 4 measures of psychopathy will not have statistically distinct angular displacement parameters within each surface, 3) Distinct profiles will emerge for each of the Dark Triad Traits across surfaces, 4) There will be mean level differences in Dark Triad traits across genders but there will not be differences in structural summary parameters across genders.

Figure 1. The Interpersonal Circumplex

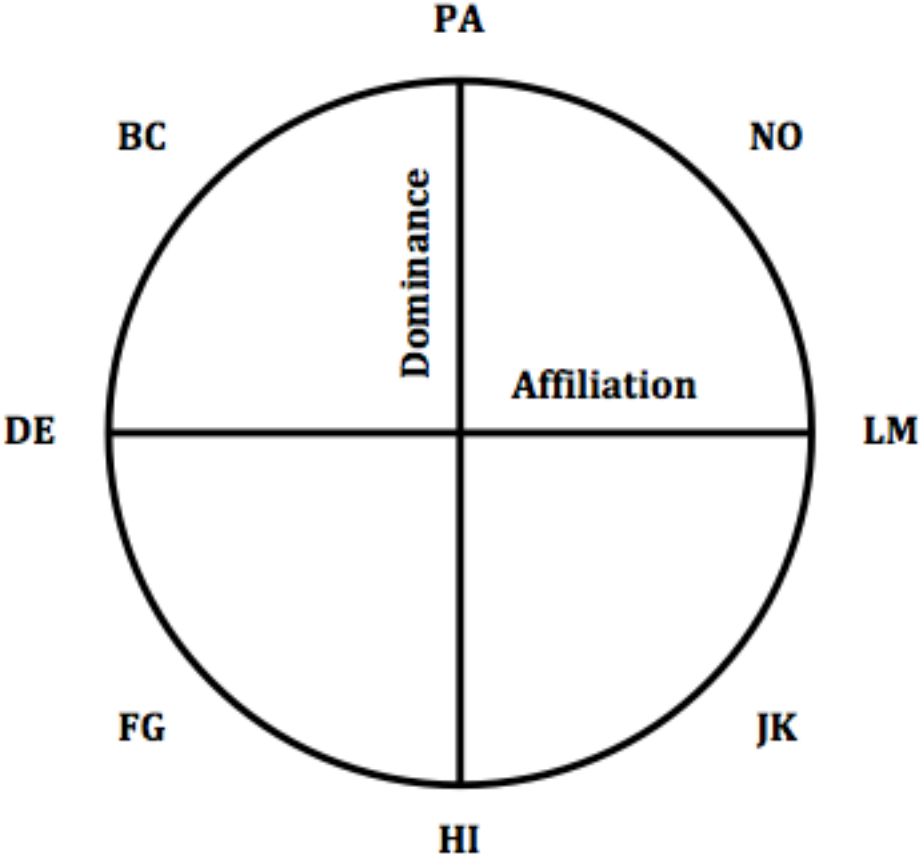
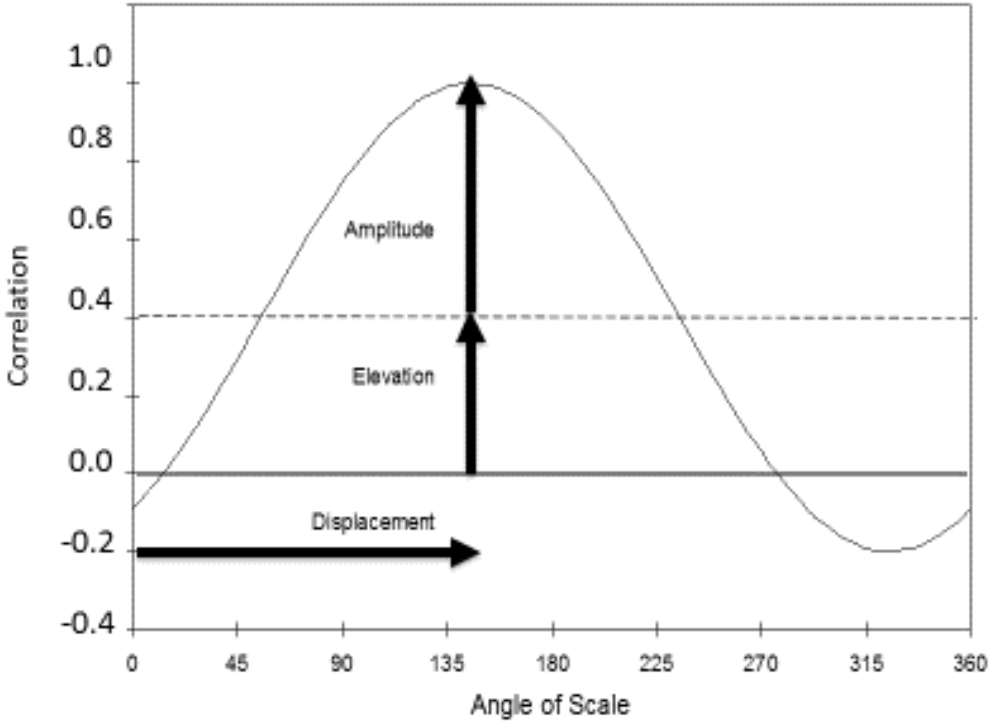


Figure 2. Structural Summary Parameters (Wu, Roche, Dowgwillo, Wang, & Pincus, 2015).



## CHAPTER 2: METHODS

### *Participants*

Participants were 653 undergraduate students recruited through the Penn State University subject pool for course credit. A total of 91 students (13.94%) generated incomplete or invalid protocols based on the following criteria: i) the number of missing items was more than 10% of the items in the questionnaire (n=16) or ii) the score on the PAI-INF scale was more than 2.5 standard deviations above the mean in a normative sample (n=75, Morey, 1991). Overall, 562 valid protocols were retained for analysis. A total of 49.3% of these participants were male and 50.7% were female.

### *Dark Triad Measures*

*Short Dark Triad (SD3)*. The SD3 (Jones & Paulhus, 2014) is a 27- item self-report measure of Machiavellianism, psychopathy, and narcissism. Items are rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). In the current study, Cronbach's  $\alpha$  for Machiavellianism, psychopathy, and narcissism were .78, .74, and .71 respectively. Although this measure was developed recently, there is significant research demonstrating convergent validity with the longer measures of the Dark Triad traits including the MACH-IV (Christie & Geis, 1970), the Self-Report Psychopathy Scale (SRP-III; Paulhus, Neumann, & Hare, in press), and Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) as well as concurrent validity with outcomes such as bullying, deception, short-term mating strategies, dominance, and materialism (Baughman et al., 2012; Giammarco, Atkinson, Baughman, Veselka, & Veron, 2013; Jones & Paulhus, 2014; Lee, Ashton, Wiltshire, Bourdage, Visser, & Gallucci, 2013).

*Self-Report Psychopathy Scale (SRP-III)*. The SRP-III is a 64-item self-report measure of psychopathic traits that was designed as a subclinical analogue to the Psychopathy Checklist-Revised (PCL-R; Hare, 1999), the gold standard measure of forensic psychopathy (Paulhus, Neumann, & Hare, in press). Items are rated on a 5-point Likert scale ranging from 1 (Disagree Strongly) to 5 (Agree Strongly). In the current study, the measure exhibited strong internal consistency with an overall scale Cronbach's  $\alpha$  of .91. The SRP-III has also shown strong convergent and discriminate validity across multiple studies (Mahmut, Homewood, & Stevenson, 2008; Mahmut, Menictas, Stevenson, & Homewood, 2011; Williams, Nathanson, & Paulhus, 2003; Williams, Paulhus, & Hare, 2007).

*Multidimensional Personality Questionnaire (MPQ-BF)*. The MPQ-BF (Patrick, Curtin, & Tellegen, 2002) is a 155-item self-report questionnaire of normal range personality that can be used to assess psychopathic traits (Benning et al., 2005). The MPQ-BF measures 11 primary traits, which load onto the 3 higher order factors of positive emotionality, negative emotionality, and emotional constraint. The trait scales of the MPQ-BF are highly correlated with the full-form trait scales (Tellegen, 1982) and combine to form the same higher order structures (Patrick, Curtin, & Tellegen, 2002). Rather than computing psychopathy scores using regression weights as indicated in Benning et al. (2003), Blonigen, Hicks, Krueger, Patrick, & Iacono (2006) identified a subset of 58 items from the MPQ-BF that can be used to compute psychopathy scores, resulting in essentially the same findings as the regressions weights while using substantially fewer items. A total of 24 items comprise the FD scale pulling 17 items from the three MPQ traits identified by Benning et al. (2003) as being uniquely predictive of FD, social potency (+), stress reaction (-) and harm avoidance (-) (Blonigen et al., 2006). A total of 34 items comprise the IA scale

pulling 32 items from 4 of the 5 MPQ traits that Benning et al. (2003) identified as being uniquely predictive of IA, alienation (+), aggression (+), control (-), and traditionalism (-). Items are rated as either True or False. In the current study, both MPQ-estimated FD and IA demonstrate good internal consistency with alphas of .76 and .76 respectively. MPQ-estimated psychopathy scores have also shown moderate test-retest reliability with scores attained 7 years apart correlating .75 for FD and .61 for IA after correcting for attenuation and demonstrate good criterion and construct validity (Benning et al., 2005; Edens, Poythress, & Watkins, 2001; Blonigen et al., 2006; Poythress, Edens, & Lilienfeld, 1998; Witt & Donnellan, 2008).

#### *Interpersonal Circumplex Measures*

*Inventory of Interpersonal Problems Short Circumplex (IIP-SC).* The IIP-SC (Soldz Budman, Demby, & Merry, 1995) is a 32-item measure that maps interpersonal problems (behaviors that are difficult to enact or are problematic) and associated distress onto the 8 octants of the interpersonal circumplex. Items are rated on a 5-point Likert scale ranging from 0 (Not at all) to 4 (Extremely). The average correlation between octant scores on the IIP-SC and full version of the measure, the IIP-C (Alden et al., 1990), was .92 (Hopwood et al., 2008). The IIP-SC has been shown to conform to the circumplex model (Hopwood et al., 2008). In the current study, Cronbach's  $\alpha$  for each octant ranged from .63 (BC) to .87 (FG) with a mean  $\alpha$  of .76. Test-retest correlations among outpatients have ranged from .71-.83 for the measure as a whole (Soldz et al., 1995). Research also indicates that the IIP-SC can reliably differentiate college students from clinical patients and has been validated in personality and clinical research (e.g., Gurtman, 1996; Hopwood et al., 2008; McEvoy,



Burgess, Page, Nathan & Fursland, 2012; Pincus & Wiggins, 1990; Sodano & Tracey, 2011; Soldz et al., 1995).

*Interpersonal Sensitivities Circumplex (ISC)*. The ISC (Hopwood, Burt, Keel, Neale, Boker, & Klump, 2011) is a 64-item measure that maps interpersonal irritants and sensitivities (bothersome behaviors enacted by others) onto the 8 interpersonal circumplex octants. Items are rated using an 8-point Likert scale ranging from 1 (Not at all, never bothers me) to 8 (Extremely, always bothers me). In the current study, Cronbach's  $\alpha$  for each octant ranged from .71 (LM) to .89 (DE) with a mean  $\alpha$  of .81. Because this measure was recently created, extensive psychometric data have not yet been published. However, initial evidence supports the circumplex structure and the criterion validity of the ISC (Hopwood et al., 2011).

*Circumplex Scales of Interpersonal Values (CSIV)*. The CSIV (Locke, 2000) is a 64-item measure that maps interpersonal values (the importance that one enacts certain interpersonal behaviors or has certain interpersonal experiences) onto the 8 octants of the interpersonal circumplex. Items are rated on a 5-point Likert scale ranging from 0 (Not important to me) to 4 (Extremely important to me). In the current study, Cronbach's  $\alpha$  for each octant ranged from .73 (PA) to .85 (LM) with a mean  $\alpha$  of .80. With a test interval of two weeks, test retest reliability coefficients for the octants ranged from .76 (HI) to .88 (BC; Locke, 2000). Research has shown the CSIV to have a robust circumplex structure and construct validity (Acton & Revelle, 2002; Locke, 2000; Locke, 2003; Locke & Christensen, 2007).

*Circumplex Scales of Interpersonal Efficacies (CSIE)*. The CSIE (Locke & Sadler, 2007) is a 32-item measure of that maps interpersonal efficacies (confidence in one's ability to

enact certain interpersonal behaviors) onto the 8 octants of the interpersonal circumplex. Items are rated on an 11-point Likert scale ranging from 0 (I am not at all confident that) to 10 (I am absolutely confident that). In the current study, Cronbach's  $\alpha$  for each octant ranged from .61 (HI) to .82 (PA) with a mean  $\alpha$  of .71. Research has shown the CSIE to conform to a circumplex model and demonstrates convergent validity with other circumplex surfaces (Locke & Sadler, 2007).

*Personality Assessment Inventory Infrequency Scale (PAI-INF)*. The PAI-INF (Morey, 1991) is an 8-item scale that is a subset of the 344-item PAI, a self-report measure of response sets, personality, and psychopathology, which assesses inattention and carelessness on the part of the participant. Items are rated on a 4-point Likert scale ranging from 0 (False, not at all true) to 3 (Very True).

### **Procedure.**

Participants completed an online questionnaire containing basic demographic information, including sex, race, age, and whether English is the participant's primary language, the MPQ-BF psychopathy items, SRP-III, SD3, IIP-SC, ISC, CSIV, CSIE, and PAI-INF items using a web-based interface that is standardized across platforms (Survey Monkey). Participants received course credit for their participation.

### **Data Analysis.**

Data analyses were completed in three stages. The first stage utilized the well-established SSM (Gurtman, 1992; Gurtman & Pincus, 2003) to calculate the  $R^2$ , elevation, amplitude, and angular displacement for the SD3 Machiavellianism scale, the SD3 narcissism scale, the SD3 psychopathy scale, the SRP-III Total Score, FD, and IA. This procedure was repeated for the problems, sensitivities, values, and efficacies surfaces.

Although the quantitative nature of the structural summary approach allows for a more objective interpretation of the data, it is predominately descriptive in nature.

The second stage utilized a novel bootstrapping method developed by Zimmerman and Wright (under review) to determine whether (a) each of the scales in the SD3 and (b) each of the four psychopathy measures on a given surface were statistically distinct.

Within-surface interpersonal profiles can be statistically compared through the use of a resampling procedure to create confidence intervals around structural summary parameters using scripts developed for the R statistical package. Although structural summary analysis of circumplex data is well established, the use of confidence intervals provides an objective and quantitative means for determining whether interpersonal profiles are distinct. Additionally, probability estimates for the confidence intervals in a particular sample are reported. This procedure allowed for examination of the discriminative validity of the Machiavellianism, psychopathy, and narcissism scales of the SD3 and the convergent validity of the four psychopathy measures on each IPC surface.

The third stage substantively compared the results across the four interpersonal surfaces. Although more than one scale may exhibit similar structural summary parameters on a single surface, by integrating information about the structural summary parameters across four surfaces, a distinct pattern of interpersonal dynamics can emerge that may further differentiate Dark Triad traits or describe discrepancies between distinct measures.

## CHAPTER 3: RESULTS

Table 1 presents the means, standard deviations, and range of responses for the SD3 Machiavellianism scale, the SD3 narcissism scale, the SD3 psychopathy scale, the SRP-III Total Score, FD, and IA for the sample as a whole, men, and women. Men scored significantly higher than women on the three SD3 scales,  $t(558) > 3.39$ ,  $p < .001$ , the SRP-III,  $t(560) = 9.59$ ,  $p < .001$ , and FD  $t(560) = 2.91$ ,  $p = .004$ . Mean scores for men and women on IA were not significantly different from each other,  $t(560) = 1.62$ ,  $p = .105$ .

### **Structural Summary Parameters and Confidence Intervals.**

Table 2 contains the structural summary parameters and the associated 95% bootstrapped CIs for each scale of SD3 and the 3 additional measures of psychopathy on each of the 4 surfaces. Before examining the CIs for amplitude and angular displacement, the probability estimates associated with the CIs should be examined. The probability estimates represent the percentage of bootstrap resamples in which the dominance or affiliation parameter values are greater than the computed minimum population values associated with these parameters (Zimmermann & Wright, under review). Briefly, minimum population values are calculated as  $1.769 * n^{-0.604}$ , where  $n$  is the sample size (Zimmermann & Wright, under review). For a full discussion surrounding this computation, see Zimmermann and Wright (under review). Probability estimates can be interpreted such that the greater the probability estimate, the less likely the sample underestimates the dominance and affiliation values in the population and the greater the probability the CIs for amplitude and angular displacement are accurate. Zimmermann and Wright (under review) suggest that the CIs for amplitude and angular displacement should not be interpreted when the probability estimate is less than .50, should be interpreted

with caution when probability estimates are between .50 and .95 as estimates might be biased to some extent, and should be interpreted confidently when probability estimates are greater than .95.

Probability estimates for the CIs indicate that the CIs around the amplitude and angular displacement parameters associated with IA and SD3 Machiavellianism on the interpersonal sensitivities surface should be interpreted with caution as they might be biased to some extent. The remaining scales on each surface have probability estimates greater than .95, indicating that the CIs for amplitude and angular displacement are likely accurate.

*Interpersonal Problems.*  $R^2$  values for all criterion variables were above the accepted cutoff of .7, indicating that profiles were prototypical in nature. Thus, along with elevation, the amplitude and angular displacement parameters can also be interpreted. Amplitude values across scales met the established cutoff criteria of .15, indicating that these scales are uniquely associated with certain interpersonal problems more so than others. Among the SD3 scales, angular displacement values ranged from  $83.60^\circ$  (narcissism) to  $158.67^\circ$  (Machiavellianism), suggesting that these traits are characterized by domineering (PA), vindictive (BC), and cold (DE) interpersonal problems. Among the psychopathy scales, angular displacement values ranged from  $73.15^\circ$  (FD) to  $133.84^\circ$  (SRP-III), suggesting that high scores on these measures are associated with domineering (PA) and vindictive (BC) interpersonal problems. Both IA and FD had interpretable elevation parameters (magnitude greater than .15). IA had a positive elevation value (CI did not contain 0), indicating that IA is associated with significant interpersonal distress. FD, on the other

hand, had a negative elevation value (CI did not contain 0), indicating that FD is associated with a notable lack of interpersonal distress.

*Interpersonal Sensitivities.* On the sensitivities surface,  $R^2$  values were above the accepted cutoff of .7 for all criterion variables except for SD3 narcissism and IA. Due to the lack of prototypicality in the profiles associated with SD3 narcissism and IA, these amplitude and angular displacement parameters cannot be interpreted. Among the remaining scales, only SD3 psychopathy and SRP-III total score had amplitude values above the established cutoff criteria of .15, indicating that these scales were uniquely associated with certain bothersome behaviors enacted by others more so than others. Among the SD3 scales, interpretable angular displacement values ranged from  $302.06^\circ$  (psychopathy) to  $339.27^\circ$  (Machiavellianism), suggesting that these traits are associated with sensitivities to dependence (JK) and affection (LM) respectively. Among the psychopathy scales, interpretable angular displacement values ranged from  $272.39^\circ$  (FD) to  $315.28^\circ$  (SRP-III), suggesting sensitivities to passivity (HI) and dependence (JK). None of the scales with acceptable prototypicality had elevation parameters above the heuristic cutoffs. However, CIs suggest that SD3 Machiavellianism has an elevation parameter that is significantly different from 0.

*Interpersonal Values.* On the values surface,  $R^2$  values were above the accepted cutoff of .7 for all criterion variables, indicating that the profiles associated with these measures were prototypical in nature and allowing for the interpretation of all amplitude and angular displacement parameters. Amplitude values across all scales except IA on the values surface met the established cutoff criteria of .15, indicating that these scales were uniquely associated with specific valued behaviors more so than others. Among the SD3 scales,

angular displacement values ranged from 95.46° (narcissism) to 162.92° (Machiavellianism), suggesting that these traits are associated with agentic (PA) and distant (DE) interpersonal values. Among the psychopathy scales, angular displacement values ranged from 65.50° (FD) to 167.94° (IA), suggesting that these psychopathy scales are associated with agentic and communal (NO) and distant (DE) interpersonal values. SD3 Machiavellianism was the only scale that had an elevation parameter whose magnitude was greater than .15. The associated confidence interval did not contain 0, indicating that these individuals generally value interpersonal experiences significantly more than the average person.

*Interpersonal Efficacies.* On the efficacies surface,  $R^2$  values were above the accepted cutoff of .7 for all criterion variables, indicating that the profiles associated with these measures were prototypical in nature and allowing for the interpretation of the amplitude and angular displacement parameters. Amplitude values across all scales on the efficacies surface met the established cutoff criteria of .15, indicating that the scales were uniquely associated with certain interpersonal efficacies more so than others. Among the SD3 scales, angular displacement values ranged from 80.47° (narcissism) to 165.43° (Machiavellianism), suggesting that the 3 SD3 scales are associated with dominant (PA), dominant and distant (BC), and distant (DE) interpersonal efficacies. Among the psychopathy scales, angular displacement values ranged from 68.56° (FD) to 143.95° (SRP-III), suggesting that these scales are associated with dominant (PA) and dominant and distant (BC) interpersonal efficacies. SD3 narcissism and FD were the only scales that had elevation parameters whose magnitude was greater than .15. Confidence intervals for both

scales did not contain 0, indicating that these individuals generally felt significantly more efficacious in acting interpersonally than the average person.

### **Gender Comparisons and Difference Confidence Intervals**

Table 3 contains the structural summary parameters for men and women and the differences among those parameters for all criterion variables on the problems, sensitivities, values, and efficacies surfaces. Of the 120 comparisons, only 4 comparisons suggest significant differences in parameter values between men and women. On the problems surface, the elevation parameter associated with FD was significantly lower for women than for men. However, both men and women who were high in FD reported notably low interpersonal distress. There were no differences between men and women on the sensitivities and values surfaces. On the efficacies surface, the dominance scores associated with SD3 narcissism and FD were significantly higher for women than for men. Additionally, the angular displacement parameter associated with SD3 psychopathy differed between men and women with women reporting values in the NO octant and men reporting values in the BC octant (a difference of 76.33 degrees). However, due to low probability values for both men and women, the accuracy of the angular displacement parameter associated with SD3 psychopathy is questionable. Because the number of significant gender differences in structural summary parameters across traits and surfaces is less than would be expected due to chance alone, gender was not considered in the across scale comparisons.

### **Across Scale Comparisons and Difference Confidence Intervals**

Table 4 contains the differences among structural summary parameters associated with each Dark Triad scale and the associated 95% bootstrapped CIs for each difference on



each of the 4 surfaces. As noted previously, probability estimates indicate that the CIs of amplitude and angular displacement for IA and SD3 Machiavellianism on the sensitivities surface fell below .95 and thus comparisons including these scales should be interpreted with caution as they might be biased to some extent. Probability estimates for the remainder of the scales and surfaces are greater than .95, indicating that the CIs of the amplitude and angular displacement and their associated comparisons are trustworthy. Visual representations of the CIs for the amplitude (vertical CI) and the angular displacement (horizontal CI) can be found in Figure 3. Note that Figure 3 does not contain a visual representation of the CIs for elevation.

*Interpersonal Problems.* Cross construct comparisons of the 3 SD3 scales identify a number of differences among Dark Triad traits. Although the three scales are not significantly different from each other in terms of amplitude, they do differ in terms of angular displacement, indicating that each is associated with a different interpersonal theme. Although psychopathy and narcissism are not significantly different in terms of dominance, dominance scores are significantly lower for Machiavellianism. Affiliation scores are significantly higher for narcissism than for either Machiavellianism or psychopathy. In terms of the elevation parameter, narcissism is associated with significantly less interpersonal distress than either Machiavellianism or psychopathy.

Within construct comparisons of the 4 psychopathy scales also identifies points of similarity and difference. Although SD3 psychopathy, the SRP-III, and FD are associated with similar amplitude parameters, IA is significantly less differentiated than the other three psychopathy scales. In terms of angular displacement, each psychopathy scale projects onto a significantly different location on the problems surface. Although the

measures do not differ from one another in terms of dominance, they each occupy a unique position on the affiliation dimension. Affiliation is greatest for FD and decreases as one moves to IA, SD3 psychopathy, and the SRP-III. FD is also associated with significantly less interpersonal distress than the other measures of psychopathy, as evidenced by it significantly lower elevation parameter. Conversely, IA has a significantly higher elevation parameter relative to the other three measures, indicating that IA is associated with significantly more interpersonal distress.

*Interpersonal Sensitivities.* As noted previously, it is important to interpret comparisons involving SD3 Machiavellianism with caution due to potential bias in the estimation of the CIs. Cross construct comparisons indicate that each SD3 scale is associated with a significantly different angular displacement parameter, indicating that each trait is associated with a different interpersonal sensitivity. Machiavellianism is significantly more sensitive to dominance while narcissism significantly less sensitive to affiliation compared to the other SD3 scales. Additionally, SD3 Machiavellianism exhibits a significantly higher elevation parameter and lower amplitude parameter than narcissism and psychopathy, suggesting an association with general interpersonal sensitivity and little substantive differentiation.

Within construct comparisons of the 4 psychopathy scales highlights points of similarity and difference. Once again, comparisons involve IA should be interpreted with caution. In terms of angular displacement, SD3 psychopathy, FD, and the SRP-III are all projected onto significantly different locations. Sensitivity to affiliation decreases as one moves from the SRP-III to SD3 psychopathy to FD. The SRP-III is also significantly more sensitive to affiliation than IA, while IA is significantly more sensitivity to dominance than

the other 3 measures of psychopathy. In terms of elevation, FD has a significantly lower elevation value compared to the SRP-III, SD3 psychopathy, and IA and a significantly lower amplitude parameter than the SRP-III. This suggests that FD is associated with significantly less general interpersonal sensitivity overall and is less differentiated than the SRP-III. Conversely, IA is significantly more elevated and less differentiated than the other psychopathy scales.

*Interpersonal Values.* Cross-construct comparisons of the 3 SD3 scales indicate that narcissism has a significantly different angular displacement parameter than both Machiavellianism and psychopathy, indicating significant differences in interpersonal theme. Narcissism was more strongly associated with valuing both dominance and affiliation than other SD3 scales. Although Machiavellianism and psychopathy did not differ significantly in terms of angular displacement, Machiavellianism had a stronger association with affiliation than psychopathy. Machiavellianism also had a significantly higher elevation parameter than both narcissism and psychopathy, indicating a significantly higher overall value of the interpersonal domain. Psychopathy was significantly more differentiated in terms of interpersonal values than both Machiavellianism and narcissism.

Within construct comparisons of the four psychopathy scales indicate that FD is projected onto a significantly different location than SD3 psychopathy, the SRP-III, and IA. FD is associated with valuing both dominance and affiliation more than the other Dark Triad scales. Additionally, IA is associated with valuing dominance less than the other three measures and affiliation more than the SRP-III and SD3 psychopathy scale. In terms of elevation, FD is significantly less elevated relative to the other psychopathy measures,

suggesting that FD is associated with placing less value on the interpersonal domain. Conversely, IA is significantly more elevated relative to the other measures of psychopathy, indicating that IA is associated with placing more value on the interpersonal domain. Additionally, both FD and IA are significantly less differentiated than SD3 psychopathy scale and the SRP-III as evidenced by significant differences in the amplitude parameter.

*Interpersonal Efficacies.* Cross construct comparisons indicate that all three SD3 scales differ from each other in terms of angular displacement, indicating that each trait is significantly associated with a different interpersonal theme. SD3 narcissism was more strongly associated with feeling effective enacting both dominance and affiliation compared to Machiavellianism. Psychopathy was more strongly associated with feeling effecting enacting dominance than Machiavellianism. Additionally, SD3 narcissism appears to have a significantly higher elevation parameter than other SD3 traits, indicating significantly greater feelings of efficacy in the interpersonal domain. Although Machiavellianism had significantly higher elevation than psychopathy, indicating greater feelings of interpersonal efficacy, Machiavellianism was significantly less differentiated in terms of interpersonal efficacies compared to both psychopathy and narcissism.

Within construct comparisons of the 4 psychopathy scales indicate that FD is projected onto a significantly different location than other measures of psychopathy such that FD is associated with significantly more feelings of efficacy when enacting both dominance and affiliation. Additionally, IA is associated with feeling less effective when enacting dominance and more effective when enacting affiliation than SD3 psychopathy and the SRP-III. In terms of elevation, FD is significantly more elevated relative to the SRP-III, SD3 psychopathy, and IA, suggesting that FD is associated with greater feelings of

interpersonal effectiveness relative to other measures of psychopathy. Conversely, IA is significantly less elevated relative to the SRP-III and less differentiated than all other psychopathy measures as evidenced by significant differences on the amplitude parameter.

Table 1. Descriptive statistics for Dark Triad traits.

	Overall				Men				Women			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
<b>SD3_MACH*</b>	3.04	0.57	1.00	4.78	<u>3.12</u>	0.55	1.67	4.78	<u>2.96</u>	0.58	1.00	4.67
<b>SD3_NAR*</b>	2.94	0.53	1.00	4.78	<u>3.02</u>	0.53	1.22	4.78	<u>2.86</u>	0.52	1.00	4.44
<b>SD3_PSYCH*</b>	2.14	0.55	0.56	3.89	<u>2.27</u>	0.55	0.56	3.89	<u>2.01</u>	0.53	0.56	3.67
<b>SRP3*</b>	2.27	0.40	1.23	3.44	<u>2.42</u>	0.37	1.36	3.44	<u>2.12</u>	0.38	1.23	3.13
<b>FD*</b>	13.13	4.39	1.00	23.00	<u>13.68</u>	4.51	2.00	23.00	<u>12.60</u>	4.21	1.00	23.00
<b>IA</b>	11.40	5.10	1.00	28.00	11.75	4.93	3.00	27.00	11.06	5.25	1.00	28.00

Note: N=560 for the SD3 scales, N=562 for the SRPIII, FD, and IA, N=285 for women across all measures, N=275 for men for the SD3 scales, N= 277 for men for the SRPIII, FD, and IA, \* indicates that the means for men and women were significantly different from each other,  $p < .01$ .

Table 2. Structural summary parameters, 95% bootstrap confidence intervals, and probability estimates for Dark Triad traits

<b>IIP-SC</b>								
<b>Trait</b>	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>R<sup>2</sup></b>	<b>Probability</b>	<b>N</b>
<b>SD3_MACH</b>	.07 [.01, .12]	-.17 [-.22, -.13]	.14 [.08, .19]	.19 [.14, .24]	158.67° [143.02°, 175.65°]	.88	1.00	523
<b>SD3_NAR</b>	.24 [.20, .29]	.03 [-.03, .08]	-.09 [-.15, -.03]	.25 [.20, .29]	83.60° [70.01°, 96.75°]	.91	1.00	523
<b>SD3_PSYCH</b>	.20 [.15, .25]	-.13 [-.18, -.08]	.08 [.03, .14]	.24 [.19, .29]	123.48° [111.91°, 134.97°]	.91	1.00	523
<b>SRP-III</b>	.19 [.14, .24]	-.18 [-.23, -.14]	.08 [.02, .14]	.26 [.21, .32]	133.84° [124.88°, 142.83°]	.97	1.00	525
<b>FD</b>	.22 [.17, .26]	.07 [.02, .12]	-.22 [-.27, -.17]	.22 [.18, .27]	73.15° [59.34°, 85.91°]	.93	1.00	525
<b>IA</b>	.17 [.11, .22]	-.02 [-.06, .03]	.21 [.16, .27]	.17 [.12, .22]	96.05° [80.59°, 110.02°]	.96	1.00	525
<b>ISC</b>								
<b>Trait</b>	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>R<sup>2</sup></b>	<b>Probability</b>	<b>N</b>
<b>SD3_MACH</b>	-.03 [-.07, .02]	.07 [.02, .11]	.12 [.06, .19]	.07 [.03, .12]	339.27° [304.10°, 16.62°]	.81	.93	560
<b>SD3_NAR</b>	-.10 [-.14, -.06]	-.03 [-.08, .01]	.05 [-.01, .12]	.11 [.07, .15]	251.80° [226.45°, 276.01°]	.63	1.00	560
<b>SD3_PSYCH</b>	-.14 [-.18, -.10]	.09 [.04, .13]	.05 [-.02, .12]	.16 [.12, .21]	302.06° [287.14°, 314.87°]	.88	1.00	560
<b>SRP-III</b>	-.13 [-.17, -.10]	.14 [.09, .17]	.02 [-.04, .09]	.19 [.15, .23]	315.42° [303.72°, 326.09°]	.91	1.00	562
<b>FD</b>	-.13 [-.17, -.09]	.01 [-.04, .05]	-.07 [-.13, -.01]	.13 [.09, .17]	272.93° [253.20°, 291.85°]	.80	1.00	562
<b>IA</b>	-.03 [-.07, .01]	.04 [.00, .09]	.17 [.10, .23]	.05 [.02, .10]	323.89° [270.79°, 10.06°]	.60	.66	562
<b>CSIV</b>								

Trait	Dominance	Affiliation	Elevation	Amplitude	Angle	R <sup>2</sup>	Probability	N
<b>SD3_MACH</b>	.05 [-.00, .10]	-.16 [-.22, -.10]	.18 [.13, .24]	.17 [.11, .23]	162.92° [141.54°, 181.36°]	.92	1.00	492
<b>SD3_NAR</b>	.16 [.10, .21]	-.02 [-.08, .05]	.08 [-.10, .14]	.16 [.10, .21]	95.46° [72.77°, 118.41°]	.94	1.00	492
<b>SD3_PSYCH</b>	.08 [.03, .13]	-.24 [-.29, -.18]	.06 [-.02, .12]	.25 [.20, .31]	161.01° [148.57°, 172.50°]	.98	1.00	492
<b>SRP-III</b>	.09 [.04, .13]	-.25 [-.30, -.19]	.03 [-.03, .09]	.26 [.21, .31]	160.88° [148.39°, 171.89°]	.99	1.00	494
<b>FD</b>	.16 [.11, .21]	.07 [.02, .13]	-.09 [-.15, -.03]	.17 [.12, .22]	65.50° [48.45°, 83.24°]	.92	1.00	494
<b>IA</b>	.03 [-.02, .07]	-.12 [-.182, -.06]	.14 [.08, .20]	.12 [.07, .19]	167.94° [141.37°, 188.72°]	.94	.99	494

**CSIE**

Trait	Dominance	Affiliation	Elevation	Amplitude	Angle	R <sup>2</sup>	Probability	N
<b>SD3_MACH</b>	.06 [-.01, .12]	-.22 [-.26, -.17]	.05 [-.00, .11]	.22 [.18, .27]	165.43° [149.51°, 181.92°]	.96	1.00	526
<b>SD3_NAR</b>	.36 [.31, .41]	.06 [.01, .11]	.19 [.14, .24]	.37 [.31, .42]	80.47° [72.21°, 88.97°]	.91	1.00	526
<b>SD3_PSYCH</b>	.21 [.15, .27]	-.23 [-.28, -.19]	-.01 [-.07, .04]	.32 [.27, .36]	138.18° [128.57°, 148.75°]	.94	1.00	526
<b>SRP-III</b>	.19 [.13, .25]	-.26 [-.30, -.22]	.02 [-.04, .08]	.32 [.28, .37]	143.95° [133.95°, 154.22°]	.96	1.00	528
<b>FD</b>	.35 [.30, .40]	.14 [.09, .18]	.20 [.16, .25]	.38 [.33, .43]	68.56° [61.33°, 75.41°]	.96	1.00	528
<b>IA</b>	.11 [.06, .17]	-.15 [-.20, -.11]	-.04 [-.10, .02]	.19 [.15, .24]	143.52° [127.86°, 162.16°]	.87	1.00	528

Note: Numbers in brackets represent the 95% confidence interval for the associated structural summary parameter



Table 3. Gender differences in structural summary parameters with 95% confidence intervals for Dark Triad traits

<b>IIP-SC</b>									
<b>Trait</b>	<b>Group</b>	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>R<sup>2</sup></b>	<b>Probability</b>	<b>N</b>
<b>SD3_MACH</b>	f	.09 [.00, .17]	-.17 [-.24, -.09]	.12 [.04, .21]	.19 [.11, .28]	152.73° [131.06°, 179.18°]	.87	.99	265
	m	.03 [-.04, .09]	-.13 [-.20, -.07]	.17 [.09, .24]	.14 [.08, .20]	168.59° [138.09°, 198.10°]	.82	.98	258
	dif	.06 [-.05, .17]	-.04 [-.14, .07]	-.05 [-.16, .07]	.05 [-.05, .16]	15.86° {-23.38°, 52.80°}			
<b>SD3_NAR</b>	f	.27 [.20, .33]	.04 [-.05, .13]	-.11 [-.19, -.03]	.27 [.21, .34]	82.01° [62.38°, 99.48°]	.88	1.00	265
	m	.21 [.15, .27]	.06 [.00, .13]	-.06 [-.15, .03]	.22 [.16, .28]	73.73° [55.68°, 90.70°]	.85	1.00	258
	dif	.06 [-.03, .15]	-.02 [-.13, .08]	-.05 [-.16, .07]	.05 [-.04, .14]	-8.28° [-34.02°, 18.41°]			
<b>SD3_PSYCH</b>	f	.23 [.15, .31]	-.14 [-.21, -.07]	.06 [-.02, .13]	.27 [.18, .35]	121.28° [106.88°, 136.21°]	.90	1.00	265
	m	.16 [.09, .22]	-.06 [-.13, .00]	.13 [.05, .22]	.17 [.11, .23]	110.77° [88.90°, 135.19°]	.85	1.00	258
	dif	.07 [-.03, .18]	-.08 [-.18, .02]	-.07 [-.18, .04]	.10 [-.01, .20]	-10.51° [-37.42°, 16.86°]			
<b>SRP-III</b>	f	.19 [.11, .27]	-.15 [-.22, -.08]	.10 [.02, .17]	.24 [.16, .33]	128.44° [114.43°, 143.57°]	.96	1.00	265
	m	.17 [.11, .23]	-.12 [-.18, -.06]	.10 [.02, .18]	.21 [.14, .28]	124.97° [107.89°, 140.73°]	.92	1.00	260
	dif	.02 [-.09, .13]	-.03 [-.12, .06]	-.01 [-.11, .11]	.03 [-.08, .15]	-3.47° [-25.65°, 16.67°]			
<b>FD</b>	f	0.21 [.14, .28]	.10 [.02, .17]	-.25 [-.31, -.18]	.23 [.17, .30]	65.31° [45.59°, 85.17°]	.90	1.00	265
	m	.21	.07	-.19	.22	73.02°	.92	1.00	260

<b>IA</b>	dif	[.15, .28]	[.00, .13]	[-.27, -.12]	[.17, .29]	[55.78°, 90.85°]				
		-.01	.03	<b>-.19</b>	.01	7.71°				
	f	[-.10, .08]	[-.07, .13]	<b>[-.27, -.12]</b>	[-.08, .09]	[-18.08°, 33.82°]				
		.18	-.03	.21	.18	99.66°	.97	1.00	265	
	m	[.10, .26]	[-.09, .03]	[.14, .27]	[.10, .27]	[78.28°, 118.47°]				
		.15	.02	.23	.15	82.62°	.83	1.00	260	
	dif	[.09, .21]	[-.04, .08]	[.15, .31]	[.09, .21]	[59.28°, 104.30°]				
		.03	-.05	-.03	.03	-17.04°				
		[-.07, .13]	[-.14, .03]	[-.13, .07]	[-.07, .13]	[-48.65°, 12.44°]				
<b>ISC</b>										
	<b>Trait</b>	<b>Group</b>	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>R<sup>2</sup></b>	<b>Probability</b>	<b>N</b>
		f	-.01	.05	.14	.05	352.01°	.50	.46	285
	<b>SD3_MACH</b>	m	[-.07, .05]	[-.01, .12]	[.05, .22]	[.01, .13]	[251.38°, 69.40°]			
			-.03	.05	.16	.06	332.27°	.71	.49	275
		dif	[-.09, .03]	[-.01, .11]	[.07, .25]	[.01, .13]	[270.80°, 93.27°]			
			.02	.00	-.03	.00	-19.74°			
		f	[-.07, .11]	[-.09, .09]	[-.15, .09]	[-.09, .08]	[-149.80°, 110.27°]			
	<b>SD3_NAR</b>	m	[-.16, -.04]	[-.14, .01]	[-.04, .01]	[.07, .18]	[205.17°, 274.82°]			
			-.10	-.04	.10	.10	248.40°	.52	.93	275
		dif	[-.16, -.03]	[-.10, .02]	[.01, .19]	[.05, .17]	[214.51°, 282.88°]			
			.00	-.03	-.05	.01	11.14°			
		f	[-.09, .08]	[-.12, .07]	[-.18, .08]	[-.07, .10]	[-42.24°, 58.37°]			
	<b>SD3_PSYCH</b>	m	[-.17, -.06]	[.00, .12]	[-.04, .13]	[.07, .19]	[267.49°, 321.48°]			
			-.14	.07	.13	.16	297.66°	.86	1.00	275
		dif	[-.19, -.09]	[.02, .13]	[.04, .22]	[.10, .21]	[279.03°, 314.33°]			
			.02	-.02	-.08	-.03	2.72°			
		f	[-.05, .10]	[-.10, .07]	[-.20, .05]	[-.11, .06]	[-30.54°, 34.75°]			
			-.10	.10	.03	.15	314.31°	.88	.96	285

<b>SRP-III</b>	m	[-.16, -.05]	[.04, .16]	[-.05, .12]	[.09, .20]	[288.89°, 336.83°]	.81	1.00	277
		-.14	.11	.14	.18	308.35°			
	dif	[-.20, -.09]	[.06, .16]	[.03, .23]	[.12, .24]	[293.79°, 322.20°]			
<b>FD</b>	f	[-.04, .12]	[-.09, .07]	[-.23, .03]	[-.11, .05]	[-33.27°, 23.35°]	.75	1.00	285
		-.13	-.01	-.07	.13	264.05°			
	m	[-.18, -.07]	[-.09, .06]	[-.15, .02]	[.08, .19]	[234.24°, 296.73°]			
<b>IA</b>	m	[-.12, -.07]	[-.09, .06]	[-.15, .02]	[.08, .19]	[234.24°, 296.73°]	.79	.99	277
		-.12	.01	-.04	.12	272.27°			
	dif	[-.17, -.06]	[-.05, .06]	[-.12, .05]	[.07, .18]	[245.12°, 297.97°]			
<b>IA</b>	f	[-.09, .07]	[-.11, .08]	[-.15, .09]	[-.06, .09]	[-34.48°, 48.33°]	.42	.38	285
		-.01	.04	.14	.05	349.49°			
	m	[-.06, .05]	[-.02, .11]	[.06, .22]	[.01, .12]	[221.35°, 110.92°]			
<b>IA</b>	m	[-.05, .05]	[-.02, .11]	[.06, .22]	[.01, .12]	[221.35°, 110.92°]	.47	.44	277
		-.05	.02	.22	.05	296.35°			
	dif	[-.10, .01]	[-.03, .07]	[.12, .32]	[.02, .11]	[217.78°, 15.22°]			
		[-.04, .12]	[-.06, .10]	[-.21, .05]	[-.07, .07]	[176.29°, 99.80°]			

**CSIV**

Trait	Group	Dominance	Affiliation	Elevation	Amplitude	Angle	R <sup>2</sup>	Probability	N
<b>SD3_MACH</b>	f	.04	-.14	.17	.15	162.15°	.82	.94	254
		[-.04, .13]	[-.22, -.06]	[.10, .24]	[.08, .23]	[123.33°, 195.05°]			
	m	.06	-.13	.22	.14	152.86°			
<b>SD3_NAR</b>	dif	[.00, .13]	[-.20, -.05]	[.14, .31]	[.08, .22]	[119.61°, 179.53°]	.95	.93	238
		-.02	-.01	-.05	.00	-9.29°			
	f	[-.13, .08]	[-.13, .10]	[-.17, .05]	[-.10, .11]	[-55.80°, 36.90°]			
<b>SD3_NAR</b>	f	.13	.04	.09	.14	73.54°	.89	.91	254
		[.05, .22]	[-.06, .13]	[.01, .16]	[.07, .23]	[38.33°, 121.27°]			
	m	.19	-.01	.09	.19	93.31°			
<b>SD3_NAR</b>	m	[.12, .25]	[-.09, .07]	[.00, .19]	[.13, .26]	[69.25°, 115.27°]	.96	1.00	238
	dif	-.05	.05	.00	-.05	19.77°			

	f	[-.16, .05]	[-.07, .17]	[-.13, .11]	[-.15, .06]	[-30.68°, 61.09°]	.97	1.00	254	
<b>SD3_PSYCH</b>	m	.07	-.24	.05	.25	163.47°				
	dif	[-.01, .15]	[-.31, -.15]	[-.03, .13]	[.17, .32]	[141.12°, 181.71°]	.93	1.00	238	
	f	.11	-.17	.09	.20	147.65°				
<b>SRP-III</b>	m	[.05, .17]	[-.25, -.10]	[-.01, .19]	[.14, .28]	[127.92°, 165.92°]				
	dif	-.04	-.06	-.04	.04	-15.82°				
	f	[-.14, .06]	[-.17, .05]	[-.17, .08]	[-.07, .14]	[-42.04°, 12.81°]	.97	1.00	254	
<b>FD</b>	m	.08	-.21	.03	.22	159.70°				
	dif	[.00, .16]	[-.30, -.12]	[-.05, .10]	[.15, .30]	[133.74°, 179.76°]	.96	1.00	240	
	f	.13	-.19	.08	.23	145.66°				
<b>IA</b>	m	[.07, .19]	[-.26, -.11]	[-.01, .18]	[.16, .30]	[129.12°, 161.50°]				
	dif	-.05	-.02	-.06	.00	-14.05°				
	f	[-.14, .05]	[-.13, .09]	[-.18, .06]	[-.11, .10]	[-39.19°, 16.50°]	.93	.97	254	
<b>SD3_MACH</b>	m	.14	.14	-.10	.20	45.64°				
	dif	[.07, .22]	[.06, .22]	[-.17, -.02]	[.13, .28]	[24.92°, 69.88°]	.93	1.00	240	
	f	.18	.06	-.07	.19	71.25°				
<b>SD3_PSYCH</b>	m	[.12, .24]	[.00, .13]	[-.16, .02]	[.13, .25]	[52.17°, 91.03°]				
	dif	-.04	.08	-.03	.01	25.61°				
	f	[-.13, .06]	[-.03, .18]	[-.15, .09]	[-.09, .11]	[-4.44°, 55.57°]	.92	.91	254	
<b>SD3_MACH</b>	m	[-.07, .07]	[-.22, -.05]	[.01, .15]	[.06, .23]	[138.96°, 206.26°]	.90	.69	240	
	dif	.06	-.09	.21	.10	147.30°				
	f	[.00, .12]	[-.17, .00]	[.11, .31]	[.04, .18]	[90.65°, 182.69°]				
		[-.14, .03]	[-.17, .07]	[-.25, .00]	[-.08, .14]	[-94.61°, 19.09°]				
<b>CSIE</b>										
	<b>Trait</b>	<b>Group</b>	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>R<sup>2</sup></b>	<b>Probability</b>	<b>N</b>
<b>SD3_MACH</b>		f	.00	-.03	.04	.03	185.86°	.01	.22	271
		m	[-.04, .04]	[-.07, .01]	[-.03, .10]	[.01, .07]	[43.20°, 275.95°]			
		m	.01	-.05	.06	.05	168.56°	.06	.66	255

SD3_NAR	dif	[-.02, .04]	[-.09, -.01]	[-.04, .16]	[.01, .09]	[113.49°, 222.80°]			
		-.01	.02	-.02	-.02	-17.30°			
	f	[-.06, .04]	[-.04, .07]	[-.14, .10]	[-.06, .04]	[-118.39°, 130.88°]	.05	.99	271
SD3_NAR	m	[.05, .11]	[-.07, .02]	[.13, .24]	[.06, .12]	[79.57°, 133.24°]			
		.01	-.05	.19	.05	166.46°	.02	.71	255
	dif	[-.03, .05]	[-.09, -.01]	[.10, .27]	[.02, .09]	[110.55°, 215.21°]			
SD3_PSYCH		<b>.07</b>	.02	.00	.04	59.54°			
	f	<b>[.02, .12]</b>	[-.03, .08]	[-.10, .10]	[-.02, .08]	[-1.56°, 114.88°]	.01	.12	271
	m	[-.02, .06]	[-.03, .05]	[-.08, .05]	[.01, .06]	[304.75°, 198.72°]	.03	.43	255
SD3_PSYCH		.04	-.03	-.04	.05	133.81°			
	dif	[.00, .06]	[-.07, .00]	[-.13, .06]	[.02, .09]	[86.42°, 175.94°]			
		-.02	.05	.02	-.03	<b>76.33°</b>			
SRP-III	f	[-.07, .03]	[-.01, .10]	[-.09, .13]	[-.06, .03]	<b>[-34.48°, -125.93°]</b>	.00	.09	271
	m	[-.04, .03]	[-.02, .06]	[-.10, .05]	[.01, .06]	[203.71°, 113.87°]	.02	.40	257
		.03	-.03	.03	.04	128.39°			
SRP-III	dif	[.00, .07]	[-.07, .01]	[-.07, .12]	[.02, .08]	[69.83°, 187.68°]			
		-.04	.05	-.05	-.02	134.97°			
	f	[-.09, .01]	[-.01, .10]	[-.17, .07]	[-.06, .03]	[15.70°, -60.95°]	.03	.95	271
FD		.07	.01	.17	.07	84.72°			
	m	[.04, .10]	[-.03, .04]	[.11, .23]	[.04, .10]	[54.08°, 116.78°]	.01	.28	257
		.02	-.03	.23	.03	151.79°			
FD	dif	[-.02, .05]	[-.06, .01]	[.17, .30]	[.01, .07]	[65.90°, 227.88°]			
		<b>.05</b>	.03	-.06	.04	67.07°			
	f	<b>[.01, .10]</b>	[-.02, .09]	[-.15, .02]	[-.01, .08]	[-20.74°, 149.53°]	.01	.14	271
IA		-.03	-.01	-.06	.03	255.96°			
	m	[-.06, .01]	[-.04, .03]	[-.13, .02]	[.01, .06]	[161.98°, 344.09°]	.01	.09	257
		.01	-.01	-.04	.02	136.88°			
IA		[-.02, .04]	[-.05, .02]	[-.13, .07]	[.01, .06]	[18.61°, 307.72°]			

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dif	<b>-0.4</b>	<b>.01</b>	<b>-0.2</b>	<b>.01</b>	<b>-119.08°</b>
	<b>[-.08, .01]</b>	<b>[-.04, .06]</b>	<b>[-.14, .10]</b>	<b>[-.03, .05]</b>	<b>[67.65°, 7.93°]</b>

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Note. Dif=difference. Items in bold represent parameters on which men and women differ (CIs do not contain 0).

Table 4. Structural summary parameters with 95% confidence intervals for differences of Dark Triad scales

<b>IIP-SC</b>						
	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>N</b>
<b>SD3_MACH vs.</b>	<b>-.13</b>	<b>-.04</b>	<b>.05</b>	<b>-.05</b>	<b>-35.19°</b>	523
<b>SD3_PSYCH</b>	<b>[-.19, -.07]</b>	<b>[-.10, .01]</b>	<b>[-.01, .11]</b>	<b>[-.12, .01]</b>	<b>[-52.70°, -20.09°]</b>	
<b>SD3_MACH vs.</b>	<b>-.18</b>	<b>-.20</b>	<b>.22</b>	<b>-.06</b>	<b>-75.07°</b>	523
<b>SD3_NAR</b>	<b>[-.24, -.12]</b>	<b>[-.27, -.14]</b>	<b>[.16, .30]</b>	<b>[-.13, .01]</b>	<b>[-98.95°, -54.68°]</b>	
<b>SD3_PSYCH vs.</b>	<b>-.05</b>	<b>-.16</b>	<b>.17</b>	<b>-.01</b>	<b>-39.88°</b>	523
<b>SD3_NAR</b>	<b>[-.10, .01]</b>	<b>[-.22, -.10]</b>	<b>[.10, .24]</b>	<b>[-.07, .05]</b>	<b>[-58.11°, -25.47°]</b>	
<b>SD3_PSYCH vs.</b>	<b>.01</b>	<b>.05</b>	<b>.00</b>	<b>-.02</b>	<b>10.16°</b>	523
<b>SRP-III</b>	<b>[-.03, .04]</b>	<b>[.01, .09]</b>	<b>[-.04, .04]</b>	<b>[-.06, .02]</b>	<b>[2.25°, 19.14°]</b>	
<b>SD3_PSYCH vs.</b>	<b>-.01</b>	<b>-.20</b>	<b>.30</b>	<b>.02</b>	<b>-50.53°</b>	523
<b>FD</b>	<b>[-.07, .05]</b>	<b>[-.27, -.13]</b>	<b>[.22, .37]</b>	<b>[-.05, .08]</b>	<b>[-68.45°, -33.75°]</b>	
<b>SD3_PSYCH vs.</b>	<b>.03</b>	<b>-.12</b>	<b>-.13</b>	<b>.07</b>	<b>-27.52°</b>	523
<b>IA</b>	<b>[-.01, .08]</b>	<b>[-.17, -.07]</b>	<b>[-.19, -.08]</b>	<b>[.02, .13]</b>	<b>[-44.01°, -13.60°]</b>	
<b>FD vs.</b>	<b>.03</b>	<b>.25</b>	<b>-.30</b>	<b>-.04</b>	<b>60.69°</b>	525
<b>SRP-III</b>	<b>[-.03, .08]</b>	<b>[.19, .31]</b>	<b>[-.37, -.23]</b>	<b>[-.10, .03]</b>	<b>[45.44°, 77.70°]</b>	
<b>IA vs.</b>	<b>-.02</b>	<b>.16</b>	<b>.13</b>	<b>-.09</b>	<b>37.79°</b>	525
<b>SRP-III</b>	<b>[-.06, .02]</b>	<b>[.12, .21]</b>	<b>[.08, .18]</b>	<b>[-.14, -.04]</b>	<b>[24.65°, 54.08°]</b>	
<b>FD vs.</b>	<b>.05</b>	<b>.08</b>	<b>-.43</b>	<b>.06</b>	<b>22.90°</b>	525
<b>IA</b>	<b>[-.01, .11]</b>	<b>[.02, .15]</b>	<b>[-.51, -.36]</b>	<b>[.00, .12]</b>	<b>[3.26°, 42.88°]</b>	
<b>ISC</b>						
	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>N</b>
<b>SD3_MACH vs.</b>	<b>.11</b>	<b>-.02</b>	<b>.08</b>	<b>-.09</b>	<b>-37.21°</b>	560
<b>SD3_PSYCH</b>	<b>[.07, .15]</b>	<b>[-.06, .03]</b>	<b>[.01, .15]</b>	<b>[-.14, -.04]</b>	<b>[-75.53°, -5.94°]</b>	
<b>SD3_MACH vs.</b>	<b>.08</b>	<b>.10</b>	<b>.07</b>	<b>-.04</b>	<b>-87.47°</b>	560
<b>SD3_NAR</b>	<b>[.03, .13]</b>	<b>[.04, .16]</b>	<b>[-.01, .15]</b>	<b>[-.09, .02]</b>	<b>[-133.59°, -45.81°]</b>	
<b>SD3_PSYCH vs.</b>	<b>-.03</b>	<b>.12</b>	<b>-.01</b>	<b>.05</b>	<b>-50.26°</b>	560
<b>SD3_NAR</b>	<b>[-.07, .01]</b>	<b>[.07, .17]</b>	<b>[-.09, .07]</b>	<b>[-.01, .10]</b>	<b>[-76.48°, -25.45°]</b>	
<b>SD3_PSYCH vs.</b>	<b>.00</b>	<b>-.05</b>	<b>.03</b>	<b>-.03</b>	<b>13.23°</b>	560

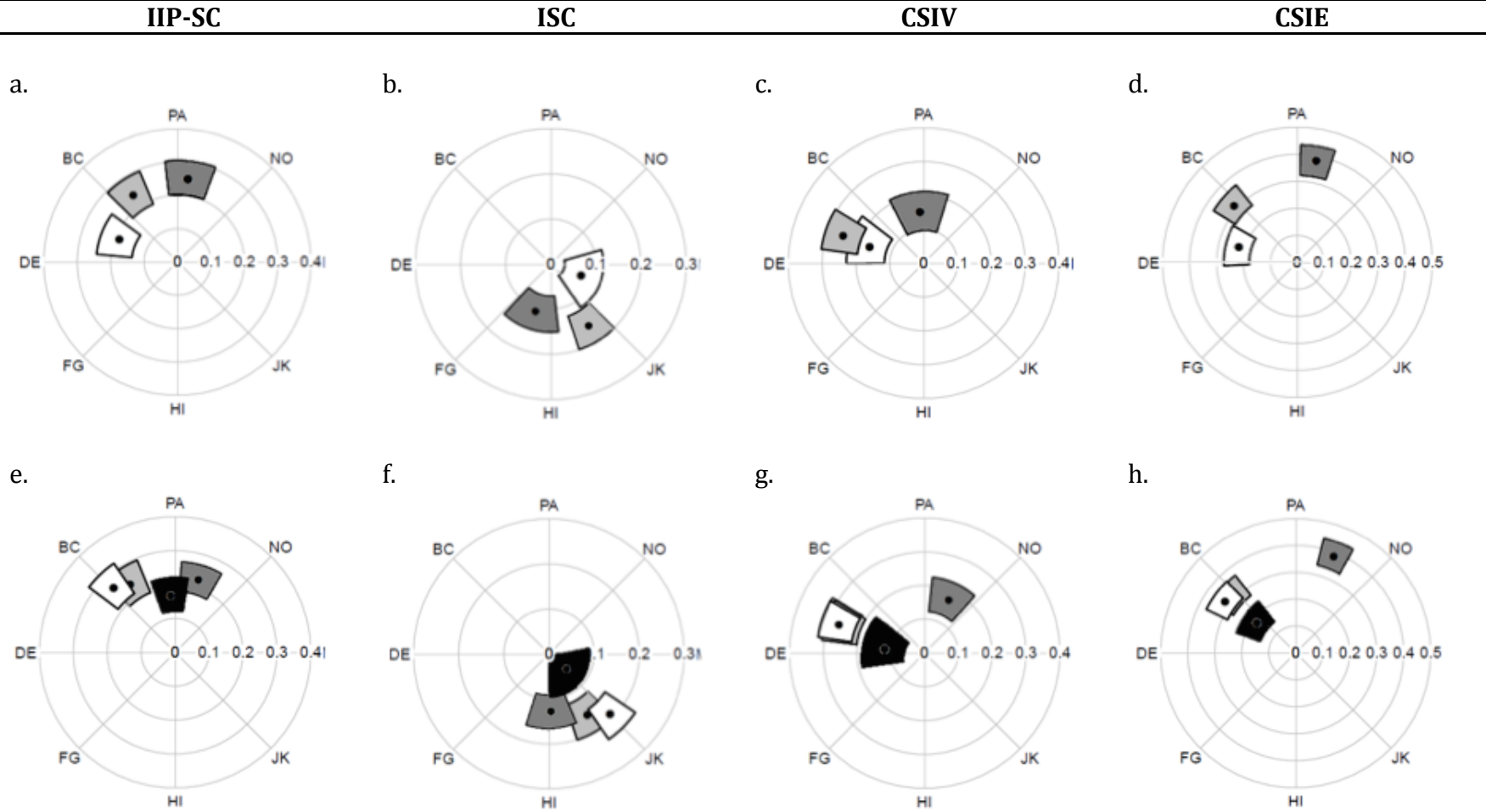
<b>SRP-III</b>	[-.03, .02]	<b>[-.08, -.02]</b>	[-.02, .07]	[-.06, .00]	<b>[3.95°, 24.16°]</b>	
<b>SD3_PSYCH vs. FD</b>	-.01	<b>.08</b>	<b>.12</b>	.03	<b>-29.67°</b>	560
<b>SD3_PSYCH vs. IA</b>	[-.14, -.07]	[.00, .09]	<b>[-.18, -.06]</b>	<b>[.06, .15]</b>	[-28.17°, 67.64°]	560
<b>FD vs. SRP-III</b>	.00	<b>-.13</b>	<b>-.09</b>	<b>-.06</b>	<b>42.49°</b>	562
<b>IA vs. SRP-III</b>	[-.05, .05]	<b>[-.18, -.08]</b>	<b>[-.17, -.01]</b>	<b>[-.11, -.01]</b>	<b>[22.13°, 63.64°]</b>	562
<b>FD vs. IA</b>	<b>[.07, .14]</b>	<b>[-.13, -.05]</b>	<b>[.09, .20]</b>	<b>[-.17, -.09]</b>	[-49.30°, 37.75°]	562
	<b>-.10</b>	-.04	<b>-.24</b>	<b>.08</b>	50.96°	
	<b>[-.15, -.04]</b>	[-.10, .03]	<b>[-.33, -.15]</b>	<b>[.02, .13]</b>	[-6.94°, 104.77°]	
<b>CSIV</b>						
	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>N</b>
<b>SD3_MACH vs. SD3_PSYCH</b>	-.03	<b>.08</b>	<b>.13</b>	<b>-.09</b>	-1.91°	492
<b>SD3_MACH vs. SD3_NAR</b>	[-.17, -.04]	<b>[-.22, -.08]</b>	<b>[.04, .18]</b>	[-.06, .09]	<b>[-96.04°, -40.88°]</b>	492
<b>SD3_PSYCH vs. SD3_NAR</b>	[-.13, -.12]	<b>[-.29, -.16]</b>	[-.10, .06]	<b>[.02, .17]</b>	<b>[-91.76°, -43.06°]</b>	492
<b>SD3_PSYCH vs. SRP-III</b>	[-.03, .03]	[-.03, .06]	[-.02, .07]	[-.06, .03]	[-7.29°, 7.33°]	492
<b>SD3_PSYCH vs. FD</b>	[-.14, -.01]	<b>[-.38, -.23]</b>	<b>[.07, .22]</b>	<b>[.01, .15]</b>	<b>[-117.75°, -72.17°]</b>	492
<b>SD3_PSYCH vs. IA</b>	<b>[.01, .10]</b>	<b>[-.18, -.06]</b>	<b>[-.14, -.02]</b>	<b>[.07, .18]</b>	[-16.86°, 26.00°]	492
<b>FD vs. SRP-III</b>	<b>[.01, .13]</b>	<b>[.25, .39]</b>	<b>[-.19, -.04]</b>	<b>[-.17, -.02]</b>	<b>[73.61°, 116.57°]</b>	494
<b>IA vs. SRP-III</b>	-.06	<b>.13</b>	<b>.11</b>	<b>-.14</b>	-7.06°	494
<b>FD vs. IA</b>	<b>.13</b>	<b>.19</b>	<b>-.23</b>	<b>.05</b>	<b>102.44°</b>	494



IA	<b>[.06, .20]</b>	<b>[.11, .27]</b>	<b>[-.30, -.14]</b>	<b>[-.03, .12]</b>	<b>[69.45°, 129.80°]</b>	
CSIE						
	<b>Dominance</b>	<b>Affiliation</b>	<b>Elevation</b>	<b>Amplitude</b>	<b>Angle</b>	<b>N</b>
SD3_MACH vs.	<b>-.15</b>	.02	.06	<b>-.09</b>	<b>-27.25°</b>	526
SD3_PSYCH	<b>[-.22, -.09]</b>	<b>[-.03, .06]</b>	<b>[.01, .12]</b>	<b>[-.15, -.04]</b>	<b>[-43.45°, -13.07°]</b>	
SD3_MACH vs.	<b>-.31</b>	<b>-.28</b>	<b>-.14</b>	<b>-.14</b>	<b>-84.96°</b>	526
SD3_NAR	<b>[-.38, -.23]</b>	<b>[-.34, -.22]</b>	<b>[-.20, -.08]</b>	<b>[-.21, -.07]</b>	<b>[-105.69°, -66.30°]</b>	
SD3_PSYCH vs.	<b>-.15</b>	<b>-.30</b>	<b>-.20</b>	<b>-.05</b>	<b>-57.71°</b>	526
SD3_NAR	<b>[-.21, -.09]</b>	<b>[-.35, -.24]</b>	<b>[-.26, -.15]</b>	<b>[-.11, .01]</b>	<b>[-71.18°, -45.97°]</b>	
SD3_PSYCH vs.	.02	.03	<b>-.03</b>	<b>-.01</b>	5.79°	526
SRP-III	<b>[-.02, .06]</b>	<b>[-.01, .06]</b>	<b>[-.07, .02]</b>	<b>[-.04, .03]</b>	<b>[-.91°, 12.82°]</b>	
SD3_PSYCH vs.	<b>-.14</b>	<b>-.37</b>	<b>-.22</b>	<b>-.06</b>	<b>-69.48°</b>	526
FD	<b>[-.21, -.08]</b>	<b>[-.43, -.31]</b>	<b>[-.28, -.15]</b>	<b>[-.14, .00]</b>	<b>[-82.36°, -56.88°]</b>	
SD3_PSYCH vs.	<b>.10</b>	<b>-.08</b>	.03	<b>.12</b>	5.62°	526
IA	<b>[.04, .16]</b>	<b>[-.13, -.03]</b>	<b>[-.03, .09]</b>	<b>[.08, .17]</b>	<b>[-9.26°, 21.50°]</b>	
FD vs.	<b>.16</b>	<b>.40</b>	<b>.19</b>	.06	<b>75.39°</b>	528
SRP-III	<b>[.10, .23]</b>	<b>[.34, .46]</b>	<b>[.12, .26]</b>	<b>[-.01, .12]</b>	<b>[62.51°, 88.99°]</b>	
IA vs.	<b>-.08</b>	<b>.11</b>	<b>-.06</b>	<b>-.13</b>	.43°	528
SRP-III	<b>[-.13, -.03]</b>	<b>[.07, .15]</b>	<b>[-.11, -.01]</b>	<b>[-.17, -.09]</b>	<b>[-13.56°, 13.54°]</b>	
FD vs.	<b>.24</b>	<b>.29</b>	<b>.25</b>	<b>.19</b>	<b>74.97°</b>	528
IA	<b>[.16, .32]</b>	<b>[.23, .36]</b>	<b>[.18, .32]</b>	<b>[.12, .26]</b>	<b>[56.55°, 94.43°]</b>	

Note. Values represent the degree to which the second trait listed differs from the first trait. Items in bold represent parameters on which the compared traits differ (CIs do not contain

Figure 3. Amplitude and angular displacement confidence intervals for Dark Triad traits across surfaces



Note. In figures 3a-3d, amplitude (vertical) and angular displacement (horizontal) CIs for SD3 Machiavellianism (white), SD3 Psychopathy (Light Gray), and SD3 Narcissism (Dark Gray) are depicted for traits with an  $R^2$  value greater than .7. In figures 3e-3h, amplitude (vertical) and angular displacement (horizontal) CIs for SRP-III (White), SD3 Psychopathy (Light Gray), FD (Dark Gray, and IA (Black) are depicted for traits with an  $R^2$  value greater than .7.

## CHAPTER 4: DISCUSSION

This study used a novel bootstrapping methodology to create confidence intervals around the structural summary parameters associated with the SD3 scales and 3 additional measures of psychopathy. Confidence intervals were also created for men and women individually to examine the statistical significance of gender differences in structural summary parameters across measures. Finally, difference confidence intervals were computed to determine whether two scales or measures were statistically distinct from one another, providing evidence for convergent and discriminate validity.

### **Gender Differences**

Overall significant mean level gender differences in Dark Triad traits were found for all measures except for IA such that men scored higher than women. These results are consistent with prior work (Jonason, Li, & Buss, 2010; Jonason et al., 2009; Paulhus & Williams, 2002). The computation of confidence intervals around the structural summary parameters allowed us to take this comparison one step further and determine whether the parameters for men and women were statistically distinct rather than relying on visual comparisons. Findings indicate that there were few (3%) significant structural summary parameter differences, suggesting that overall these traits function interpersonally in the same way for men and women. These results provide support for Hypothesis 4 and are consistent with previous work. When Dark Triad traits have been correlated with variables like the Big Five personality traits, measures of cognitive ability, measures of self-enhancement, and mate retention and poaching tactics, similar correlation coefficients tend to be found for men and women (Jonason, Li, & Buss, 2010; Jonason et al., 2009; Paulhus & Williams, 2002). Given that the structural summary parameters were generated from the

correlation matrix that arose when Dark Triad traits and interpersonal octant scores were correlated, the absence of significant gender differences in structural summary parameters is consistent with prior findings.

### **SD3 Scales**

Structural summary parameters associated with SD3 Machiavellianism, narcissism, and psychopathy were computed for the problems, sensitivities, values and efficacies surfaces. Although the relative positioning of Dark Triad traits is similar to that reported in previous research (Dowgwillo & Pincus, 2013; Jones & Paulhus, 2011; Rauthmann & Kolar, 2013), statistical comparisons are not possible without the computation of confidence intervals. Thus, confidence intervals were computed in the current study to determine for the first time whether these parameters were statistically distinct from one another. Of the 60 (3 pairwise comparisons x 5 parameters x 4 surfaces) comparisons made, 42 (70%) were statistically significant. In particular, angular displacement values, which identify the dominant interpersonal theme associated with each trait, were significantly different from one another 92% of the time, providing support for Hypothesis 1. In fact, the only time Dark Triad traits did not have distinct angular displacements was when Machiavellianism and psychopathy were compared on the interpersonal values surface. It was always the case that Dark Triad traits on a given surface differed from one another by at least 2 of the 5 parameters, indicating that although patterns of significance were less consistent across surfaces for the other 4 parameters, significant differences were still prevalent. Thus, the use of CIs provides support for the construct validity of Machiavellianism, narcissism, and psychopathy as assessed by the SD3. These findings also suggest that a composite measure of Dark Triad traits might overlook the unique interpersonal characteristics associated

with each Dark Triad trait individually. Given that the SD3 is a relatively new and short measure of Dark Triad traits, findings such as these are an important step if this measure is to be widely used in the Dark Triad literature.

### **Psychopathy Measures**

In addition to determining whether different constructs have different interpersonal characteristics, SSM confidence intervals also allow researchers to examine whether different measures of the same construct have statistically similar interpersonal characteristics. Structural summary parameters associated with SD3 psychopathy, the SRP-III total score, and MPQ assessed FD and IA were computed for the problems, sensitivities, values and efficacies surfaces. CIs were then computed to determine whether parameters were statistically different from one another. Findings suggest that the SRP-III and SD3 psychopathy scales have similar interpersonal characteristics 80% of the time. FD and IA, however, are each consistently and statistically different from the SRP-III, SD3 psychopathy, and each other. One possible explanation for this difference is that the SRP-III and SD3 psychopathy scales were created to assess psychopathy specifically, while FD and IA are orthogonal constructs computed from a subset of items drawn from the MPQ, a measure of normal range personality. Consistent with current findings, previous research suggests that measures designed to assess psychopathy or antisocial behavior specifically (including the SRP-II, SRP-III, SD3, PPI, PAI-Antisocial scale, and the PDQ- Antisocial Personality Disorder scale) typically fall in the BC octant of the IPC, appearing in visually similar locations (Jones & Paulhus, 2014; Salekin et al., 2001). Although MPQ-estimated psychopathy factors have demonstrated good criterion and construct validity in past research (Benning et al., 2005; Witt & Donnellan, 2008), it is possible that the interpersonal

content of the MPQ-derived scales differs from that in more traditional measures of psychopathy. In particular, MPQ facets have been located in the LM (well-being, social closeness), PA (social potency), BC (stress reaction, alienation, aggression), and JK (achievement) octants in prior studies (DeYoung, Weisberg, Quilty, & Peterson, 2013; Hopwood, Burt, Keel, Neale, Boker, & Klump, 2011). The greater prevalence of items related to interpersonal warmth may explain why MPQ based measures of psychopathic traits are often statistically distinct from more traditional measures of psychopathy.

### **Cross Surface Integration**

Although looking at a single surface is a useful way to examine the distinctiveness of trait measures, examination of the dominant interpersonal themes across surfaces provides a more comprehensive portrait of the personality dynamics associated with each trait.

*SD3 Machiavellianism.* High scores on Machiavellianism are associated with cold interpersonal problems, characterized by difficulty expressing affection and love toward others, making long-term commitments to other people, and getting along with and forgiving others. High Machiavellianism is not only associated with difficulty expressing affection, but also with experiencing irritation when others express affection and act in warm and familiar ways. Machiavellianism is also associated with valuing appearing detached and guarded and concealing one's thoughts and feelings from others, and efficacy doing so. Machiavellianism is associated with the ability to be cold, unfriendly, tough and even cruel when needed. High scorers are capable of convincing others to leave them alone.

*SD3 Psychopathy.* High scores on SD3 psychopathy are associated with vindictive interpersonal problems, characterized by both a general distrust of others and an inability

to care about their needs and happiness. These individuals not only don't care about the needs of others but are also sensitive to dependence, finding it bothersome when others rely on or defer to them. Like those high on Machiavellianism, individuals scoring high on psychopathy value concealing their thoughts and feelings from others and appearing guarded and detached. Unlike those high on Machiavellianism, individuals scoring high on psychopathy report efficacy at being aggressive rather than cold and are able to keep the upper hand and win arguments when needed.

*SD3 Narcissism.* High scores on narcissism are associated with domineering interpersonal problems characterized by a controlling and manipulative approach often in an effort to try and change other people. Individuals high on narcissism not only report that they are controlling, but also report that submissiveness and weakness in others (i.e. people who are easily able to be controlled) is irritating. High narcissism is associated with valuing confidence, appearing to be in authority, and preventing others from bossing one around. Such individuals not only report that they value these behaviors but that they feel they have efficacy to enact these behaviors indicating that they can be forceful and assertive and can take charge and speak up when they have something to say.

*Personality Dynamics.* Although SD3 Machiavellianism, psychopathy, and narcissism exhibit distinct interpersonal themes (cold, aggressive, and controlling respectively), similar underlying dynamics undergird the relationship between surfaces. Figure 3 visually provides an overview of findings for the amplitude and angular displacement associated with each trait across the four surfaces. Figure 3 does not contain a visual representation of the CIs associated with the elevation parameter.

In particular, consideration of the problems and sensitivities surfaces suggests that the one's own problematic behaviors are often directly opposite (180°) of the behaviors that are identified as bothersome when enacted by others. This suggests that individuals are bothered most by individuals who are least like themselves. These findings are consistent with previous research by Hopwood et al. (2011) suggesting that interpersonal opposites are generally perceived aversively.

While oppositeness characterizes the relationship between the problems and sensitivities surfaces, sameness characterizes the parameters on the values and efficacies surfaces. Thus, the interpersonal behaviors that are valued for each trait are also the behaviors that are identified as effectively enacted. Interestingly, these same behaviors that are valued and enacted effectively are also often the behaviors that are identified as problematic, suggesting that perhaps respondents are aware of the social costs associated with their dark personality traits.

### **Limitations, Future Directions, and Conclusions**

One limitation of this study was the exclusive use of self-report in the assessment of Dark Triad traits. A substantial literature exists on the degree of self-other agreement for both personality disorders and more general personality traits, suggesting median correlations of .36 across the 10 DSM-IV defined PDS (Klonsky, Oltmanns, & Turkheimer, 2002) and correlations of .40-.47 when five factor model personality traits were considered (McCrae et al., 2004). When Dark Triad traits themselves have been examined, researchers found that self and informant reports of the SD3 scales were correlated .34 for narcissism, .42 for Machiavellianism, and .57 for psychopathy (Jones & Paulhus, 2014). When informants knew the participant well, Miller, Jones, & Lynam (2011) found that self-other



correlations across a number of psychopathy scales ranged from .34 to .83. Thus, self-other correlations for Dark Triad traits appear to be comparable to correlations associated with personality traits more broadly. Future work might examine these concerns statistically by looking at differences in structural summary parameters when self and informant ratings are considered or when different methodologies (interviews vs. self-report) are used in data collection.

Despite this limitation, the current study is one of the first to use SSM confidence intervals to examine theoretically important statistical differences in interpersonal profiles of dark personality traits. Given that point estimates are often biased and the use of confidence intervals has been a recommended practice in psychology journals for the past 15 years (Wilkinson & Task Force on Statistical Inference, 1999), the bootstrap extension is an important methodological advance within the SSM approach to interpersonal construct validation. Although past research has relied heavily on visual inspection when interpreting findings, future work can take advantage of this new methodology to move from the descriptive to the inferential.

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