Cross-cultural Generalizability of Psychopathic Personality Disorder: Differences Between Individualistic Versus Collectivistic Cultures

by

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Abstract

Research on Psychopathic Personality Disorder (PPD) has hitherto focused predominantly on White North Americans. The extent to which the current conceptualization of PPD can be extrapolated to other cultures remains a question. The main purpose of this study was to investigate the generalizability of the construct of PPD, as defined using the Comprehensive Assessment of Psychopathic Personality (CAPP; see Cooke, Hart, Logan, & Michie, 2013), across individualistic versus collectivistic (IND-COL) cultures. Specifically, the measurement equivalence of CAPP self-ratings across IND-COL cultures was examined using Means and Covariance Structure (MACS) analysis in a sample of 775 undergraduates. IND-COL was measured four ways at three levels: the individual cultural orientation level, the perceived cultural context, and the syndromal levels of nationality and ethnicity. Results showed general configural invariance for a 3-factor solution for the CAPP, indicating the construct of PPD was conceptually similar across IND-COL groups. There was, however, some indication of a lack of metric and scalar invariance, depending on how IND-COL was operationalized. Implications for understanding the pan-cultural core of PPD and future cross-cultural research on PPD are discussed.

Keywords: Psychopathy; CAPP; Cross-culture; Individualism-Collectivism; Measurement Equivalence; Means and Covariance Structure Analysis

Dedication

To my family, for all the sacrifices you made to allow me this amazing opportunity.

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Chapter 1.

Introduction

Psychopathic personality disorder (PPD), also known as antisocial or dissocial personality disorder, comprises symptoms related to behavioral deviance, egocentricity, unemotionality, and interpersonal disturbances. Importantly, it is a known risk factor for serious criminality and violence (Leistico, Salekin, DeCoster, & Rogers, 2008; Salekin, Rogers, & Sewell, 1996) and represents serious economic and social costs to the individual sufferers, their victims, and the community (Cooke, 1996). Although our understanding and assessment of PPD have improved substantially over the last thirty years, we know little about its cross-cultural generalizability; research on PPD has hitherto focused predominantly on White North American males. This is particularly concerning given the grave implications PPD has for individual liberty and public safety around the world. Offenders labelled as psychopaths are often thought to be more dangerous and untreatable, and this label has been used to justify their longer incarceration, exclusion from treatment, denial of parole, and other constraints on their liberty (Lloyd, Clark, & Forth, 2010; Lyon & Ogloff, 2000). To ignore potential cultural differences and assume measurements of PPD are equally meaningful across different cultural and ethnic groups is unethical and discriminatory.

Historical and anthropological research have traced the existence of PPD among the Inuit of northwest Alaska and the Yoruba of Nigeria (Arrigo & Shipley, 2001; Murphy, 1976). This suggests the disorder is more than a phenomenon of industrialized Western societies (Cooke, 1996). However, the extent to which the current conceptualization of PPD and its association with violence and criminality can be extrapolated to other cultures remains a question. Although studies comparing North American and European samples have generally found structural invariance for PPD, and showed positive associations between PPD and violence (Cooke, Michie, Hart, & Clark, 2005a; Hare, Clark, Grann, & Thornton, 2000), inferences concerning its cross-cultural validity can at best be made only across industrialized Western societies. Even between Europe and North America,

differences not attributable to raters have been found, particularly with the interpersonal features of the disorder (Cooke et al., 2005a; Cooke, 1996; Mokros et al., 2011). Moreover, a recent meta-analysis indicated stronger associations between PPD and violence in Canadian and European samples than in American samples (Leistico et al., 2008). Indeed, studies have found differential predictive associations with violence for the different ethnic groups even on an intra-national level (Asscher et al., 2014; Kosson, Smith, & Newman, 1990; McCoy & Edens, 2006; Walsh & Kosson, 2007). Specifically, in a recent study by Walsh (2012), PPD was found to be more strongly predictive of violence among European American than among African Americans, and it was not at all predictive of violence for Latino Americans.

In the handful of studies that have investigated PPD outside the Western world, cross-cultural variations of the disorder were even more pronounced. Compared to North Americans, symptoms related to deficient emotional experience among East Europeans and Middle Easterners were more discriminatory than were symptoms related to arrogant and deceitful interpersonal style (Shariat et al., 2010; Wilson, Abramowitz, Vasilev, Bozgunov, & Vassileva, 2014). In a Japanese study, differences in the factorial structure of the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) were observed, supporting that the manifestation of psychopathy is shaped, in part, by the social environment (Yokota, 2012).

1.1. Cultural Shaping of PPD

In the following sections, I will discuss the multitude of ways culture can influence and shape the presentation, prevalence, and level of impairments associated with PPD.

1.1.1. Variations in Behavioral Manifestation of Underlying Traits

According to the cultural facilitation model, because different socialization and enculturation experiences are likely to differentially facilitate the expression of certain traits while suppressing others (Cooke, Michie, Hart, & Clark, 2005b; Cross & Markus, 1999),

there would be cross-cultural differences in the way PPD manifested. This is akin to the finding that the people of Asian heritage tend to express depression in somatic terms, rather than psychological symptoms of feeling sad or blue that is more commonly reported by people of European heritage (Kleinman, 1977; Ryder, Ban, & Chentsova-Dutton, 2011). Hare (1998) himself acknowledged that the behavioral manifestation of the disorder is dependent on the societal and cultural context, and he conceded that "it is more difficult to determine how psychopaths express themselves in societies that are highly structured and in which there are strong traditions to conform to group standards" (p. 105).

Indeed, differences in interpersonal and affective items were noted when comparing Iranian samples to North American samples, and these differences were thought to be due to an Iranian cultural practice known as *taarof* (Shariat et al., 2010). This culture of *taarof* meant that being superfluously agreeable and charming is culturally accepted and even encouraged in Iran (Shariat et al., 2010).

1.1.2. Variations in Prevalence of the PPD Traits

Cultural variations may also exist at the levels of the traits and not just the different manifestation of the traits. Culture may promote and engender certain culturally valued trait to the extent that there may be greater levels of that trait in the population. This can be seen as a variant of the cultural facilitation model, except instead of culture influencing the expressions of the traits, here, culture directly influences the levels of the traits through culturally-shaped feedback loops (Ryder, Dere, Sun, & Chentsova-Dutton, 2014). Importantly, as Ryder argued, the higher levels of the trait may still cause dysfunctions and thus should still be considered pathological, even if having high levels of the traits are considered normal in the particular culture (Ryder, Dere, et al., 2014). In this sense then, the culture itself is a causative factor for the personality disorder. Evidence for this proposition may be deduced from the differences in the rates of crime, especially of violent crimes, across North America, European, and East Asia countries, as well as the differences in the rates of personality disorders, particularly antisocial personality disorder (Cooke, 1996; Harrendorf, Heiskanen, & Malby, 2010).

Another set of evidence that support this idea of cultural variations in prevalence of different personality traits comes from the a series of global studies on the five-factor model (FFM; McCrae & Costa, 1997). These studies support the idea that countries do have meaningful and characteristic personality profiles, and the European and North American aggregate personality profiles were distinct from those of Asian and African nations (Allik & McCrae, 2004; McCrae, 2002; Schmitt, Allik, McCrae, & Benet-Martinez, 2007). Specifically, European and North American cultures were higher in extraversion and openness to experience, and lower in agreeableness than Asian and African cultures (Allik & McCrae, 2004; Schmitt et al., 2007). The two Western cultures also had greater variabilities, which reflect a greater heterogeneity within their populations, than the Asian and African cultures (McCrae, 2002; Schmitt et al., 2007). The latter two had smaller variability in general, including smaller gender differences (Costa, Terracciano, & McCrae, 2001; McCrae, 2002). Taken together, these studies suggest cultures that have similar heritage or history shared more similar personality profiles than cultures that are less similar (Allik & McCrae, 2004; Schmitt et al., 2007) and support the notion that cultures can, and do, have an impact on the prevalence of certain personality traits.

Consider this information in light of the literature linking the FFM to PPD. Lynam and colleagues (e.g., Derefinko & Lynam, 2007; Lynam & Miller, 2014; Lynam, 2002; Miller, Lynam, Widiger, & Leukefeld, 2001; Miller & Lynam, 2012) have studied PPD from a FFM perspective. According to them, PPD can be conceptualized as a constellation of low agreeableness across all six facets; low conscientiousness across dutifulness, self-discipline, and deliberation; low neuroticism across self-consciousness, anxiety, depression, and vulnerability, but high across impulsiveness and angry hostility; high extraversion across excitement seeking and assertiveness, but low in warmth; and finally high in openness to actions but low in openness to feelings (Lynam, 2002; Miller et al., 2001). Given the above findings that Asian and African cultures generally had higher levels of agreeableness and lower levels of extraversion and openness to experience, one should expect lower levels of PPD in Asian and African cultures.

1.1.3. Variations in Impairments Associated with PPD Traits

In contrast, cultural variations may exist at the level of impairment associated with the traits, the differences in the level of traits notwithstanding. Culture shapes personal and social reactions to extreme traits that may or may not lead to dysfunction, and therefore have an impact on whether the personality style would be considered disordered (Ryder, Dere, et al., 2014). As such, some traits may be more normative within certain cultures and may not become problematic until they become more extreme (Ryder, Dere, et al., 2014). For instance, in Iran, being superficial and charming is not pathological and there are no impairments associated with those traits because of *taarof* whereas it was hypothesized that being superficial and charming in North American may cause some problems for the individual (Shariat et al., 2010). In addition, previous studies have found PPD not to be associated with violence and criminality in the same way in certain sub-groups (Skeem, Edens, Camp, & Colwell, 2004; Walsh, Swogger, & Kosson, 2004; Walsh, 2012).

Seeing as individualistic societies generally tolerate, and even facilitate, low to moderate levels of PPD traits (Cooke, 1996)—unlike collectivistic societies that may actually act to suppress them—I postulate that PPD will be associated with greater dysfunction at lower levels of the traits in collectivistic societies. Some evidence for this come from a study by Caldwell-Harris and Ayçiçegi (2006) that found idiocentric personality styles were associated with poorer psychological and social outcomes, including greater engagement in antisocial and criminal behaviors, among the Turkish students, but not among the American students. Instead, idiocentric personality styles were associated with better psychological adjustment among the American students and, surprisingly, not with antisocial or borderline personality. These variations in societal reactions to the traits might explain the very high discrimination parameters of lack of empathy and lack of remorse in the Iranian sample (Shariat et al., 2010), which may indicate impairments are likely present even at lower levels of these two items. As the authors pointed out, Iran is a collectivistic society which likely values interpersonal relationships and thus may be more sensitive to even the slightest deviations in terms of “selfish” emotions like lack of empathy and lack of remorse (Shariat et al., 2010).

1.1.4. Variations in Basic Psychological and Neurobiological Processes

A fundamental assumption that underpins the study of personality disorder is that the basic psychological processes, such as cognitive structure, emotions, motivations, and personality, are universal (Norenzayan & Heine, 2005). However, recent studies have shown this to be untrue: the way people think, feel, and experience themselves and the world around them differ in very fundamental ways as a function of their culture (Nisbett, Peng, Choi, & Norenzayan, 2001; Rule, Freeman, & Ambady, 2013). Even the FFM, which has been proposed as a framework for studying PPD (Lynam & Widiger, 2007), has been shown not to be universal. This has led to the development of newer models of personalities like the HEXACO (Ashton & Lee, 2007) as well as other cultural-specific models like the Chinese Personality, which has a slightly different factor structure, a stronger focus on interpersonal relations, and a different underlying conceptualization of the self (F.M. Cheung et al., 1996; F.M. Cheung, Cheung, & Jianxin, 2004). In fact, cross-cultural studies have shown personality traits, compared to social identities, are less central to people from collectivistic cultures (Sul, Choi, & Kang, 2012).

The emerging area of cultural neuroscience has shown these cultural differences to be evident in the brain itself. Culture interacts with the genes and the environment to assert different behavior and adaptive traits and shapes the brain structure and function in different ways (Chiao, Cheon, Pornpattananangkul, Mrazek, & Blizinsky, 2013). What this means is the research on the neurobiology and etiology of PPD that has been done almost exclusively with White males may not translate across cultures. Specifically, individualism-collectivism, power distance, and strength of identification with one's racial group have been found to modulate the neural bases of social and emotional behaviors, including amygdala response to emotional faces, empathy, pain perception and experiences, moral decision making—processes that are fundamental to our understanding of PPD (Chiao et al., 2008, 2013; Harenski, Harenski, & Kiehl, 2014). Indeed, laboratory findings of diminished punishment learning and deficient response modulation found in Caucasian psychopathic inmates have not been replicated with African American males inmates (Kosson et al., 1990; Lorenz & Newman, 2002).

1.2. Conceptual and Methodological Issues in Cross-Cultural Research

1.2.1. Measuring Culture

Given the clinical and legal interests in PPD around the world (Felthous & Saß, 2007), there are potentially grave implications associated with the use and misuse of PPD assessment instruments and the misdiagnosis of the disorder. The need for a more nuanced and sophisticated understanding of culture and PPD cannot be understated. Unfortunately, there are various methodological considerations in cross-cultural research that can make it extremely cumbersome and unfulfilling. Good cross-cultural studies are arduous and resource-intensive. Not only is the definition of PPD controversial (see Skeem & Cooke, 2010a, 2010b and Hare & Neumann, 2010), the conceptualization of culture itself is also polemical (Fischer, 2009; Kuper, 1999; Rohner, 1984); there is no one accepted definition of culture in psychology, anthropology, or sociology today. Broadly, culture has been understood as a set of shared beliefs, norms, values, customs, and behaviors unique to a particular group and is learned through socialization processes (Fischer, 2009). However, even with this definition, it is still difficult to actually operationalize and measure culture. Previous studies on cross-cultural PPD have largely used nationality (e.g., Cooke, Hart, & Michie, 2004; Cooke et al., 2005a; Cooke, 1995; Hare et al., 2000; Mokros et al., 2011; Neumann, Schmitt, Carter, Embley, & Hare, 2012; Shariat et al., 2010; Wilson et al., 2014; Yokota, 2012) or ethnicity (e.g., Olver, Neumann, Wong, & Hare, 2013; Skeem, Edens, Camp, & Colwell, 2004; Skeem, Edens, Sanford, & Colwell, 2003; Walsh, 2012) to index culture. Although valid, these approaches of using country as culture and ethnicity as culture have been criticized by cross-cultural/cultural scholars as being overly simplistic (Chirkov, Lynch, & Niwa, 2005; D. Cohen, 2013; Kitayama, 2002; Matsumoto & Yoo, 2006; Ryder et al., 2011).

There are also a few methodologically issues. For studies using country as culture, it is unclear how this grouping variable is defined: does it refer to the country of birth, residence, or citizenship? One study showed the associations between culture and the variables of interest were significantly different depending on whether culture was defined

as country of birth, country of residence, or national citizenship (Crotts & Litvin, 2003). Although for the majority of participants their country of birth, country of residence, and national citizenship will the same, there is a growing substantial minority for whom these are different. In fact, according to a recent census, 21% of the Canadian population and 13% of the United States population is foreign-born (Statistics Canada, 2013). Likewise, for those studies that looked at PPD across the different ethnic groups, they did not specify if ethnicity was coded based on self-identification, ancestral heritage, or official documents. There were also no explanations for how participants with mixed ethnicities were coded. More importantly, these approaches take culture as static and assume a high level of cultural homogeneity within the group, which is untenable especially in today's highly globalized world where national and ethnic boundaries are becoming increasingly permeable and fluid (Chirkov et al., 2005; Kirmayer, 2006; Oyserman, Coon, & Kemmelmeier, 2002; Poortinga & van Hemert, 2001). It ignores the heterogeneity that might exist within national and ethnic groups that is due to important differences in regional affiliation, level of ethnic/cultural identification, and levels of acculturation (Chirkov et al., 2005; Matsumoto & Yoo, 2006).

More importantly, using such simplistic proxy indicators does not actually explain the between group differences in any meaningful or empirically justifiable way (Kao, Hsu, & Clark, 2004; Kitayama, 2002; Ryder et al., 2011). Despite that cultural contextualization is by definition necessary to understand PDs (Alarcon, 1996), many of these studies only minimally examined the context of the different cultural groups they studied, if at all. As systematic exploration of the cultural contexts was never part of the study design, explanations for observed differences can only be post-hoc, conjectural, and untested.

1.2.2. Unpacking Culture: Individualism-Collectivism

Instead, cross-cultural researchers recommend directly assessing the cultural differences that underlie these more arbitrary categories of race, nationality, or ethnicity (Betancourt & López, 1993; Matsumoto & Yoo, 2006; Poortinga & van de Vijver, 1987; Soares, Farhangmehr, & Shoham, 2007; Triandis, 1993). Such designs are known as "unpacking" studies where culture as an unspecified (or poorly specified) variable is

clarified and “unpacked” by examining and explicitly testing the cultural dimension that is thought to cause the observed difference (Fischer, 2009; Matsumoto & Yoo, 2006; Poortinga & van de Vijver, 1987). The trade-off with using such broad multi-faceted construct is that measurement of cultural dimension with fidelity becomes difficult (Oyserman et al., 2002; Singelis, Triandis, Bhawuk, & Gelfand, 1995); it will be less reliable than measurements of nationality or ethnicity. Nevertheless, as Cronbach (1990) argued, it is better to obtain rough information about all the important aspects of the broad construct than in precisely measuring only narrow elements of it in such situations.

One fundamental and widely studied dimension that accounts for major cultural differences between the East and the West is Individualism-Collectivism (IND-COL; Hofstede, 1980; Oyserman, Coon, & Kemmelmeier, 2002; Triandis, 2000). IND-COL refers to the way individual and societies are organized vis-à-vis one another and whether the individual or the group is seen as the basic unit of reference. Individualism (IND) can be broadly understood as a cluster of values, beliefs, and attitudes that is organized around the individual and emphasizes independence, personal uniqueness, individual goals, and freedom of choice. Collectivism (COL), on the other hand, emphasizes on the group, with the group’s goals and well-being being superordinate to the individual’s (Oyserman & Lee, 2008). Cross- and multinational studies have generally found Asian and Eastern European countries to be more collectivistic, whereas North American and Western European countries tended to be more individualistic (Hofstede, 1980, 2001; Oyserman et al., 2002; Triandis, 1993). IND-COL has important implications for personality, self-concept, well-being, cognitive and attribution style, emotional experience, and relationality; it directly influences the way we think, behave, and relate to others (for a review, see Oyserman et al., 2002; Triandis & Suh, 2002).

Following this logic, it is not difficult to see how IND-COL can impact PPD. IND elevates the individual, values hedonism and stimulating experiences, and rewards independence and competitiveness—behaviors that, in their extreme forms, appear to mirror PPD. Indeed, it had been postulated that IND may not only be associated with greater prevalence of PPD but is also a cause (Cooke & Michie, 1999; Cooke, 1996; Hare, 1993; Lykken, 1995; Paris, 1998). Conversely, COL, which places greater emphasis on

the relatedness between people, may lead to the suppression of certain PPD-related traits and behaviors, hence lowering severity and prevalence of the disorder as a whole. Members of collectivistic societies are also known to be more concerned with conforming to social norms, even ones that have no moral obligations (Kemmelmeier et al., 2003; Saucier et al., 2014). Alternatively, COL may promote alternative expressions of the underlying traits in ways that are not be intuitively recognized to be related to PPD, thereby leading to the underdiagnosis and the underestimation of the disorder in collectivistic societies (Ryder, Sun, Dere, & Fung, 2014). For instance, although dominance is a major component of PPD, the strategies that would be effective in gaining power and control may be very different in an individualistic society compared to a more collectivistic one. An example of this is how aggression is used and displayed in individualistic versus collectivistic societies. Whereas within individualistic societies, some levels of aggression may be accepted as means for asserting oneself, establishing dominance, and even gaining respect; overt displays of aggression, even in mild forms, in collectivistic cultures are usually seen as disruptive and are more strongly shunned (Bond, 2004; Mesquita & Walker, 2003; Triandis, 2000). However, that is not to say there is no or even less aggression in collectivistic cultures. Instead, individuals in collectivistic societies may express aggression and exert coercive control in more subtle and indirect ways, such as through relational aggression (Bergeron & Schneider, 2005; Li, Wang, Wang, & Shi, 2010). In fact, this may be a more effective method and may cause more harm given the higher value placed on relationships with others in collectivistic societies. Alternatively, they may also attempt to gain dominance and display aggression in a manner that is more socially acceptable, such as directing it towards out-group members. Previous studies have shown association between social dominance orientation (SDO), which is an individual's preference for group dominance and power hierarchy (Pratto, Sidanius, Stallworth, & Malle, 1994), and PPD (Glenn, Iyer, Graham, Koleva, & Haidt, 2009; Hodson, Hogg, & MacInnis, 2009; Yokota, 2012). For collectivists, there are clear distinctions between in-group and out-group, and although conformity and loyalty is expected towards the in-group (Triandis, Bontempo, Villareal, Asai, & Lucca, 1988; Triandis, 1995), they may show a lack of caring, derogation, and strong prejudice towards out-group members (Brown et al., 1992; Pratto et al., 2000).

1.2.3. Culture as a Multi-Level Construct

The appropriate level of analysis of culture continues to be a matter of much debate among cross-cultural researchers (Fischer, 2009; Ralston et al., 2013). Culture is a complex multi-faceted but also multi-levelled construct that, like an onion, has many different layers to it. IND-COL can be studied as a cultural syndrome at the country level (Hofstede, 2001), a cultural attitude or orientation at the individual level (Hui & Triandis, 1986), or a social norm at the perceived cultural context level (Fischer, 2009). Studying IND-COL as a country-level cultural syndrome is the approach most commonly used in cross-cultural psychopathology research. However, as with the cross-national research, this approach has been greatly criticized primarily because it ignores any within-group variability (Chirkov et al., 2005; Oyserman et al., 2002). As an alternative approach, researchers have used attitudinal scales to measure individual's IND-COL, which is a convenient approach for the direct assessment of culture at the individual level. However, this approach conflates culture with personality and is less useful in the study of cultural processes and dynamics (Chirkov et al., 2005; Fiske, 2002). The final approach to study culture as a set of social norms sidesteps these issues to study the expressions of shared meaning (Fischer, 2009). Cultural norms are implicit guidelines transmitted through socialization and enculturalization processes to guide behaviors, thinking, and feelings within certain defined contexts, relationships, and events (Matsumoto & Hwang, 2011). Studying individuals' perceptions of shared norms allows an unpacking of the sociocultural processes that might influence and shape behaviors vis-à-vis individual personality factors (Chirkov et al., 2005).

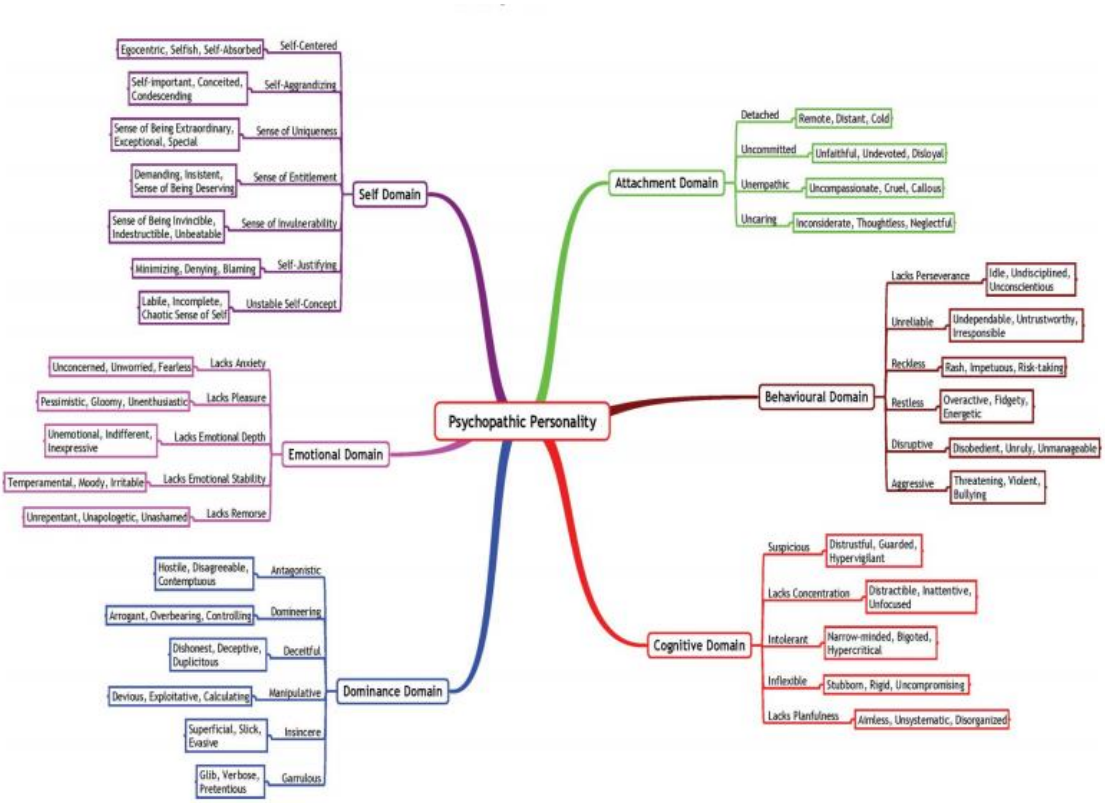
1.2.4. Measuring PPD Across Cultures

Studies attempting to establish the cross-cultural validity of PPD have typically used the Psychopathy Checklist-Revised (PCL-R; Hare, 1991) (Cooke et al., 2005a; Cooke, 1995; Hare et al., 2000; Mokros et al., 2011; Neumann et al., 2012; Olver et al., 2013; Shariat et al., 2010; Wilson et al., 2014). The PCL-R contains 20 items thought to reflect features of PPD. It was initially developed for use with North American Caucasian male offenders but is now the one of the most commonly used instruments worldwide in

the assessment of PPD (Hare et al., 2000; Singh et al., 2014). The problem, I argue, with using the PCL-R in cross-cultural research on PPD is that the PCL-R is a specific and a fairly narrow operationalization of PPD; the PCL-R is unlikely, in my opinion, to be able to capture fully the alternate presentations of PPD in non-Western groups. In addition, the PCL-R immediately assumes an association between PPD and criminality and includes items that are defined primarily by criminal conduct, even though this association between PPD and criminality has not been shown to be robust in certain sub-groups (e.g., Asscher et al., 2013; Cale & Lilienfeld, 2002; Kosson et al., 1990; Walsh & Kosson, 2007). Various scholars have also called for more studies to investigate the disorder with alternative measures, concerned that the field's overreliance on the PCL-R has led to the conflation of the construct of PPD with PCL-R as a measure of PPD (Hart & Cook, 2012; Skeem & Cooke, 2010a, 2010b).

In response, a variety of alternative models and measures of PPD have been proposed in the recent years (e.g., Lilienfeld & Andrews, 1996; Patrick, Fowles, & Krueger, 2009), one of which is the Comprehensive Assessment of Psychopathic Personality (CAPP) by Cooke and colleagues (Cooke, Hart, Logan, & Michie, 2004, 2012; see also www.gcu.ac.uk/capp2). The CAPP is a comprehensive broad-based lexical model of the PPD that was developed based on thorough reviews of the theoretical, empirical, and clinical literature and on interviews with subject matter experts of diverse theoretical orientations. It consists of 33 symptoms grouped into the six broad domains of *Attachment, Behavior, Cognition, Dominance, Emotion*, and *Self* (see Figure 1.1). Each symptom is elaborated by three trait-descriptive adjectives or adjectival phrases to help triangulate its meaning. Currently, the CAPP has been translated into more than 18 languages and although research with the CAPP is still in its infancy, preliminary findings about its content validity across gender and culture have been encouraging (e.g., Heinzen, Fittkau, Kreis, & Huchzermeier, 2011; Hoff, Rypdal, Mykletun, & Cooke, 2012; Kreis, Cooke, Michie, Hoff, & Logan, 2012; Kreis & Cooke, 2011).

Figure 1.1. The Comprehensive Assessment of Psychopathic Personality (CAPP)



There are two reasons why I believe the CAPP will be more suitable for assessing different phenotypic manifestations of PPD across diverse cultural groups. First, it does not presuppose criminal behaviors and instead focuses on personality traits. Although closely linked, behaviors do not have a one-to-one association with personality traits and are more context-dependent. Even the types of behaviors that are thought characteristic of the different personality traits vary according to the individual's age, gender, culture, and other societal and environmental factors (Cooke et al., 2012). Second, the developers were intentionally over-inclusive during the development of the CAPP and retained putative items that may be considered "less central" to PPD to avoid potential problems with construct underrepresentation. Although it is still possible that the CAPP missed symptoms that are relevant to PPD in other cultures (i.e., emic or culture-specific) since

the episteme it was based on was heavily North American or European, the broad and over-inclusive nature of the model militate against this.

1.3. Assessing Cross-Cultural Equivalence of PPD

Although not isomorphic, there exists certain structural and analytical parallels between examining the cross-cultural generalizability of psychiatric classifications and the cross-cultural measurement equivalence of psychological tests (Blashfield & Livesley, 1991). Foremost, the relationship between items to test or scale can be thought of, to an extent, as being structurally akin to the relationship between symptoms to disorder. Secondly, both tests and diagnostic classifications are evaluated using similar concepts of reliability and validity and statistical methodologies (Blashfield & Livesley, 1991). Thus, to an extent, the cross-cultural generalizability of the disorder m be evaluated by examining the cross-cultural measurement equivalence of a corresponding measure.

The assessment of cross-cultural generalizability of the disorder and the measurement equivalence of test is concerned with three primary questions: The first is, is the disorder conceptually the same across the two cultures? In other words, does the disorder have the same meaning, and is it defined by the same cluster of symptoms across cultures (van de Vijver & Leung, 1997)? In terms of measurement, this question is concerned if the measurement model has the same number of factors and pattern of factor loadings across groups. Invariance at this level is known as configural equivalence. The second question is whether the symptoms relate to the disorder the same way across cultures; that is, are they equally important to or diagnostic of the disorder across cultures? In terms of measurement, this question is concerned with whether the items share the same unit of measurement across groups. Invariance at this level is known as metric invariance. A lack of invariance at this level may mean some symptoms are more important to the disorder for one group than the other. Thirdly, in the examination of measurement equivalence, it is important to ensure scalar or strong factorial invariance to allow for comparison of latent means (Meredith, 1993). Scalar invariance is concerned with not only the scale having the same unit of measurement but also having the same

origin. Until metric and scalar equivalence are demonstrated, there can be no meaningful comparison of tests across the different cultural groups—the observed difference in test scores between the two groups could be due to a true group difference in the level of the trait, or it could be due to measurement bias and different responding styles (Little, 1997)[1]. There is a fourth level of invariance, known as strict invariance, which is concerned with the precision of the measurement being the same across groups. However, this form of residual or uniqueness invariance is difficult to achieve and not necessary for establishing cross-group comparability in terms of factor structure or latent means (Byrne & Stewart, 2006). These various degrees of measurement invariance are typically examined using either multi-group confirmatory factor analysis (MG-CFA), in which different constraints are imposed onto a series of nested models and the goodness-of-fit of the more restricted models are evaluated against a less constrained baseline (Vandenberg & Lance, 2000).

1.3.1. Differential Item Functioning (DIF) and Differential Test Functioning (DTF)

When items function differently for different groups either at the metric or scalar levels, it can be said that the item is non-invariant and differential item functioning (DIF) has occurred. DIF has traditionally been studied using item response theory (IRT) models. Briefly, IRT models specify the nonlinear relationship between an individual response on an item or test score and the underlying latent trait (θ) that is postulated to underpin item or test scores. The probabilities of achieving a particular score on an item or test given a person's latent trait levels is specified by the S-shaped item response functions, also known as item characteristic curve (ICC) and test characteristic curve (TCC), respectively. DIF and DTF is said to occur when the item or test response functions are not invariant across groups.

[1] These various levels of invariance can be thought to be somewhat akin to the comparison between Celsius, Fahrenheit, and Kelvin. All three are measures of temperature, but it would be senseless to compare their raw numerical values directly. Celsius and Fahrenheit have completely different scale (Δ1ºC = Δ1.8ºF) and origin (0ºC = 32ºF). Even though Celsius and Kelvin have the same scale (Δ1ºC = Δ1K), they are still not directly comparable due to their different origins (0ºC = 273.15K).

DIF is essentially the between-group difference in the probability of an item response when the level of latent trait is the same (Mellenberg, 1994). DIF can exist as a difference in how discriminating or how extreme the items are across groups. Difference in item discrimination, also known as non-uniform DIF, refers to the difference in the ability of the item to differentiate between individuals with different levels of the latent trait. The higher the discrimination parameter, the more sensitive and the better distinguishing the item is of individuals with different levels of the latent trait. In a sense, non-uniform DIF suggest the item is more closely related to the latent construct in one group than the other (Cooke, Kosson, & Michie, 2001). On the other hand, differences in item difficulty (attractiveness), or uniform DIF, is said to exist when the thresholds for the item scores are different across the groups. This is when individuals from different groups score differently on particular items despite having the same latent trait standing. This may be due to different responding styles, suppression or facilitation effects of different social norms, or different groups having different reference points when responding to the item (F.F. Chen, 2008). Consequently, differences in item difficulty means the symptom becomes apparent at different levels of the latent trait for each group. Accordingly then, items with uniform DIF may be meaningful only in one group and not the other at lower levels of the latent trait. Of the two, non-uniform DIF poses a more serious threat to the cross-cultural generalizability of the model because non-uniform DIF signifies differences in the way the item relates to the underlying construct in terms of its theoretical conceptualization, suggesting that the item could be culturally specific (Cooke et al., 2001; Hulin, 1987).

When the expected true score at the scale level is different across the groups, it is known as differential test functioning (DTF; Zumbo, 2003). Bias at the item level does not automatically result in bias at the test or scale level. Differences at the item level may cancel each other out when the scores are summed at the scale level. Nevertheless, identifying items that are non-invariant and understanding how they function differently across cultural groups can provide unique insights into how culture and socialization processes can alter the meaning of the disorder, differentially shape the expression of the disorder, and promote or suppress the levels of the traits present in different cultural groups.

Within the field PPD research, Cooke, Michie, Hart, and Clark (2005a) used IRT analysis to compare the PCL-R scores of 1,316 adult male offenders from the UK to those of 2,067 adult male offenders and forensic psychiatric patients from North America. They found a PCL-R score of 30 in North America was closer to a PCL-R score of 28 in the UK in terms of the actual severity of PPD, with the affective symptoms of the disorder being the most invariant across the two cultures. Interpersonal and behavioral aspects, on the other hand, were most vulnerable to the pathoplastic effects of cultures.

1.3.2. Mean and Covariance Structure (MACS) Analysis

An alternative approach to evaluating measurement equivalence and detecting DIF is mean and covariance structure analysis (MACS; Sörbom, 1974). Unlike IRT which is based on nonlinear models, MACS analysis belongs to a class of methodology known as structural equation modeling (SEM). It can be thought of as an extension to the standard MG-CFA (Little, 1997). Accordingly, MACS posits a linear relationship between the latent trait and the observed response according to the equation

$$x = \tau + \Lambda_x \xi + \delta$$

where x is a vector of *m* X 1 observed variables; τ is the intercept; ξ is the latent factor; Λ_x is an *m* X 1 factor loading matrix; and δ is a *m* X 1 vector of residuals or measurement errors. Traditional CFA model assumes τ to be zero and does not estimate it. Whereas CFA tests for measurement equivalence based on analysis of the covariance structure, MACS analysis considers both the covariance and the mean structures (González-Romá & Hernández, 2006; Little, 1997). The inclusion of mean structure allows for (a) simultaneous validation of the hypothesized factorial structure in each group; (b) testing of cross-group equivalence of the reliable measurement parameters, correcting for measurement error variance; (c) detecting between-group differences in latent construct's mean, variance, and covariance; and (d) testing hypotheses about culture differences on the constructs (J. Lee, Little, & Preacher, 2011; Little, 1997).

The links between IRT and MACS have been well articulated elsewhere and will not be reviewed in detail here (e.g., Chan, 2000; Elosua & Wells, 2013; Raju, Laffitte, &

Byrne, 2002; Reise, Widaman, & Pugh, 1993; Stark, Chernyshenko, & Drasgow, 2006). Briefly, the MACS model has similar structure as the two-parameter IRT model (Mellenberg, 1994). Differences in intercept parameters in MACS DIF analysis correspond to differences in item difficulty/attractiveness levels in IRT. Interpreted within the MACS framework, the higher the intercept, the more attractive or less difficult the item is in the sense there is stronger endorsement of the item on average[2]. The loading parameters correspond to the discrimination parameters; items with higher loading differentiate between individuals with different levels of the trait better.

To quantify the effect of item-level DIF, Nye and Drasgow (2011) developed an effect size index defined as

$$d_{MACS} = \frac{1}{SD_{iP}} \sqrt{\int \left(\hat{X}_{iR} - \hat{X}_{iF} \,|\xi\right)^2 \, f_F(\xi) d\xi}$$

where SD_{iP} is the pooled standard deviation of item *i,* $\hat{X}_{iR}$ is the reference group's mean predicted response, $\hat{X}_{iF}$ is the focal group's mean predicted response, and $f_F(\xi)$ is the ability density of the latent factor in the focal group. Consequently, the DTF can be quantified as

$$d_{DTF} = \frac{1}{SD_{SP}} \left[\sum_{1}^{n} \int \left(\hat{X}_{iR} - \hat{X}_{iF} \,|\xi\right) f_F(\xi) d\xi \right]$$

in which item-level differences are summed across all *n* items and allowed to cancel out each other (i.e., not squared) and then divided by the pooled standard deviation of the scale, SD_{SP}. Because these indices use the pooled standard deviation, they are comparable to Cohen's (1988) *d*.

[2] In IRT, the higher the *b*- (threshold) parameters, the more difficult/less attractive the item, and the more extreme one needs to be on the trait to receive a score on the item. This would be tantamount to having lower intercepts within the MACS context. In MACS analysis, the higher intercepts indicate the relative ease to score on the items even at low levels of the trait. For more a complete explication about the relationship between the MACS factor loadings and intercept parameters and the IRT *a*- and *b*- parameters, see Lord and Novick (1968) and McDonald (1999).

There are a few advantages to the MACS analysis that makes it particularly attractive for evaluating measurement invariance and detecting DIF in this case. Foremost, IRT typically require sample sizes of over 500 per group, although sample sizes of over 1,000 per group are more typical, to obtain accurate parameter estimates, especially for polytomous cases (Reise et al., 1993). MACS analysis, on the other hand, has been shown in previous stimulation studies to have acceptable power and Type I error rates for detecting medium-sized uniform and non-uniform DIF with sample sizes as low as 200 using free-baseline strategies (González-Romá & Hernández, 2006; Hernández & González-Romá, 2003; J. Lee et al., 2011; Stark et al., 2006). In fact, González-romá and Hernández's study (2006) showed that MACS analysis continued to demonstrate acceptable power and Type I error rates even when the sample size was reduced to 100 per group. DIF detection with IRT is also more complicated in that one must decide on an appropriate model that would adequately describe the way people response to the items (Stark et al., 2006). A variety of item response models with different mathematical functions have been developed, and their fit has to be each examined empirically before DIF analysis can be performed. Additionally, while IRT methods are confined to testing DIF in unidimensional scales, MACS can be used to test DIF across multiple latent constructs, including second-order factor models (Byrne & Stewart, 2006), and across multiple groups simultaneously. It is not possible to assess the measurement equivalence of the association between different latent factors using IRT. Another disadvantage of the IRT method is that it only has likelihood ratio chi-square test, which is extremely sensitive to sample size, as a measure of model fit. In contrast, MACS analysis has the plethora of fit indices that corrects for large sample sizes to help evaluate model fit (Chan, 2000). Further, in addition to detecting DIF, the MACS model can simultaneously present latent trait parameter values and test the between-group differences (Chan, 2000). Unless specifically interested in examining between-group differences in tendency to endorse specific options, MACS analysis is the recommended approach for polytomous data when the sample size is smaller than 1,000 (J. Lee et al., 2011; Stark et al., 2006).

1.4. The Current Study

The overarching aim of this study was to evaluate the generalizability of PPD, as measured by the self-ratings on the CAPP, across individualistic and collectivistic cultures in an undergraduate sample. To do so, the measurement invariance of the CAPP and identified items that had DIF, across attitudinal and normative median split IND and COL groups using MACS analysis were assessed. The subsidiary aim of this study was to unpack the role of culture, specifically IND-COL, on the expression of PPD. If PPD is indeed an extreme manifestation of an individual's IND orientation, then IND attitude scores would be expected to correlate with CAPP self-ratings. In addition, if the expression of the disorder is affected by socialization and enculturation processes as theorized, then the association between individual's IND-COL attitudes and CAPP would be expected to be a function of the broader cultural syndrome and social norms.

Psychopathic traits are thought to exist on a continuum (Hart & Cook, 2012) and thus meaningful to study in a non-forensic population. Studying psychopathic traits in community samples can contribute to the understanding of PPD by extricating the core personality features of the disorder from the confounding correlates of criminality (Belmore & Quinsey, 1994). It also sidesteps the problem having the strong selection biases within the criminal justice systems enhance or mask ethnic differences (Skeem et al., 2004). Additionally, undergraduate samples have the added advantage of being relatively free from comorbid disorders. They are also generally better respondents on self-report measures given their higher level of literacy.

Based on previous findings comparing North Americans, Western Europeans (Cooke et al., 2005a), Eastern Europeans (Wilson et al., 2014), and Middle Easterners (Shariat et al., 2010), I expected differences in item functioning in the interpersonal and behavioral domains. In contrast, I expected items in the affective domains to be most invariant, and therefore the most diagnostic of the disorder pan-culturally.

For the second research question examining the role of culture on the expression of PPD, I expected attitudinal IND-COL to be correlated with the CAPP such that those

who endorsed a stronger individualistic orientation would score higher in terms of their CAPP self-ratings. Secondly, I expected this association between attitudinal IND-COL and CAPP self-ratings to be moderated by syndromal and normative levels IND-COL.

Chapter 2. Method

2.1. Participants

Participants were 775 (32% male) Simon Fraser University undergraduate students recruited in exchange for course credits. The data of one participant was excluded in the final analysis due to excessive missing data. Thus, the final sample consisted of 774 (32% male) undergraduate students between the ages of 17 and 38 (*M* = 19.5, *SD* = 2.36). In terms of their ethnicity, 41% identified as East Asian, 30% as White Caucasian/European, 16% as South Asian, 7% as South East Asian, 1% as Aboriginal/First Nation, and 5% as Others.

A substantial minority reported being foreign born (*n* = 276; 36%), and the age at which they arrived in Canada ranged between 2 months to 21 years old (*M* = 10.2, *SD* = 6.1). Among the foreign born participants, 60% reported being born in East Asia (e.g., China, Hong Kong, Korea, Taiwan, etc.), 12% in either North America or Europe (e.g., United States, United Kingdom, Sweden, etc.), 11% South East Asia (e.g., The Philippines, Malaysia, Thailand, Singapore, etc.), and 9% South Asia (e.g., India, Pakistan, etc.); a total of 35 countries were listed as country of birth. The percentage of foreign born participants in the three major ethnic groups were as follows: 52% of East Asians, 31% of South Asians/South East Asians, and 15% of White Caucasians/Europeans reported they were born outside of Canada.

2.2. Procedure

Participants registered for the study through the Research Participation System (RPS). They were then provided a link and a unique password to the online survey that could be access from any internet-connected computer and participants completed the survey at their leisure. The Remark Web Survey Software 5.0 was used for the online survey, which was hosted on a secure web server. Prior to starting the questionnaire, participants were provided information about the nature of the study as well as the

researcher's contact information should they have any questions regarding the study before participating. Participants had to select the checkbox indicating they read and consent to the study before they could proceed. Participants who declined to consent were automatically exited from the survey. The data collected from participants is securely stored on Simon Fraser University computing server. Ethics approval was received from Simon Fraser University's Office of Research Ethics.

2.3. Materials

2.3.1. Demographic Variables

Participants were asked to report their gender, age, ethnicity, country of residence, country of origin/country of birth, age arrived in Canada, education level, and familial income. No other identifying information was collected.

2.3.2. Psychopathic Traits Measure

Comprehensive Assessment of Psychopathic Personality (CAPP). The CAPP (Cooke et al., 2004, 2012) is a new personality-based model developed using a lexical approach to capture the full range of PPD symptoms. It consists of 33 symptoms, each elaborated by three adjectives or adjectival phrases. The 33 symptoms are rationally organized into six domains: *Attachment*, *Behavior*, *Cognition*, *Dominance*, *Emotion*, and *Self*. In this study, participants rated on a 4-point scale (0 = *not at all like me*, 3 = *very like me*) how characteristic each item is of them. These ratings were ratings of personality traits rather than symptom endorsements as there was no assessment of the functional impairments associated with the items. The self-ratings on the 33 items were summed to derive a total score, which could range from 0 to 198, with higher scores indicating greater levels of psychopathy. The CAPP total score demonstrated excellent internal consistency (α = .90) in the current sample.

2.3.3. Cultural Measures

The cultural dimension of IND-COL was measured four ways in this study, using the shortened INDOL scale (Hui & Yee, 1994) to assess at the individual-attitudinal level, the Normative IND-COL scale (Fischer et al., 2009) to assess at the perceived cultural context level, participant's self-identified ethnic group to assess at the ethnicity-syndromal level, and finally, the Hofstede's IDV index based on their country of origin to assess at the country-syndromal level.

Shortened INDCOL Scale (ATT). Hui's (1988) original INDCOL scale and the shortened version (Hui & Yee, 1995) were developed to measure IND-COL attitudes in individuals, with high scores reflecting high COL. The Shortened INDCOL was developed as an improvement over the original scale, both in terms of the length of the scale as well as the psychometric properties. It consists of 36 items rated on a 6-point scale (0 = *strongly disagree*, 5 = *strongly agree*). The scale has been well-validated and used in cross-cultural research of various disciplines including psychology, business, consumer and organizational research (Oyserman et al., 2002). Importantly, studies have shown support for the measurement equivalence of the INDCOL scale across a number of different cultures (Robert, Lee, & Chan, 2006). The Shortened INDCOL scale was used in this study to measure culture on the individual attitudinal level. The Cronbach's alpha for the overall Shortened INDCOL is typically reported to be between high .60s to high .70s (Grimm, Church, Katigbak, & Reyes, 1999; Hui & Yee, 1999; Vogt & Laher, 2009). The internal consistency of the Shortened INDCOL scale was acceptable in the current sample (α = .75).

Normative IND-COL Scale (NORM). Instead of measuring personal preferences or attitudes, the Normative IND-COL Scale measures descriptive group norms (Fischer et al., 2009). It was designed much like a semantic differential scale with 22 opposite pairs of individualistic (e.g., "*Most people act in line with their rights*") and collectivistic (e.g., *"Most people act in line with their group norms and duties*") statements. Participants rated on a 7-point scale which of the two statements was more typical of members of their self-identified ethnic group (1 = *strongly agree with the first statement*, 7

= *strongly agree with the second statement*). Having such statement anchors not only help contextualize the items but also avoids the problem of frequency or typicality statements having different meaning across cultural groups. The scale yields four attribute subscales score of Self (5 items), Structure of Goals (5 items), Rational vs. Relational Concern (6 items), and Norms vs. Attitudes (6 items) and a total score. Higher scores represent higher perceived COL norms, and the theoretical score range from 22 to 154. Only the total scores were used in this study to measure culture on a perceived group normative level. Initial validation with samples from 11 cultures demonstrated good psychometric properties with adequate agreement within cultures and evidence for convergent and divergent validity (Fischer et al., 2009). The Normative IND-COL total score had good internal consistency in the current sample (α = .88).

Hofstede's country IDV index (IDV). Participants' self-reported country of origin were used to calculate their country-level relative's IND-COL based on Hofstede's (2001) IDV (Individualism versus Collectivism) indices. A low IDV score indicates high COL. These indices were derived from Hofstede's IBM study of national cultural differences that took place between 1967 and 1973 with 117,000 individuals in 71 countries with updates and replications done in 2001 and 2010 (Hofstede & Minkov, 2010; Hofstede, 1980, 2001). Because these scores are meant to be interpreted only in comparison with each other and the relative scores have been shown to be quite stable over time, they can be considered up to date (Hofstede & Minkov, 2010). In general, Asian countries were generally found to be more collectivistic and North American and Western European countries more individualistic (Hofstede, 2001).

2.4. Data Analytic Plan

2.4.1. MACS Analysis

All analyses were conducted using STATA 13.1 (StataCorp, 2013). Cross-cultural generalizability of the CAPP across attitudinal and normative IND and COL groups were analyzed using MACS analysis. A previous Monte Carlo stimulation demonstrated free-

baseline MACS analysis with sample size of 250 had power and Type I error rate of .88 and .03, respectively, when the DIF is small (Stark et al., 2006). When the DIF is large, the power and Type I error rate were 1.00 and .06, respectively (Stark et al., 2006). Attitudinal and normative IND and COL groups were formed based on median splits on the attitudinal and normative IND-COL measures. The measurement invariance analysis outlined below was repeated with both attitudinal and normative median-split groups to investigate how different conceptualization and measurement of culture might affect the measurement of cross-cultural PPD.

Because testing for measurement invariance begins with a factor model that can be simultaneously fitted across the IND and COL groups, the first step of the data analysis was to find a structural model that would fit well to each group. In the event that a global one-factor model did not produce a good fit to either of the groups, exploratory factor analysis would be carried out to find alternative factor solutions. A model's fit was evaluated by several absolute and relative fit indices, specifically, the root mean square error of approximation (RMSEA), the non-normed fit index (NNFI), the comparative fit index (CFI), and the chi-squared statistics. The RMSEA should be below 0.08 and the NNFI and CFI should be more than .90 to indicate acceptable fit (Kline, 1998). The chi-square value should be relatively low and statistically non-significant, although chi-square tends to inflated in large sample sizes anyway (Browne & Cudeck, 1993). Generally, given several model alternatives, the most appropriate one is the one consistent with theoretical considerations while providing the best fit to the data, as evidenced by the fit indices. Maximum likelihood (ML) estimation is typically the default method for confirmatory factor analytic models such as these, given its robustness against most normality distribution assumption violations. Previous Monte Carlo studies, however, have shown multivariate skewness and kurtosis to drastically bias parameter estimations (Benson & Fleishman, 1994; Yuan, 2005). Given that the distribution of severe psychopathic traits was unlikely to be normally distributed in an undergraduate sample, there was concern that this might lead to biased statistics and inappropriate inferences. As such, it was decided *a priori* that if the data displayed significant skewness and kurtosis, the asymptotic distribution free (ADF) option in STATA 13.1, which does not make any normality assumptions, would be used instead.

Once an equivalent-form factor structure that could fit each group well separately was identified, measurement invariance was tested following on the MACS testing strategies recommended by Lee, Little, and Preacher (2011). This is a three-stage testing procedure that has been shown to be robust against potential misspecification of baseline models and choosing of biased anchors, even in sample size of 100 (J. Lee et al., 2011). A multi-group configural invariance model, in which all the measurement parameters were freely estimated, was first fitted to the data as a baseline model (M_1). Omnibus metric invariance (M_2) was tested in stage two by constraining the factor loadings to be equal across groups and comparing it with the baseline model. In cases where the metric invariance held, omnibus scalar invariance (M_3) with both the factor loadings and intercepts constrained to be equal across groups were then tested in the third stage. The models were considered to be invariant if, when compared against the baseline model, $\Delta\chi^2$ was non-significant at $\alpha = .05$ and ΔCFI was less than - 0.01 (G.W. Cheung & Rensvold, 2002).

For models where metric invariance was not tenable, free-baseline MACS DIF analysis with Bonferroni-corrected likelihood ratio test was conducted to examine each item separately for non-uniform DIF (J. Lee et al., 2011). To identify and scale the structural equation model, the factor loading and intercept of one of the item is conventionally set to unity across all groups. This item is known as the referent. Valid DIF analysis hinges upon the assumption that the referent item is invariant. However, in practice, this item is often chosen arbitrarily. As Cheung and Rensvold (1999) and others have demonstrated, if this assumption is incorrect, there can be serious ramifications for item-level DIF analysis and may lead to very misleading results: invariant items can be erroneously detected as having DIF, whereas items that did have DIF may be missed (G.W. Cheung & Lau, 2011; E.C. Johnson, Meade, & DuVernet, 2009; Stark et al., 2006). A more empirically validated method for identifying referent item is the factor-ratio test proposed by Cheung and Rensvold (1999). This entails systematically estimating and examining all possible models with each items set as the referent and then comparing it to the baseline model to identify the invariant referent. Although highly labor intensive—a total of $n(n - 1)/2$ models need to be estimated, where n is the number of items in the factor—given lack of *a priori* knowledge about which items would most likely be invariant

across IND-COL groups and the serious ramifications associated with using the wrong items as referents, it was decided that the factor-ratio test was necessary. Once an invariant referent item was identified, non-uniform DIF was determined to be present if $\Delta\chi^2$ was significant at the Bonferroni-corrected α-level for the corresponding test items (J. Lee et al., 2011; Stark et al., 2006). The loading parameters of items showing non-uniform DIF were allowed to be freely estimated in the partial metric invariance model and remained unconstrained through the subsequent analysis. If the model failed to show scalar invariance, items were then examined for uniform DIF. Items were considered to display uniform DIF if the $\Delta\chi^2$ was significant at the Bonferroni-corrected α-level when comparing the respective models with the item's intercept constrained to be equal across groups against the full or partial metric invariance model that was identified in the earlier stage. The effect sizes of item-level DIF and scale-level DTF were calculated using the respective indices developed by Nye and Drasgow (2011) as discussed above. The magnitude of non-equivalence in this study was interpreted according to guidelines suggested by Nye and Drasgrow (2012), wherein the lower bounds for small, medium, and large effects are 0.15, 0.30, and 0.45, respectively. These guidelines were empirically derived based on a stimulation study and a review the extant research on the sizes of DIF encountered in previous measurement non-equivalence studies (Nye & Drasgow, 2012).

2.4.2. Multiple Regression

For the second part of the analysis, multiple regression analyses were conducted to examine how the three levels of IND-COL were related to the CAPP score. The variables were entered into the model in a hierarchical fashion with attitudinal IND-COL entered as the first block, and syndromal and normative IND-COL entered as the second block. Interaction terms were entered in the third block to examine if social norms and broader cultural syndromes interacted with individual's attitudinal IND-COL to affect their expressions of PPD.

Chapter 3. Results

3.1. Data Screening and Preliminary Analyses

Mean imputation was used to handle missing data. Multivariate outliers in the CAPP were screened using an algorithm proposed by Billor, Hadi, Velleman (2000) based on Mahalanobis' distance, and none of the cases were identified as an outlier at $\alpha = .15$. However, examinations of the multivariate skewness and kurtosis in the CAPP self-ratings revealed substantial multivariate non-normality in the data, CAPP: Mardia's skewness coefficient = 128.58, $p < .001$; Mardia's kurtosis coefficient =1419.00, $p < .001$. The distributions of the scores were positively skewed.

Examination of the means, standard deviations, and histograms suggested there was a good range and variability in the ATT and NORM IND-COL scores in this sample. No univariate outliers were identified in the ATT and NORM IND-COL scales. In addition, assumptions of univariate normality were supported in the examinations of skewness, kurtosis and the Shapiro-Wilk tests (ATT: S-W's V = 1.71, $p = .10$; NORM: S-W's V = 1.88, $p = .06$).

3.1.1. Ethnicity and Correlational Analyses of Cultural Measures

For theoretical interests reason and because of the relatively small numbers in some of the ethnic groups, ethnic comparisons were only conducted between East Asians ($n = 316$), South and South East Asians ($n = 179$)[3], and Caucasians ($n = 234$). The means and standard deviations for each of the cultural measure for the three major ethnic groups are reported in Table 3.1.

[3] South Asians and South East Asians were combined to form one group. There were no significant differences in their ATT and NORM IND-COL scores.

Table 3.1. Means and standard deviations of ATT and NORM IND-COL and Hofstede's

Ethnic Group	*n*	ATT		NORM		Hofstede's IDV	
		M	*SD*	*M*	*SD*	*M*	*SD*
East Asians	316	95.99	15.12	86.71	19.35	51.00	29.89
South/South East Asians	179	99.72	15.02	93.80	18.37	67.07	22.48
Caucasians	236	99.58	15.51	72.35	18.02	77.16	11.28

Contrary to expectations, East Asians in this sample had the strongest attitudinal IND orientation: their ATT scores were significantly lower than both South/South East Asians, $t(493) = 2.65$, $p = .008$, $d = .25$; and Caucasians, $t(550) = 2.74$, $p = .007$, $d = .24$. South/South East Asians and Caucasians did not differ significantly on the ATT measure of IND-COL. On the NORM measure, however, East Asians scored higher than the Caucasians, $t(542) = 8.82$, $p < .001$, $d = .76$; but lower than the South/South East Asians, $t(484) = 3.95$, $p < .001$, $d = .37$. This indicates East Asians perceived their own ethnic group as being moderately more collectivistic than the Caucasians, although not as much as the South/South East Asians, which is more in line with what would be expected. The NORM scores for South/South East Asians were also significantly higher than the Caucasians', $t(408) = 11.83$, $p < .001$, $d = 1.18$. As noted above, a larger proportion of East Asians were foreign-born (52%), and they hailed from countries that are considered to be more COL based on Hofstede's IDV index. In comparison, only 15% of Caucasians who were foreign-born, and even then, they tended to hail from countries that are considered to be more similar to Canada in terms of the country-level IND-COL (e.g., United States, United Kingdom, etc.). The proportion of foreign-born participants who identified as being South/South East Asians was in between those of the East Asians and Caucasians (31%).

Correlational analyses were conducted to understand how the different measures of IND-COL related to each other in general. Although there was a significant positive association between ATT and NORM IND-COL ($r = .14$, $p < .001$) and a significant negative correlation between NORM IND-COL and the inversely coded Hofstede's IDV measure ($r = -.13$, $p < .001$), the magnitudes of the associations were small. The

association between ATT IND-COL and Hofstede's IDV was not significant (r = -.02, p = .675), which is consistent with the notion that these cultural measures are hierarchically organized from measuring the more individual and attitudinal aspects of IND-COL to indexing IND-COL on broader and more syndromal levels. When analyzed by the three ethnic groups, a significant difference in the correlation between ATT and NORM IND-COL was found between the East Asians and the Caucasians (r_{EA} = .07, p = .20; r_C = .28, p < .001; Fisher's Z = -2.52, p = .01, q = .22). That is, for East Asians, their perception of the normative IND-COL was not related to their personal IND-COL orientation (r_{EA} = .07, p = .20); whereas for Caucasians, their perception of cultural norms was associated with their personal IND-COL orientation.

3.2. Exploratory and Confirmatory Factor Analysis

A global one-factor model with all 33 CAPP items and a six-factor model directly corresponding to the thematic CAPP domains both did not produce good fit when fitted to the data as a whole, 1-factor model: $\chi^2(495) = 2789.25$; CFI = .701; NNFI = .681; SRMR = .068; RMSEA = .078, 90% CI [.075, .080]; 6-factor model: $\chi^2(480) = 2497.38$; CFI = .737; NNFI = .711; SRMR = .068; RMSEA = .074, 90% CI [.071, .077]. As such, an exploratory factor analysis (EFA) was conducted in attempts to identify the internal structure of the CAPP ratings.

To avoid capitalizing on chance, the EFA was conducted using a separate independent sample drawn from the same larger research study. With the exception that these participants did not complete the cultural measures, they were similar in terms of recruitment strategies, measurement procedures, and demographics. Specifically, this derivation sample consisted of 574 (35% male) undergraduate students from Simon Fraser University, aged between 17 and 37 (M = 19.9, SD = 2.15). Their self-reported ethnicity breakdown is as follows: 46% identified as East Asians, 30% as Caucasians/European, 19% as South Asians, and 6% as Others.

EFA was conducted using principal axis factor analysis with oblique promax rotation. An examination of eigenvalues (i.e., eigenvalues > 1) and the scree plot suggested a three-factor solution that accounted for 87% of the variance. The first three eigenvalues were 7.88, 1.53, and 1.30, and accounted for 87% of variance, respectively. Results from both Horn's (1965) Parallel Analysis (PA) and the Minimum Average Partial (MAP) method of Velicer (1976) also indicated the presence of a three-factor structure. Thus, a three-correlated-factor solution was retained (Table 3.2). The first factor was composed of 13 items and appears to reflect the dominance aspect of the disorder, hence labelled Dominance (DOM). The second factor was composed of 11 items and appears to reflect deficient emotional experience and attachment and relationship problems, hence labelled Deficient Attachment (DA). The final factor was composed of nine items and appears to reflect problems with inhibition and organization, hence labelled Disorganized/Disinhibited (DIS). To an extent, these three factors appear to reflect similar facets as those of Cooke and Michie's (2001) three factor model that posits PPD is underpinned by Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, and Impulsive and Irresponsible Behavioral Style.

Table 3.2. Factor Loadings from Derivative Sample

	DOM	DA	DIS
Sense of invulnerability (S)	**.68**	.00	-.17
Self-aggrandizing (S)	**.61**	.05	.01
Self-centred (S)	**.56**	.07	.12
Sense of entitlement (S)	**.56**	-.02	.12
Domineering (D)	**.49**	.05	.15
Manipulative (D)	**.49**	.22	.00
Lacks anxiety (E)	**.48**	.24	-.28
Intolerant (C)	**.44**	.16	.10
Sense of uniqueness (S)	**.44**	**-.33**	-.02
Aggressive (B)	**.42**	.22	.07
Disruptive (B)	**.41**	.05	.24
Reckless (B)	**.41**	-.01	.22
Garrulous (D)	.28	.09	.16
Detached (A)	.01	**.59**	.10
Uncaring (A)	.21	**.57**	-.03
Lacks emotional depth (E)	-.02	**.56**	.02

Uncommitted (A)	.20	**.51**	-.01
Unempathic (A)	**.41**	**.48**	-.13
Deceitful (D)	.22	**.46**	.08
Lacks pleasure (E)	-.24	**.44**	.29
Lacks remorse (E)	**.40**	**.41**	-.16
Suspicious (C)	.01	**.39**	.22
Unreliable (B)	.11	**.37**	.21
Insincere (D)	**.34**	**.35**	.04
Lacks concentration (C)	-.06	-.01	**.62**
Lacks emotional stability (E)	-.01	.05	**.52**
Lacks planfulness (C)	-.03	.22	**.41**
Unstable self-concept (S)	.04	.29	**.39**
Lacks perseverance (B)	-.03	**.32**	**.39**
Self-justifying (S)	.11	.02	**.37**
Restless (B)	.28	**-.36**	**.36**
Antagonistic (D)	.24	.18	**.31**
Inflexible (C)	.15	.05	**.30**

Note. Domains of the respective are indicated in brackets; A = Attachment domain, B = Behavioral domain, C = Cognitive domain, D = Dominance domain, E = Emotional domain, and S = Self domain. Factor loadings ≥ |.30| are bolded and underlined.

The means, standard deviations, Cronbach's alpha, skewness and kurtosis for each of the three factors in the study sample are summarized in Table 3.3. To maximize the power, this three-factor model was first tested with confirmatory factor analysis using the full study sample. The fit of the three-factor model was fair, $\chi^2(477) = 1910.82$; CFI = .813; NNFI = .793; SRMR = .063; RMSEA = .062, 90%CI [.060, .065]. Considering the complexity of the model, number of parameters, and the low communalities (Marsh, Hau, & Grayson, 2005; Meade & Bauer, 2007), the model could have been accepted as appropriate. However, because the model had to be fitted to multi-groups with smaller sample sizes, this overall three-factor model was discarded in favor of examining each of the three factors of DOM, DA, and DIS separately, before examining the overall CAPP model as a whole.

Table 3.3. Descriptive Statistics and Alpha Coefficients of DOM, DA, DIS

Factors	*M*	*SD*	Skewness	Kurtosis	Alpha
DOM (13 items)	10.35	6.18	0.52	2.80	.83
DA (11 items)	6.05	5.07	0.87	3.18	.83
DIS (9 items)	8.76	4.38	0.17	2.47	.72

3.3. Measurement Invariance across Normative IND-COL Groups

To compare the CAPP measurements across individualistic and collectivistic cultures, two sets of two groups were created based on the median spilt on the NORM and ATT IND-COL scales. The results for the ATT median-split groups are presented in the next section.

The means, standard deviations, Cronbach's alpha, skewness and kurtosis for each of the three factors by median-spilt NORM IND-COL groups are summarized in Table 3.4. None of the cases was identified as a multivariate outlier, although assumptions about multivariate normality were again violated. As such, the ADF option was used instead of the usual ML approach.

3.3.1. DOM Factor

Configural Invariance (M_1). Table 3.5 shows the DOM single factor model had good fit in the N-IND (the median-spilt individualistic group based on normative IND-COL measure) and N-COL (the median-spilt collectivistic group based on normative IND-COL measure) groups separately, as well as to the two groups simultaneously. This multi-group configural invariance model served as the baseline model against which subsequent comparisons were made. Overall, this indicated the factor was defined by the same symptoms across both N-IND and N-COL groups: the DOM factor had zero and non-zero loadings on the same items in both cultures.

Metric Invariance (M_2). When the factor loadings were constrained to be equal across N-IND and N-COL groups, the model resulted in practical, ΔCFI = -.018, and

significant, $\Delta\chi^2(12) = 27.86$, $p = .005$, decline in model fit (Table 3.5). This indicated the assumption that the model is metrically invariant across N-IND and N-COL groups was untenable. The factor-ratio test identified *Sense of entitlement* as an invariant item suitable to act as the referent. Two items were identified by the free-baseline MACS analysis to have non-uniform DIF at the Bonferroni-corrected α-level (.05/13): *Aggressive,* $\lambda_{N\text{-}IND} = .42$ and $\lambda_{N\text{-}COL} = .25$; $\Delta\chi^2(1) = 14.70$, $p < .001$, $d_{MACS} = .67$; and *Self-centred,* $\lambda_{N\text{-}IND} = .56$ and $\lambda_{N\text{-}COL} = .46$; $\Delta\chi^2(1) = 12.03$, $p < .001$, $d_{MACS} = .29$. The loading parameters of these items were allowed to be freely estimated to derive a partial metric invariance model (partial M_2, see Table 3.5). They remained unconstrained through the subsequent test for scalar invariance. The lower factor loadings for both items in the COL group suggest these items are less central to the latent DOM factor among those who reported more COL group norms. As an illustration, the item functioning plot showing non-uniform DIF for *Aggressive* is given in Figure 3.1.

Scalar Invariance (M_3). Scalar invariance was tested by constraining both factor loadings and intercepts to be equal across groups for the rest of the items that were not showing non-uniform DIF. Compared to the partial metric invariant model, there was no significant nor practical decline in the model fit, indicating the rest of the items demonstrated scalar invariance (see Table 3.5).

When examined at the scale level, the effect of the item-level DIF was small and resulted in the IND group scoring only 0.35 points higher than the COL group on the DOM scale ($d_{DTF} = .07$). The test functioning plot for DOM is given in Figure 3.2. An examination of the factor loadings revealed *Sense of entitlement* and *Self-aggrandizing* had the highest factor loadings, whereas *Sense of uniqueness* had the lowest factor loading, indicating these were the items that were thought to be the most and least central to the latent DOM factor, respectively (Table 3.6). For the intercepts, *Aggressive*, *Disruptive*, and *Intolerant* had the lowest intercepts, indicating they were unpopular (i.e., least endorsed or difficult) items. On the other hand, *Sense of Uniqueness* had the highest intercept, denoting conceptually low thresholds for endorsement.

Table 3.4. Descriptive Statistics and Alpha Coefficients of DOM, DA, DIS by Median-split NORM IND-COL Groups

Factor	NORM IND-COL median-split group	*n*	*M*	*SD*	Skewness	Kurtosis	Mardia's skewness coefficient	Mardia's kurtosis coefficient	Alpha
DOM	N-IND	373	10.26	6.50	0.67	3.02	25.17	245.07	.85
	N-COL	390	10.38	5.85	0.31	2.44	19.77	228.60	.82
DA	N-IND	373	5.95	5.20	0.85	2.84	39.18	218.20	.83
	N-COL	390	6.08	4.87	0.75	2.71	32.40	211.86	.82
DIS	N-IND	373	8.59	4.58	0.28	2.40	9.37	115.60	.74
	N-COL	390	8.91	4.19	0.07	2.57	7.30	106.14	.71

Note. The Mardia's skewness and kurtosis coefficients were significant for all at $p < .001$.

Table 3.5. Results of Measurement Invariance tests for DOM, DA, and DIS factors across N-IND and N-COL groups.

Model	χ^2	*df*	RMSEA	NNFI	CFI	$\Delta\chi^2$	Δdf	*p*	ΔCFI
DOM									
M_0 N-IND	93.23	61	.038 CI [.021 - .052]	.892	.915				
M_0 N-COL	96.45	57	.042 CI [.027 - .056]	.894	.922				
M_1	197.76	118	.042 CI [.032 - .042]	.881	.910				
M_2	225.62	130	.044 CI [.035 - .049]	.871	.892	27.86	12	.005	-.018
Partial M_2	210.30	128	.041 CI [.035 - .055]	.887	.907	12.54	10	.250	-.003
M_3	220.58	138	.040 CI [.031 - .049]	.895	.907	10.28	10	.416	.000
DA									
M_0 N-IND	53.06	37	.034 CI [.007 - .054]	.909	.939				
M_0 N-COL	48.03	37	.028 CI [.000 - .048]	.933	.955				
M_1	101.02	70	.034 CI [.018 - .048]	.904	.939				
M_2	115.22	80	.034 CI [.019 - .047]	.905	.931	14.20	10	.164	-.008
M_3	153.43	90	.043 CI [.031 - .055]	.847	.875	38.31	10	< .001	-.056
DIS									
M_0 N-IND	43.83	26	.043 CI [.019 - .064]	.899	.927				
M_0 N-COL	33.20	23	.034 CI [.000 - .058]	.919	.948				
M_1	77.22	46	.042 CI [.025 - .058]	.889	.929				
M_2	85.86	54	.039 CI [.023 - .055]	.904	.928	8.64	8	.374	-.001
M_3	100.38	62	.040 CI [.025 - .054]	.899	.913	14.52	8	.069	-.016

Note. CI represents 90% confidence interval. RMSEA = root mean square error of approximation; NNFI = nonnormed fit index; CFI = comparative fit index. Underlined values indicate invariance was not held at that level.

Table 3.6. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DOM across N-IND and N-COL groups.

	λ (SE)		*τ (SE)*	
Item	N-IND	N-COL	N-IND	N-COL
Self-aggrandizing (S)	.57 (.02)		.68 (.03)	
Sense of entitlement (S)	.57 (.02)		.76 (.03)	
Sense of invulnerability (S)	.50 (.03)		.63 (.03)	
Intolerant (C)	.48 (.02)		.48 (.03)	
Manipulative (D)	.47 (.02)		.57 (.03)	
Domineering (D)	.45 (.02)		.78 (.03)	
Reckless (B)	.39 (.03)		.75 (.03)	
Disruptive (B)	.35 (.03)		.43 (.03)	
Lacks anxiety (E)	.34 (.03)		.71 (.03)	
Garrulous (D)	.33 (.03)		.73 (.03)	
Sense of uniqueness (S)	.24 (.03)		1.58 (.03)	
Aggressive (B)	.42 (.03)	.25 (.03)	.40 (.03)	.29 (.03)
Self-centred (S)	.56 (.03)	.46 (.03)	.67 (.03)	.59 (.04)

Figure 3.1. Plot of the Item Functioning for *Aggressive* showing non-uniform DIF (d_{MACS} = .67) across NORM IND and COL groups.

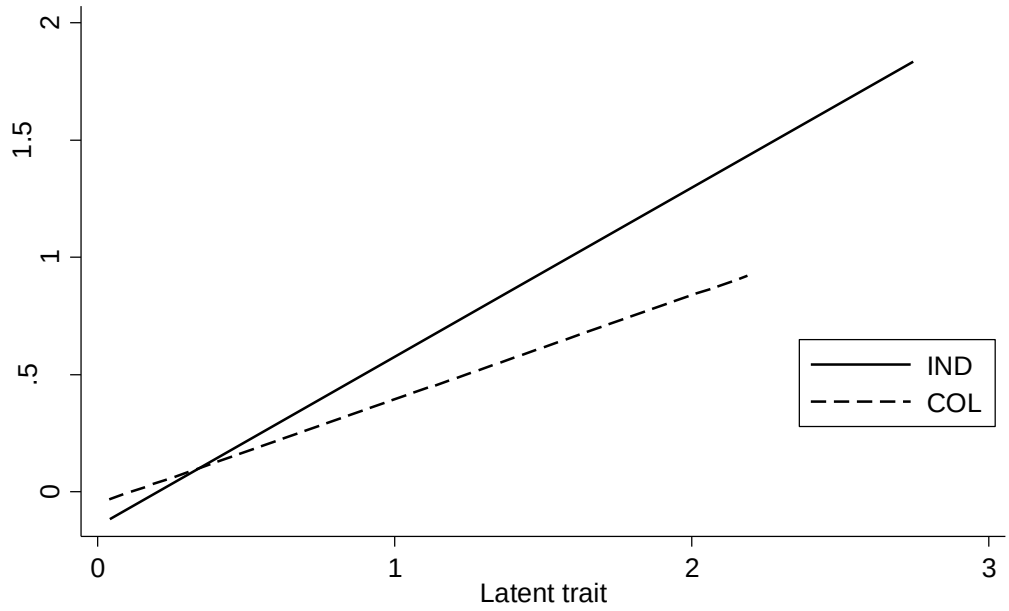
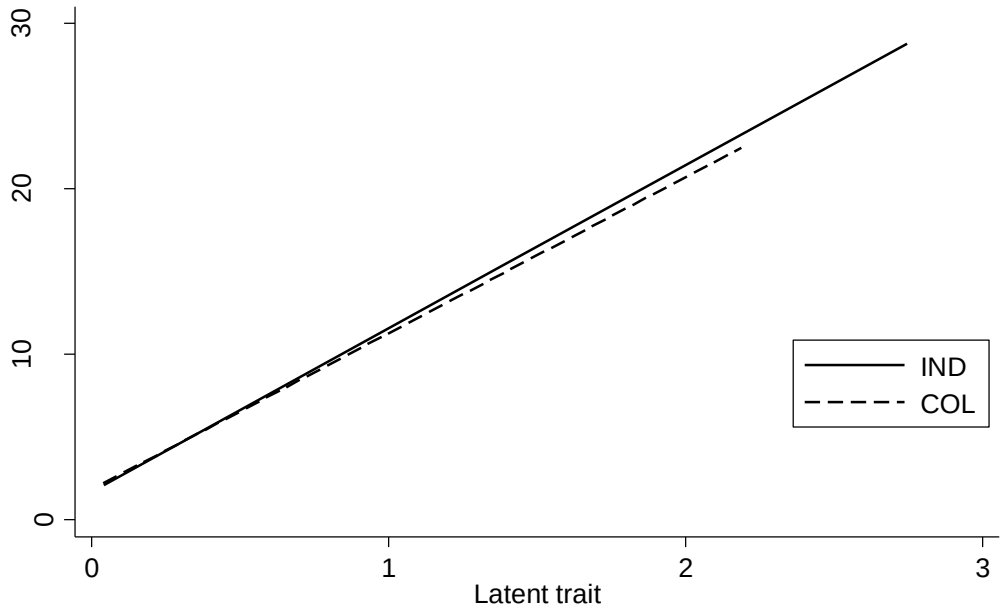


Figure 3.2. Plot of the Test Functioning for DOM across NORM IND and COL groups showing little DTF (d_{DTF} = .07).



3.3.2. DA Factor

The above steps testing the nested configural, metric, and scalar invariance models were repeated for the DA factor, and the fit information are presented in Table 3.5. The single DA factor model had excellent fit when fitted separately to N-IND and N-COL groups and when fitted simultaneously across both groups in a multi-group model, fulfilling the baseline requirement of a configural invariant model. There was no significant or practical decline in model fit when the metric invariant model was fitted to the data, which signified the metric invariance model was tenable. However, practical and significant decline in model fit was noted when the factor loadings and intercepts were constrained to test for scalar invariance, indicating scalar invariance was not tenable, $\Delta\chi^2(10) = 38.21$, $p < .001$, ΔCFI = -.056. The factor-ratio test identified *Uncaring* as an invariant item suitable to act as the referent. MACS DIF analyses identified *Unreliable*, $\Delta\chi^2(1) = 15.45$, $p < .001$, $d_{MACS} = .34$; and *Suspicious*, $\Delta\chi^2(1) = 8.40$, $p < .004$, $d_{MACS} = .48$; as having substantial

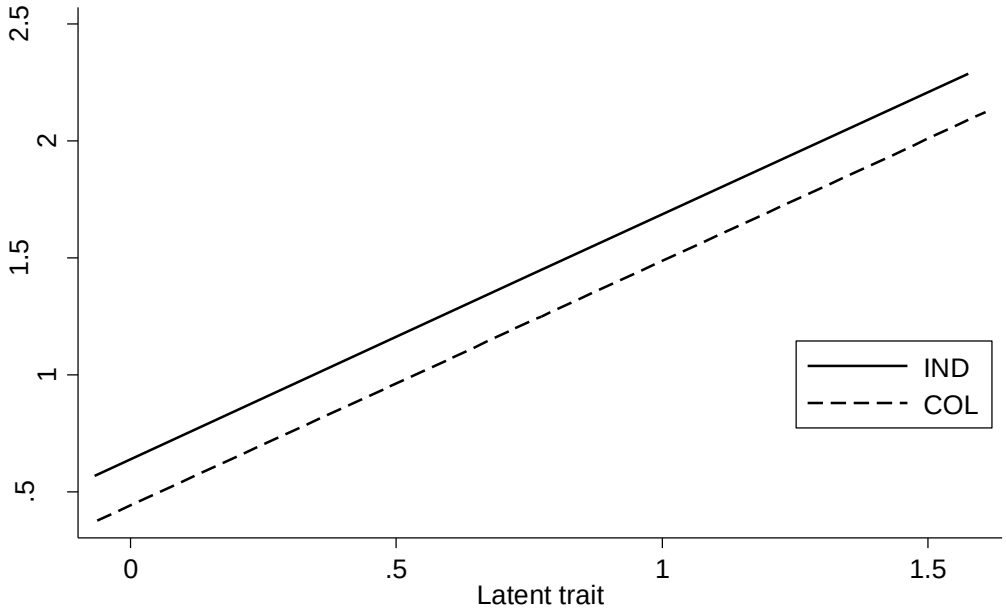
uniform DIF, although in different directions. Their respective intercepts are reported in Table 3.7. Figure 3.3 shows the item functioning plot for the uniform DIF in *Suspicious*.

The item-level DIF cancelled out each other at the scale-level, and their combined impact on the test functioning was negligible (raw score difference = 0.09, d_{DTF} = .02). An examination of the factor loadings revealed *Insincere* and *Deceitful* were the most discriminating items, whereas *Lacks pleasure* and *Unreliable* were least discriminating. *Uncommitted*, *Unreliable*, and *Uncaring* had the lowest intercepts, indicating they were the least popular items.

Table 3.7. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DA across N-IND and N-COL groups.

	λ (SE)		τ *(SE)*	
Item	N-IND	N-COL	N-IND	N-COL
Insincere (D)	.46 (.02)		.45 (.03)	
Deceitful (D)	.44 (.02)		.38 (.02)	
Suspicious (C)	.43 (.03)		.89 (.04)	.70 (.04)
Detached (A)	.41 (.03)		.61 (.03)	
Uncaring (A)	.40 (.02)		.25 (.02)	
Unempathic (A)	.39 (.02)		.29 (.02)	
Lacks emotional depth (E)	.38 (.03)		.65 (.03)	
Uncommitted (A)	.37 (.02)		.25 (.02)	
Lacks remorse (E)	.36 (.03)		.40 (.03)	
Lacks pleasure (E)	.31 (.03)		.84 (.03)	
Unreliable (B)	.31 (.02)		.25 (.02)	.36 (.03)

Figure 3.3. Plot of the Item Functioning for *Suspicious* showing uniform DIF (d_{MACS} = .48) across NORM IND and COL groups.



3.3.3. DIS Factor

The fit indices for the nested models for the single DIS factor are presented in Table 3.5. In sum, the single factor DIS model had a good fit to the data and demonstrated configural and metric invariance. However, as with DA, there was a practical reduction in the goodness-of-fit when the scalar invariant model was fitted to the data, although this was not significant, $\Delta\chi^2(8) = 26.86$, $p = .069$, ΔCFI = -.015. The factor-ratio test identified *Unstable Self-concept* as an invariant item suitable to act as the referent. Nevertheless, MACS analyses for uniform DIF identified three items as being non-invariant: *Lacks perseverance*, $\Delta\chi^2(1) = 8.71$, $p = .003$, $d_{MACS} = .29$; *Lacks planfulness,* $\Delta\chi^2(1) = 8.05$, $p = .004$, $d_{MACS} = .27$; and *Lacks concentration,* $\Delta\chi^2(1) = 7.91$, $p = .005$, $d_{MACS} = .23$. All three items had higher intercepts that suggested a greater ease of endorsement of these items in the COL group (see Table 3.8).

An examination of the item parameters suggest *Lacks concentration* was the most discriminating, whereas *Restless* was the least discriminating of the indicators for DIS. In terms of item difficulty, the most difficult item to endorse was *Antagonistic*, and the easiest items were *Lacks concentration* and *Restless.* Because of the item-level DIF, the IND group scored 0.37 points lower than the COL group on the DIS scale (d_{DTF} = .11).

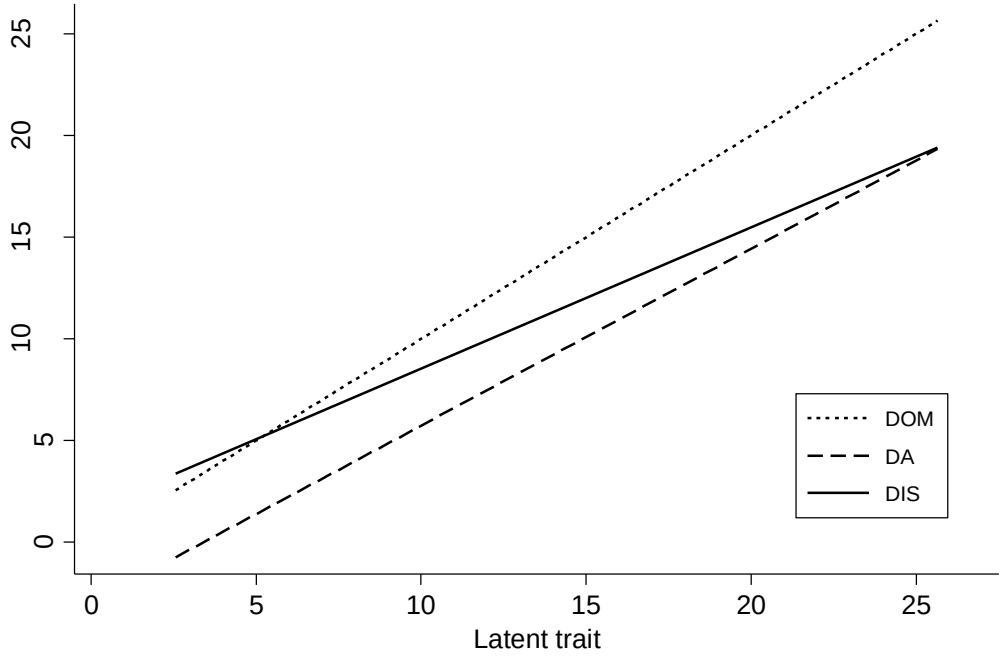
Table 3.8. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DIS across N-IND and N-COL groups.

	λ (SE)		*τ (SE)*	
Item	N-IND	N-COL	N-IND	N-COL
Lacks concentration (C)	.64 (.03)		1.29 (.05)	1.39 (.06)
Lacks planfulness (C)	.52 (.03)		.79 (.04)	.92 (.05)
Unstable self-concept (S)	.52 (.03)		.64 (.04)	
Lacks emotional stability (E)	.42 (.03)		1.00 (.04)	
Lacks perseverance (B)	.42 (.03)		.53 (.03)	.64 (.04)
Self-justifying (S)	.37 (.03)		1.07 (.03)	
Antagonistic (D)	.35 (.03)		.52 (.03)	
Inflexible (C)	.32 (.04)		1.09 (.03)	
Restless (B)	.28 (.04)		1.30 (.03)	

3.3.4. CAPP Total

Since there were no substantial DTF at the scale-level for the three DOM, DA, and DIS factors, their respective item scores were summed to create three subscale scores. A one-factor model with a PPD factor indicated by the three subscales was then modelled to examine the association between the global PPD factor and the three constituent factors. This model was invariant at the configural, metric, and scalar levels, indicating the three DOM, DIS, and DA factors were associated with the global PPD factor in the same way across NORM IND-COL groups. There was no difference in the Total CAPP score due to item-level DIF; they cancelled each other out, and the overall effect at the total score level was negligible (raw score difference = 0.07, d_{DTF} = .006). The plot of the three subscales' test functioning indicated DOM was the most discriminating and DIS was the least discriminating scales overall (Figure 3.4).

Figure 3.4. Plot of the Test Functioning for DOM, DA, and DIS subscales across latent trait PPD.



3.3.5. Discussion

The factor structures for all three DOM, DA, and DIS factors and for the overall PPD factor were similar across both normative IND-COL groups. This suggests these constructs are conceptually equivalent and PPD is defined by the same three facets and each facet is defined by similar symptoms. However, there is some evidence of cross-cultural variations. When measuring culture as a set of normative behaviors and values, collectivistic norms appeared to impact the way the PPD is expressed, particularly in terms of interpersonal style. Specifically, *Aggressive* and *Self-Centred* had lower factor loadings in the COL group than IND group with DIF of large and medium effect sizes, respectively. This meant *Aggressive* and *Self-Centred* were less discriminating, or less central to, the latent trait DOM among individuals who reported stronger COL norms. In fact, *Aggressive* was one of the least discriminating item of PPD in the COL group. In other words, PPD is not typically expressed as violent, aggressive, and threatening in cultures where there are

perceived stronger COL norms. In terms of uniform DIF, *Unreliable, Lacks Perseverance, Lacks Planfulness,* and *Lacks Concentration* had higher intercepts for the COL group. That is, individuals who reported perceiving stronger COL norms were more likely to endorse these items even at lower levels of latent trait. In contrast, *Suspicious* had a lower intercept in the COL group, meaning this symptom was suppressed and less likely to be endorsed until higher levels of the latent trait. Nevertheless, these differences did not substantially impact the overall test at both the scale and total score levels.

3.4. Measurement Invariance across Attitudinal IND-COL Groups

Table 3.9 reports the means, standard deviations, Cronbach's alpha, skewness and kurtosis for each of the three factors by median-spilt ATT IND-COL groups. MACS analyses were conducted using ADF due to the significant skewness and kurtosis in the data.

The fit indices for the individual, configural, metric, and scalar invariance models for DOM, DA, and DIS factors are reported in Table 3.10. All three factors satisfied conditions for configural and metric invariance, but not scalar invariance. Factor-ratio tests indicated the three items identified as referents in the previous analysis were also invariant across ATT IND-COL groups and thus were used as referents in this analysis. MACS analyses revealed *Sense of invulnerability,* $\Delta\chi^2(1) = 12.68$, $p < .001$, $d_{MACS} = .29$; and *Sense of uniqueness,* $\Delta\chi^2(1) = 8.92$, $p = .003$, $d_{MACS} = .61$, of the DOM factor had uniform DIF. The variant and invariant factor loadings and intercepts are reported in Table 3.11. Both *Sense of invulnerability* and *Sense of uniqueness* had higher intercepts and were more attractive to those who personally endorsed stronger COL orientation. However, the effect of this on the DOM subscale score was negligible ($d_{DTF} = .05$). They only scored 0.28 points higher than their IND counterparts at the scale level due to DIF.

For DA factor, *Detached,* $\Delta\chi^2(1) = 18.54$, $p < .001$, $d_{MACS} = .45$, and *Lacks pleasure,* $\Delta\chi^2(1) = 8.06$, $p = .004$, $d_{MACS} = .47$, had uniform DIF (Table 3.12). These items had higher

intercepts in the IND group, resulting in them scoring an average of 0.37 points higher than the COL group on the DA scale due to DIF. This represented a small effect (d_{DTF} = .09).

Finally, for DIS factor, *Restless*, $\Delta\chi^2(1) = 8.69$, $p = .003$, $d_{MACS} = .91$, had uniform DIF across ATT IND-COL groups (Table 3.13). Although at the item level, this represents a substantial DIF, its effect on the scale was very small ($d_{DTF} = .06$). The COL group scored an average of 0.21 points higher on the overall DIS scale due to the uniform DIF on *Restless.*

The very small d_{DTF} at the subscale levels indicated the subscale scores were comparable across groups. These subscales were then used to examine the overall model with a global PPD factor indicated by three subscales. Whereas there was configural equivalence when this model was fitted across ATT IND-COL groups, metric equivalence was not tenable, $\Delta\chi^2(1) = 5.20$, $p = .023$, ΔCFI = -.011. MACS DIF analyses indicated non-uniform DIF for the *Deficient Attachment* subscale, with it being less central to the construct of PPD in the COL group; IND, $\lambda = .94$, $\tau = -3.25$, and COL, $\lambda = .75$, $\tau = -2.38$; $\Delta\chi^2(1) = 4.94$, $p = .027$, $d_{MACS} = .40$. Partial scalar invariance was achieved when the parameters for *Deficient Attachment* were freely estimated. The non-uniform DIF due to DA at the subscale level translated to a small d_{DTF} of .14 at the Total CAPP scale level, with a 1.48 point suppression in the COL group. Figure 3.5 shows the non-uniform DIF plot for DA for the ATT IND and COL groups.

Table 3.9. Descriptive Statistics and Alpha Coefficients of DOM, DA, DIS by Median-split ATT IND-COL Groups

Factor	ATT IND-COL median-split group	*n*	*M*	*SD*	Skewness	Kurtosis	Mardia's skewness coefficient	Mardia's kurtosis coefficient	Alpha
DOM	A-IND	386	11.36	6.34	0.35	2.58	18.59	226.49	.84
	A-COL	388	9.33	5.84	0.69	3.20	27.07	245.37	.83
DA	A-IND	386	7.48	5.43	0.64	2.73	25.88	188.58	.83
	A-COL	388	4.61	4.24	1.00	3.42	51.22	249.07	.79
DIS	A-IND	386	9.56	4.48	0.14	2.43	6.01	105.30	.72
	A-COL	388	7.97	4.13	0.12	2.37	10.69	114.91	.71

Note. The Mardia's skewness and kurtosis coefficients were significant for all at $p < .001$.

Table 3.10. Results of Measurement Invariance tests for DOM, DA, and DIS factors across ATT-IND and ATT-COL groups.

Model	χ^2	*df*	RMSEA	NNFI	CFI	$\Delta\chi^2$	Δdf	*p*	ΔCFI
DOM									
M_0 A-IND	96.19	57	.042 CI [.027 - .056]	.892	.921				
M_0 A-COL	80.13	57	.032 CI [.012 - .048]	.906	.931				
M_1	171.03	110	.038 CI [.027 – .048]	.896	.927				
M_2	188.23	122	.038 CI [.026 - .048]	.898	.920	17.20	12	.142	-.006
M_3	220.88	134	.041 CI [.031 - .050]	.878	.896	32.65	12	.001	-.025
DA									
M_0 A-IND	61.74	38	.040 CI [.020 - .058]	.887	.922				
M_0 A-COL	52.78	37	.033 CI [.005 - .052]	.891	.927				
M_1	111.07	74	.036 CI [.021 - .049]	.894	.929				
M_2	117.72	84	.032 CI [.017 - .045]	.915	.935	6.65	10	.7580	.006
M_3	156.26	94	.041 CI [.030 - .053]	.860	.880	38.54	10	< .001	-.055
DIS									
M_0 A-IND	39.24	26	.036 CI [.005 - .058]	.925	.946				
M_0 A-COL	38.26	24	.039 CI [.012 - .062]	.897	.932				
M_1	75.48	48	.039 CI [.020 - .055]	.909	.939				
M_2	86.21	56	.037 CI [.020 - .052]	.914	.933	10.73	8	.2177	-.006
M_3	106.34	64	.041 CI [.027 - .055]	.895	.906	20.13	8	.010	-.027

Note. CI represents 90% confidence interval. RMSEA = root mean square error of approximation; NNFI = nonnormed fit index; CFI = comparative fit index. Underlined values indicate invariance was not held at that level.

Table 3.11. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DOM across A-IND and A-COL groups.

	λ *(SE)*		τ *(SE)*	
Item	A-IND	A-COL	A-IND	A-COL
Garrulous (D)	.32 (.03)		.80 (.03)	
Domineering (D)	.45 (.02)		.90 (.03)	
Disruptive (B)	.34 (.03)		.53 (.03)	
Sense of uniqueness (S)	.27 (.03)		1.60 (.04)	1.73 (.04)
Reckless (B)	.34 (.03)		.84 (.03)	
Self-aggrandizing (S)	.56 (.02)		.82 (.03)	
Intolerant (C)	.43 (.02)		.55 (.03)	
Sense of invulnerability (S)	.48 (.03)		.69 (.04)	.82 (.04)
Lacks anxiety (E)	.32 (.03)		.81 (.03)	
Manipulative (D)	.49 (.02)		.71 (.03)	
Sense of entitlement (S)	.53 (.02)		.89 (.03)	
Aggressive (B)	.37 (.02)		.42 (.02)	
Self-centred (S)	.54 (.02)		.79 (.03)	

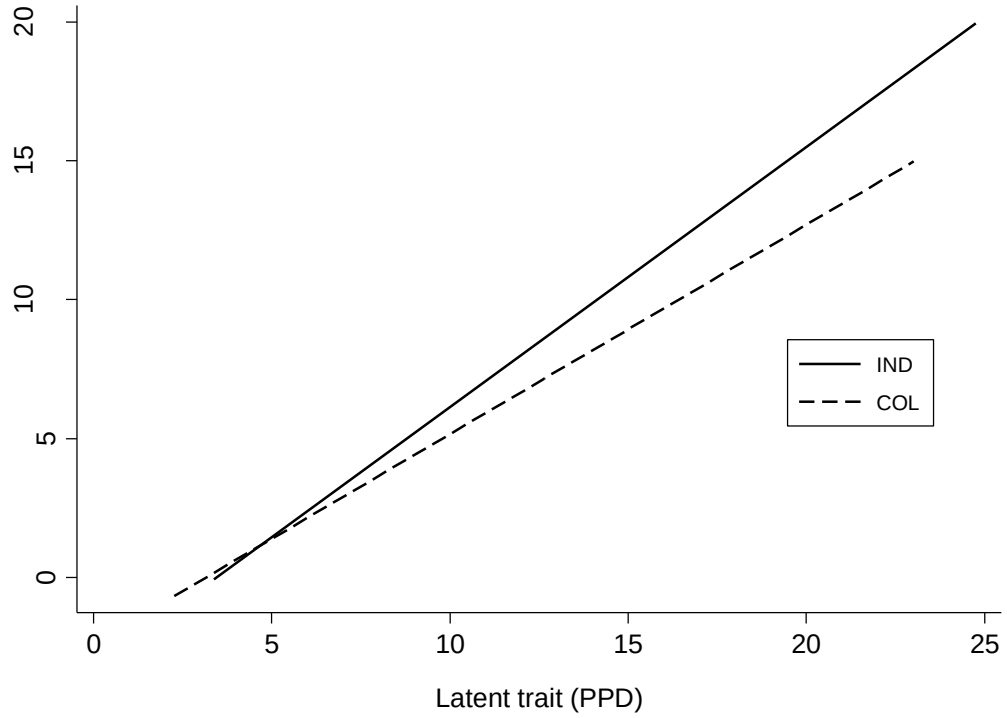
Table 3.12. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DA across A-IND and A-COL groups.

	λ *(SE)*		τ *(SE)*	
Item	A-IND	A-COL	A-IND	A-COL
Lacks pleasure (E)	.24 (.03)		.97 (.04)	.80 (.04)
Lacks emotional depth (E)	.37 (.03)		.73 (.03)	
Detached (A)	.37 (.03)		.81 (.04)	.62 (.04)
Suspicious (C)	.36 (.03)		.90 (.03)	
Insincere (D)	.42 (.02)		.56 (.03)	
Unreliable (B)	.29 (.02)		.37 (.02)	
Unempathic (A)	.34 (.02)		.36 (.03)	
Lacks remorse (E)	.33 (.02)		.48 (.03)	
Uncommitted (A)	.32 (.02)		.26 (.02)	
Uncaring (A)	.35 (.02)		.34 (.03)	
Deceitful (D)	.38 (.02)		.45 (.03)	

Table 3.13. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DIS across A-IND and A-COL groups.

	λ *(SE)*		τ *(SE)*	
Item	A-IND	A-COL	A-IND	A-COL
Antagonistic (D)	.31 (.02)		.60 (.03)	
Inflexible (C)	.31 (.03)		1.21 (.03)	
Restless (B)	.27 (.04)		1.27 (.04)	1.48 (.08)
Self-justifying (S)	.34 (.03)		1.16 (.03)	
Lacks planfulness (C)	.49 (.03)		1.00 (.04)	
Lacks emotional stability (E)	.43 (.03)		1.14 (.04)	
Lacks concentration (C)	.60 (.03)		1.51 (.04)	
Lacks perseverance (B)	.38 (.02)		.69 (.03)	
Unstable self-concept (S)	.47 (.03)		.78 (.04)	

Figure 3.5. Plot of the Test Functioning for the DA subscale showing non-uniform DTF (d_{DTF} = .40) across ATT IND and COL groups.



3.4.1. Discussion

Again, there was evidence to support syndromal equivalence of all three DOM, DA, and DIS and the overall PPD factors across attitudinal IND-COL groups. Further, when examining the lower level DOM, DA, and DIS factors, none of the items showed non-uniform DIF, suggesting the items were equally discriminating across both groups. In other words, the items were equally important to the respective DOM, DA, and DIS latent factors across both groups. There was, however, a lack of scalar invariance in that individuals who endorsed stronger COL attitudes also had a greater tendency to endorse items such as *Sense of invulnerability*, *Sense of uniqueness*, and *Restless* even at lower levels of the trait. Conversely, they were less likely to endorse *Lacks pleasure* and *Detached*, meaning there was a suppression of these symptoms and they only become apparent at higher levels of the trait. More noteworthy is the fact that DA as a scale was less discriminatory of PPD in the COL group, which suggest the disorder is less strongly expressed in terms of deficient emotional experiences and attachment for those who endorsed greater COL personal orientations. Such finding makes sense when considering that one of the hallmarks of collectivism is valuing relationships and bonding with others (Oyserman et al., 2002). Nevertheless, the differences due to this non-uniform DIF in DA translated only to a small DTF at the total score level.

3.5. Measurement Invariance across Ethnic Groups

Because of the smaller sample size for the South/South East Asians (i.e., less than 200), measurement invariance analyses were conducted only between Caucasians (n = 234) and East Asians (n = 316). Recall East Asians in this sample endorsed slightly greater individualistic personal orientations but perceived their ethnic group to have more collectivistic group norms (see Table 3.1, p. 28). Table 3.14 reports the means, standard deviations, Cronbach's alpha, skewness and kurtosis for each of the three factors for Caucasians and East Asians. Even though it was previously decided that ADF was the more appropriate method when there is significant skewness and kurtosis in the data, the ADF method tended to produced more negative bias when sample sizes are small

(Curran, West, & Finch, 1996). As such, the ML method was used instead for comparisons across ethnic groups.

Table 3.15 shows fit indices for the individual, configural, metric, and scalar invariance models for DOM, DA, and DIS factors. Item parameters for the (partial) scalar invariance model for each of the three factor are reported in Tables 3.16, 3.17 and 3.18, respectively. The same items were used as referents since they were also found to be invariant across Caucasians and East Asians. The DOM factor satisfied the requirements for configural invariance but not metric invariance, and *Aggressive*, $\Delta\chi^2(1) = 20.14$, $p < .001$, $d_{MACS} = .37$, was found to have non-uniform DIF. It had a higher factor loading in East Asians, indicating it was more discriminating and central to the construct of DOM among East Asians than Caucasians (Table 3.16). When the constraints for *Aggressive* were relaxed, partial metric invariance was achieved. However, practical and significant decline in the model fit was again observed when the intercepts for the rest of the items were constrained to be equal across both groups. MACS analyses revealed *Sense of invulnerability*, $\Delta\chi^2(1) = 8.19$, $p = .004$, $d_{MACS} = .53$; and *Sense of uniqueness*, $\Delta\chi^2(1) = 13.55$, $p < .001$, $d_{MACS} = 1.12$, to have uniform DIF across the two ethnic groups. The intercepts for both items were higher among the Caucasians (Table 3.16), which meant they were more attractive to Caucasians, or to put it another way, they were less attractive to East Asians. The DIF at the item level resulted in a 0.41 point difference at the scale-level. In other words, East Asians would be expected to score an average of 0.41 points lower than Caucasians on the DOM scale for the same level of latent trait ($d_{DTF} = .08$). An examination of the item parameters (Table 3.16) revealed the most discriminating items for the latent DOM factor were items that were from the Self domains: *Self-aggrandizing*, *Sense of invulnerability*, and *Sense of entitlement*.

Likewise, the DA model showed good fit both when fitted independently and simultaneously across the two ethnic groups. However, it was not metrically invariant. MACS analyses found *Uncommitted*, $\Delta\chi^2(1) = 18.08$, $p < .001$, $d_{MACS} = .95$, to display non-uniform DIF across East Asians and Caucasians. Partial metric invariance was achieved when the loadings for *Uncommitted* was relaxed. There was no further decline in model fit when the intercepts for the rest of the items were constrained, which indicated scalar

invariance was tenable. The factor loading for *Uncommitted* was higher in East Asians than Caucasians, meaning it was a more discriminating item for the East Asians than it was for Caucasians (Table 3.17). In fact, it was the least discriminating item for Caucasians. As a result of the non-uniform DIF by *Uncommitted*, East Asians would be expected to score an average of 0.31 points higher than Whites on the DA scale (d_{DTF} = .07). Based on the factor loadings, items that were the most central to the DA factor were *Detached, Unempathic, Deceitful*, and *Insincere*. Again, *Uncommitted*, *Unreliable*, and *Uncaring* were the least popular items, whereas *Suspicious* and *Lacks pleasure* were easily endorsed by participants.

The DIS model satisfied conditions for configural and metric invariance, but not scalar invariance. MACS analyses with the DIS scale revealed *Lacks perseverance,* $\Delta\chi^2(1) = 10.01$, $p = .002$, $d_{MACS} = .52$; *Lacks planfulness,* $\Delta\chi^2(1) = 9.68$, $p = .002$, d_{MACS} = .51, and *Lacks concentration*, $\Delta\chi^2(1) = 8.48$, $p = .004$, $d_{MACS} = .42$, to have uniform DIF. The intercepts for all three items were higher in the East Asian group, suggesting East Asians had a greater tendency compared to their Caucasian counterparts who are on the same latent trait standing to endorse these items. The DIF at the item-level resulted in East Asians scoring an average of 0.66 points higher than Whites on the DIS scale due to DIF ($d_{DTF} = .20$). The rank ordering of items in terms of their factor loadings and intercepts were similar to those obtained from models fitted across the NORM and ATT groups: *Lacks concentration* was the most discriminating item as well as the easiest item to endorse. On the other hand, although Restless had one of the highest intercepts, it had the lowest factor loading, indicating this item may be measuring something other than the intended DIS construct.

Given the relatively small DTF, the items are summed across the respective factors to form the three subscales to examine the overall model with a global PPD factor. Configural equivalence was achieved when this model was fitted across East Asians and Caucasians but metric equivalence was not, $\Delta\chi^2(2) = 9.01$, $p = .011$, ΔCFI = -.037. MACS analyses indicated non-uniform DTF for the *Disorganized/Disinhibited* subscale, with it being less central to the construct of PPD among East Asians, $\lambda_C = .79$ and $\lambda_{EA} = .54$; $\Delta\chi^2(1) = 8.64$, $p = .003$. However, the higher intercepts for East Asians indicate the items

reflecting disorganization and disinhibition were more attractive to them (τ_C = 0.55, τ_{EA} = 3.59). This had an overall small effect size (d_{DTF} = .22). Partial scalar invariance was achieved when the parameters for *Disorganized/Disinhibited* were freely estimated. The non-uniform DIF due to DIS at the subscale level had a negligible effect at the Total CAPP scale level (aggregate score difference = 0.65, d_{DTF} = .06). Figure 3.6 shows the non-uniform DIF plot for DIS.

Table 3.14. Descriptive Statistics and Alpha Coefficients of DOM, DA, DIS for Caucasians and East Asians

Factor	NORM IND-COL median-split group	*n*	*M*	*SD*	Skewness	Kurtosis	Mardia's skewness coefficient	Mardia's kurtosis coefficient	Alpha
DOM	Caucasians	236	8.79	5.66	0.48	2.44	34.60	238.86	.83
	East Asians	316	11.43	6.46	0.48	2.72	20.79	225.73	.85
DA	Caucasians	236	4.85	4.91	1.16	3.51	57.92	241.40	.85
	East Asians	316	7.23	5.30	0.74	3.14	25.88	188.69	.83
DIS	Caucasians	236	7.48	4.35	0.64	2.95	13.88	115.56	.75
	East Asians	316	9.78	4.23	-0.07	2.64	6.80	107.07	.69

Note. The Mardia's skewness and kurtosis coefficients were significant for all at $p < .001$.

Table 3.15. Results of Measurement Invariance tests for DOM, DA, and DIS factors between Caucasians and East Asians.

Model	χ^2	*df*	RMSEA	NNFI	CFI	$\Delta\chi^2$	Δdf	*p*	ΔCFI
DOM									
M_0 Caucasians	114.63	60	.062 CI [.045 - .080]	.904	.926				
M_0 East Asians	120.91	62	.055 CI [.040 - .069]	.929	.943				
M_1	250.12	118	.064 CI [.053 - .075]	.902	.926				
M_2	285.16	130	.066 CI [.056 - .076]	.895	.913	35.03	12	< .001	-.013
Partial M_2	274.30	129	.064 CI [.053 - .074]	.901	.918	24.18	11	.012	-.007
M_3	323.66	140	.069 CI [.059 - .079]	.885	.897	49.36	11	< .001	-.022
DA									
M_0 Caucasians	137.39	41	.100 CI [.082 - .119]	.849	.887				
M_0 East Asians	106.73	40	.073 CI [.056 - .090]	.906	.932				
M_1	173.93	74	.070 CI [.057 - .084]	.919	.945				
M_2	216.58	84	.076 CI [.063 - .088]	.905	.928	42.65	10	< .001	-.018
Partial M_2	202.65	83	.072 CI [.060 - .085]	.913	.935	28.73	9	.001	-.010
M_3	221.23	92	.071 CI [.059 - .084]	.916	.929	18.58	9	.029	-.005
DIS									
M_0 Caucasians	50.34	23	.071 CI [.044 - .098]	.886	.927				
M_0 East Asians	57.10	26	.062 CI [.040 - .083]	.858	.897				
M_1	115.60	46	.074 CI [.057 - .091]	.840	.898				
M_2	111.52	52	.065 CI [.048 - .081]	.879	.912	-4.08	6	.666	.015
M_3	135.84	60	.068 CI [.053 - .083]	.866	.888	24.32	8	.002	-.024

Note. CI represents 90% confidence interval. RMSEA = root mean square error of approximation; NNFI = nonnormed fit index; CFI = comparative fit index. Underlined values indicate invariance was not held at that level.

Table 3.16. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DOM in Caucasians and East Asians.

	λ *(SE)*		τ *(SE)*	
Item	C	EA	C	EA
Garrulous (D)	.34 (.03)		.87 (.04)	
Domineering (D)	.47 (.03)		1.00 (.04)	
Disruptive (B)	.36 (.03)		.62 (.04)	
Sense of uniqueness (S)	.26 (.04)		1.85 (.07)	1.57 (.05)
Reckless (B)	.38 (.04)		.93 (.04)	
Self-aggrandizing (S)	.56 (.03)		.94 (.04)	
Intolerant (C)	.43 (.03)		.65 (.04)	
Sense of invulnerability (S)	.54 (.04)		1.04 (.07)	.78 (.05)
Lacks anxiety (E)	.35 (.04)		.85 (.04)	
Manipulative (D)	.49 (.03)		.82 (.04)	
Sense of entitlement (S)	.54 (.03)		1.00 (.04)	
Aggressive (B)	.25 (.04)	.43 (.04)	.45 (.04)	.48 (.04)
Self-centred (S)	.52 (.03)		.88 (.04)	

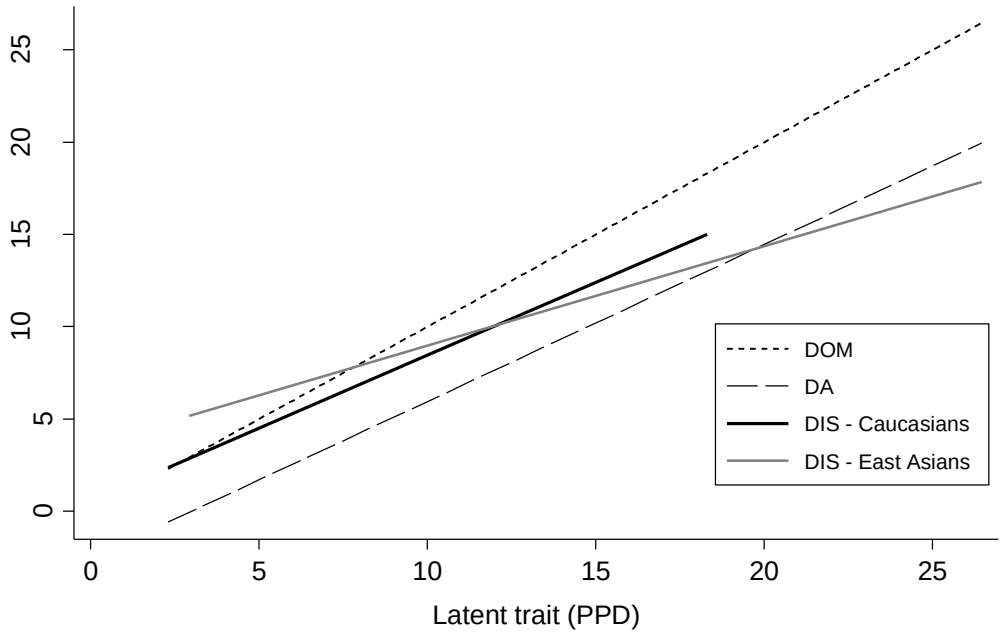
Table 3.17. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DA in Caucasians and East Asians.

	λ *(SE)*		τ *(SE)*	
Item	C	EA	C	EA
Lacks pleasure (E)	.37 (.04)		.99 (.04)	
Lacks emotional depth (E)	.45 (.04)		.84 (.04)	
Detached (A)	.49 (.04)		.85 (.04)	
Suspicious (C)	.41 (.04)		1.03 (.04)	
Insincere (D)	.45 (.03)		.65 (.04)	
Unreliable (B)	.29 (.02)		.40 (.03)	
Unempathic (A)	.46 (.02)		.49 (.03)	
Lacks remorse (E)	.43 (.03)		.59 (.04)	
Uncommitted (A)	.24 (.03)	.40 (.03)	.28 (.03)	.37 (.03)
Uncaring (A)	.43 (.02)		.43 (.03)	
Deceitful (D)	.45 (.03)		.56 (.04)	

Table 3.18. Factor Loadings and Intercepts for the Partial Scalar Invariant Model for DIS in Caucasians and East Asians.

	λ *(SE)*		τ *(SE)*	
Item	C	EA	C	EA
Antagonistic (D)	.38 (.04)		.61 (.04)	
Inflexible (C)	.27 (.04)		1.23 (.04)	
Restless (B)	.23 (.04)		1.35 (.04)	
Self-justifying (S)	.36 (.04)		1.16 (.04)	
Lacks planfulness (C)	.44 (.04)		.87 (.06)	1.10 (.05)
Lacks emotional stability (E)	.44 (.04)		1.16 (.04)	
Lacks concentration (C)	.55 (.05)		1.35 (.07)	1.57 (.05)
Lacks perseverance (B)	.42 (.03)		.63 (.05)	.85 (.05)
Unstable self-concept (S)	.55 (.04)		.81 (.05)	

Figure 3.6. Plot of the Test Functioning for the DIS subscale showing non-uniform DTF (d_{DTF} = .22) for Caucasians and East Asians against the invariant plots for DOM and DA.



3.5.1. Discussion

There was evidence for configural equivalence of DOM, DA, and DIS and the overall PPD factor across East Asians and Caucasians; they had the same underlying factor structure. However, cross-ethnic variations were also noted. Specifically, *Aggressive* and *Uncommitted* were found to be more discriminatory among East Asians than Caucasians with a medium and a large effect size, respectively. *Aggressive* being more discriminatory in East Asians is somewhat contrary to the earlier finding that *Aggressive* was less discriminatory among those who reporter stronger COL norms. The reason for this contradiction is unclear. In terms of differences in item thresholds, it appears that the DOM symptoms—specifically *Sense of invulnerability* and *Sense of uniqueness*—were more easily endorsed by Caucasians, whereas the DIS symptoms—*Lacks Perseverance, Lacks Planfulness,* and *Lacks Concentration*—were more easily endorsed by East Asians even at lower levels of the respective latent traits. Furthermore, even though DIS items were more easily endorsed by East Asians, DIS was found to be less discriminatory of PPD. The effect of this at the total score level, however, was negligible.

3.6. Additional Exploratory Analyses

As a manipulation check, the total sample was randomly split to form two equal groups to which the same model-fitting procedure was applied. There was no evidence of any uniform or non-uniform DIF, as would be expected, supporting the validity of this method.

Given that there continues to be much debate about the most appropriate approach for conducting MACS analyses, and this is the first study to use MACS to evaluate the cross-cultural generalizability of PPD as measured by self-ratings on the CAPP, additional exploratory analyses were performed to examine the stability of the findings across the different approaches and group split methods. Specifically, the above analyses with median-split NORM and ATT IND-COL groups were repeated using the ML method. For the NORM IND-COL comparisons, there was no decline in model fit when

the increasingly more constrained metric and scalar models were fitted for the DOM and DIS factors. The scalar invariant model, however, was not tenable for DA and MACS analyses showed *Unreliable* to have uniform DIF (Table 3.19). For the comparisons across ATT IND-COL groups, all three factors satisfied conditions for scalar invariance, and none of the items were identified as having DIF. Additional analyses across the following comparison groups were also conducted:

1) NORM extreme-split groups, comparing participants scoring on the upper and lower tertiles of the NORM scale using ML;
2) ATT extreme-split groups, comparing participants scoring on the upper and lower tertiles of the ATT scale using ML;
3) median-split groups based on Hofstede's IDV measure using ML; and
4) median-split groups based on Hofstede's IDV measure using ADF.

Tables 3.19, 3.20, and 3.21 summarized the parameter estimates for items that were identified as being non-invariant for each of the three factors, respectively. Median-split groups based on the Hofstede's IDV index demonstrated scalar invariance for all three factors, and no items were identified as having DIF. MACS analysis for NORM and ATT extreme split groups and across East Asians and Caucasians were also conducted using ADF, but the multi-group baseline models had poor fit to the data and was not analyzed further.

Table 3.19. Parameter Estimates Associated with DIF Items on the DOM scale.

Group-split method	Group 1 vs. Group 2	DIF Item	Loading		Intercept			
			Λ_{IND}	Λ_{COL}	τ_{IND}	T_{COL}	ΔX^2	p
Extreme ATT split, ml	IND (n = 254) vs. COL (n = 268)	*Sense of invulnerability*			.83	1.05	17.39	<.001
		Sense of uniqueness			1.54	1.83	15.33	<.001
Median Hofstede's IDV split, adf	IND (n = 535) vs. COL (n = 239)	*Sense of uniqueness*			1.64	1.41	11.43	<.001
		Aggressive			.38	.24	9.49	.002

Table 3.20. Parameter Estimates Associated with DIF Items on the DA scale.

Group-split method	Group 1 vs. Group 2	DIF Item	Loading		Intercept			
			Λ_{IND}	Λ_{COL}	τ_{IND}	T_{COL}	ΔX^2	p
Extreme NORM split, ml	IND (n = 242) vs. COL (n = 256)	*Unreliable*	.54	.98	.29	.45	11.94	<.001
Extreme ATT split, ml	IND (n = 254) vs. COL (n = 268)	*Detached*			1.01	.83	11.57	<.001
		Lacks pleasure			1.12	.89	10.71	.001
Median Hofstede's IDV split, adf	IND (n = 535) vs. COL (n = 239)	*Unreliable*			.26	.36	8.28	.004

Table 3.21. Parameter Estimates Associated with DIF Items on the DIS scale.

Group-split method	Group 1 vs. Group 2	DIF Item	Loading		Intercept			
			Λ_{IND}	Λ_{COL}	τ_{IND}	T_{COL}	ΔX^2	p
Extreme ATT split, ml	IND (n = 254) vs. COL (n = 268)	*Restless*			1.24	1.55	12.26	<.001
Median Hofstede's IDV split, adf	IND (n = 535) vs. COL (n = 239)	*Lacks emotional stability*	.94	.48	1.03	.97	10.55	.001
		Inflexible	.66	.33	1.14	1.10	9.70	.002

3.7. Multiple Regression Analyses

Correlational and hierarchical multiple regression analyses were conducted to examine how the various levels of IND-COL were associated with the CAPP Total score. These analyses were then repeated with the DOM, DA, and DIS factor scores to examine if there might be aspects of PPD that were more strongly associated with culture. Given that the differential test functioning at the total and factor CAPP score levels were insubstantial, the raw scores were used in the following analyses.

Zero-order correlations between ATT, NORM, and IDV and the CAPP Total and factor scores are reported in Table 3.22. As was hypothesized, attitudinal IND-COL was significantly negatively correlated with CAPP score, although this association was only a weak one. Stronger individualistic attitudes (i.e., lower ATT scores) was weakly associated with higher CAPP self-rating scores. Country-level IND-COL was also significantly associated with CAPP Total and factor scores, although this was in the opposite direction: being from countries that were considered more collectivistic was weakly associated with higher CAPP self-rating scores. Participants' perceptions of the relative IND-COL norms (i.e., NORM) were not associated with CAPP Total or factors scores.

Table 3.22. Zero-order correlations between the three INDCOL measures and CAPP Total and Factor Scores.

CAPP	Total	DOM	DA	DIS
ATT	-.29**	-.18**	-.34**	-.23**
NORM	.02	.02	.00	.05
Hofstede's IDV	-.18**	-.18**	-.15**	-.11**

Note. ** $p < .001$.

Steiger's Z-tests for correlated correlation coefficients revealed ATT to be more strongly related to DA than to DOM ($Z = 5.13$, $p < .001$) and DIS ($Z = 3.36$, $p < .001$). The correlations between ATT and DOM and between ATT and DIS were not significantly different ($Z = 1.52$, $p = .128$). ATT being more strongly related to DA is consistent with the

notion that ATT measures personal IND-COL orientation, which may not necessarily translate into behaviors. There were no significant differences in the correlation coefficients between IDV and the three factor scores.

Hierarchical regression on the CAPP Total scores were conducted with age and gender entered as covariates in the first block; ATT entered as the second block; NORM, IDV, and ethnicity entered in the third block. Two-way interactions between ATT and IDV, NORM, and ethnicity were entered in the fourth block to examine if the associations between attitudinal IND-COL and CAPP self-rating scores were moderated by social norms and broader cultural syndromes. As was hypothesized, ATT was significantly associated with CAPP Total scores, such that greater personal IND endorsement was associated with higher CAPP Total scores (Table 3.23). In addition to greater attitudinal IND endorsements, being East Asian and, oddly, being from countries that are considered to be more COL based on Hofstede's IDV index were also significantly associated with higher CAPP Total scores. The association between ATT and CAPP Total scores was not moderated by social norms and broader cultural syndromes.

To better understand how the different aspects of PPD are shaped and influenced by culture, the above regression analysis was repeated with each of the three DOM, DA, and DIS factor. As would be expected, ATT was significantly associated with all three factors, although most significantly associated with DA (Table 3.24). However, contrary to expectations, in addition to ATT, IDV was significantly associated with DOM and DA, but not DIS. That is, those from countries that are considered to be more COL based on Hofstede's IDV index had higher DOM and DA scores. On the other hand, being East Asian was significantly positively associated with DIS controlling for ATT. As per the regression analysis for CAPP Total, association between ATT and CAPP factor scores were not moderated by social norms and broader cultural syndromes. In fact, NORM was not associated with CAPP Total and factor scores.

Table 3.23. Hierarchical regression analysis for culture measures predicting CAPP Total Scores.

	CAPP Total Scores			
	β	*t*	R^2	ΔR^2
Block 1			.086**	
Age	-.04	-1.09		
Gender	-.28**	-8.10		
Block 2			.154**	.068*
ATT	-.25**	-7.40		
Block 3			.195**	.041**
NORM	.00	-0.02		
IDV	-.13**	-3.65		
East Asian ethnicity	.12**	2.73		
South/SE Asian ethnicity	.03	0.73		
Block 4			.201**	.006
ATT x NORM	.01	0.04		
ATT x IDV	.39	1.56		
ATT x East Asian	.13	0.48		
ATT x South/SE Asian	.40	1.48		

Note. ** $p < .001$.

Table 3.24. Hierarchical regression analysis for culture measures predicting CAPP factor Scores.

	DOM				DA				DIS			
	β	*t*	R^2	ΔR^2	β	*t*	R^2	ΔR^2	β	*t*	R^2	ΔR^2
Block 1			.107**				.091**				.009*	
Age	.01	0.34			-.07	-2.04			-.05	-1.38		
Gender	.33**	9.32			.30**	8.39			-.08	-2.25		
Block 2			.131**	.023**			.184**	.093**			.060**	.051**
ATT	-.15**	-4.35			-.31**	-9.10			-.23**	-6.29		
Block 3			.164**	.034**			.216	.032**			.094**	.034**
NORM	-.02	-0.62			.00	-0.01			.03	0.80		
IDV	-.16**	-4.27			-.11*	-3.09			-.05	-1.32		
East Asian ethnicity	.06	1.36			.09	2.20			.16**	3.57		
South/SE Asian ethnicity	.05	1.13			-.02	-0.52			.05	1.11		
Block 4			.172**	.007			.226**	.010			.98**	.005
ATT x NORM	.19	0.75			-.07	-0.3			-.16	-0.58		
ATT x IDV	.30	1.19			.41	1.67			.28	1.05		
ATT x East Asian	-.38	-1.41			.34	1.29			.53	1.89		
ATT x South/SE Asian	.02	0.09			.70	2.61			.38	1.31		

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

Chapter 4. General Discussion

Despite the widespread recognition of the importance of culture to the understanding of personality and personality disorders, there is a dearth of cross-cultural research on PPD. More than just intellectual chagrin, the lack of systematic research on the influence of culture on the manifestation and consequences of the disorder is particularly perturbing because of its clinical and legal applications. This study attempted to reduce ethnocentrism in the science and practice by examining how the self-ratings of psychopathic traits might vary across one fundamental cultural dimension, IND-COL. Specifically, this study examined the measurement equivalence, as well as any differential item functioning (DIF), of the CAPP across IND-COL groups using a MACS approach, with IND-COL measured four ways across three levels. There are three main conclusions about the cross-cultural generalizability of the CAPP self-ratings can be drawn from this study.

4.1. Cross-Cultural Generalizability of the CAPP

Firstly, there is some preliminary evidence for a 3-factor solution for the CAPP self-ratings. The three-factor model was intentionally kept broad in this study, but it still had a reasonably good fit to the data and was robust across the different permutations of IND-COL and ethnic groups. A particular strength of this study was that the model was developed using an independent sample and then cross-validated on the current sample, which enhances its plausibility (van de Vijver & Leung, 1997). The factor structure of PPD and its various measures has been a matter of ongoing investigations for the past two decade with differing supports for the 2- (Hare, 1991; Harpur, Hare, & Hakstian, 1989), 3- (Brinkley, Diamond, Magaletta, & Heigel, 2008; Cooke et al., 2001; Cooke & Michie, 2001; Sellbom, 2011), and 4-factor models (Kosson et al., 2013; Neumann, Hare, & Pardini,

2014; Vitacco, Neumann, & Jackson, 2005). The primary aim for developing a factor model here was to allow for further cross-cultural analysis. Nevertheless, the fact that the three factors found in the present study—Dominance (DOM), Deficient Attachment (DA), and Disorganized/Disinhibited (DIS)—parallels to an extent Cooke and Michie's (2001) Arrogant and Deceitful Interpersonal Style, Deficient Affective Experience, and Impulsive and Irresponsible Behavioral Style facets and Brinkley's (2008) Egocentricity, Callous, and Antisocial factors lends further support to the theoretical validity of this model.

Secondly, the syndromal structure of PPD, as operationalized by the CAPP and indicated by DOM, DA, and DIS factors, was invariant across attitudinal and normative IND-COL median split groups and across Caucasians vs. East Asians. This suggest the construct of PPD is conceptually similar across IND-COL cultures. In addition, the domineering and arrogant interpersonal aspects of the disorder consistently emerged as the most discriminating, whereas behavioral problems relating to disinhibition and impulsivity was consistently the least discriminating. Thirdly, even though there were a handful of items and scales that did displayed metric and scalar differences when comparing across IND-COL groups, these item-level biases cancelled each other out at the test level, resulting in overall insubstantial DTF. Taken together, these results support the cross-cultural generalizability of the CAPP and its use in individualistic and collectivistic cultures and with East Asians and Caucasians.

4.1.1. Effects at Item Level

4.1.1.1 Items with Non-Uniform DIF

Nevertheless, it is still worthwhile to consider which items showed DIF to understand the pathoplastic effect of culture on self-ratings of psychopathic traits. The items that were found to display differential functioning depended to certain extent on how IND-COL was measured: by participant's perceived cultural context (i.e., NORM), individual IND-COL orientation (i.e., ATT), self-identified ethnicity, or country of origin (i.e., based on Hofstede's IDV index). That said, there were a few items that consistently displayed non-uniform DIF with medium to large effect sizes. One example is *Aggressive.*

Aggressive was found to be less discriminating among those who reported perceiving stronger COL norms but more discriminating in East Asians. The reason for this paradoxical finding is not clear. Compared with White Europeans, East Asians have been known to exhibit higher levels of dialectical thinking and less consistency in their self-conceptions (S.X. Chen, Benet-Martínez, & Ng, 2014), and this may explain the inconsistent findings on the CAPP self-ratings. It is also possible that this result is related to acculturation issues given the greater proportion of foreign born participants in the East Asians group. Previous studies with such bicultural individuals who have been exposed to East Asian and Western cultures have found their self-perceptions to be quite drastically different depending on which of their two cultures was primed (S.X. Chen et al., 2014; S.X. Chen, 2015; Ross, Xun, & Wilson, 2002; Sik Hung Ng & Lai, 2009). Although there was not priming or cultural frame switching involved in this study, it is possible that responding to items about their personality and culture in English may have primed a more Westernized conception of themselves, resulting in greater endorsement of IND attitudes and higher ratings on CAPP items that appear more desirable in a Western context. This may also explain the odd pattern of associations between ATT, NORM, and IDV found for East Asians.

Regardless, the results suggest aggression may relate to PPD differently in collectivistic and East Asian cultures than in individualistic and Western cultures. As discussed earlier, the behaviors effective in asserting dominance and gaining power and control is different in different cultures (Bergeron & Schneider, 2005; Bond, 2004; Mesquita & Walker, 2003; Triandis, 2000). Thus, it is possible that in collectivistic cultures that prize harmony and eschew direct confrontation (Hofstede, 1980; Nisbett, 2003; Sims, 2007) the domineering interpersonal facet of PPD is less expressed through overt displays of violence and aggression. Instead, they may attempt to express dominance and assert control through other more subtle and indirect ways (Bond, 2004; Gunsoy, Cross, Uskul, Adams, & Gercek-Swing, 2015; Tinsley & Weldon, 2003). Although violent outcomes were not specifically examined in this study, a logical implication if there were indeed a suppressor effect of cultural norms on the aggressive interpersonal style associated with PPD is that the predictive utility of PPD on violent outcomes may be limited in cultures that has strong COL norms. Indeed, other studies have shown the association between PPD

and violence is moderated by ethnicity and other sociocultural factors (Asscher et al., 2014; Edens, Campbell, & Weir, 2007; Leistico et al., 2008; Singh, Grann, & Fazel, 2011; Walsh & Kosson, 2007; Walsh, 2012).

Other items that also showed non-uniform DIF were *Unreliable* and *Uncommitted*. Both had higher factor loadings in the COL and East Asian groups. These items appear to relate to interpersonal functioning and social role obligations. It is possible that being unreliable and failing to fulfil social role obligations is more disruptive and detrimental, and therefore more deviant and pathological, in collectivistic cultures, where there are greater emphasis on interdependence (Hofstede, 2001; Markus & Kitayama, 1991). In fact, *Unreliable* and *Uncommitted* were better indicators (i.e., had higher factor loadings) of DA for the COL group than the affective items. Affective symptoms, particularly *Lacks pleasure*, being less diagnostic of the disorder may be understood by considering the cultural differences in emotional experience and expression. Although previous studies comparing North Americans and Western and Eastern Europeans have suggested items in the affective domain to be most culturally invariant (Cooke et al., 2005a; Shariat et al., 2010; Wilson et al., 2014), this may not extrapolate to more collectivistic and Eastern cultures where the context, rules, expectations, meaning, and experience of emotions are quite different (Eid & Diener, 2001; Halberstadt & Lozada, 2011; Mesquita & Walker, 2003). Specifically, several studies have shown although the modal and preferred emotional experience in North America is pleasure, East Asians tend to experience "neutral" or no emotions (Eid & Diener, 2001; Matsumoto & Hwang, 2011; Mesquita & Karasawa, 2002; Mesquita & Walker, 2003). Pleasure was also found to be less central as a source of motivation and predictor of overall life satisfaction in collectivistic than individualistic cultures (Diener, Oishi, & Lucas, 2003; Kitayama, Markus, & Kurokawa, 2000; Miyamoto, Ma, & Petermann, 2014). Hence, in collectivistic cultures, lacking in pleasurable emotions may not be as problematic or dysfunctional as it would be in individualistic cultures, which may explain its greater irrelevance to PPD.

4.1.1.2 Items with Uniform DIF

There were also a number of items that consistently showed uniform DIF. Specifically, *Sense of invulnerability* and *Sense of uniqueness* on the DOM scale tended to be endorsed more by Caucasians and those who endorsed greater COL attitudes; whereas *Lacks Perseverance, Lacks Planfulness,* and *Lacks Concentration* on the DIS scale tended to be endorsed by East Asians and those who reported perceiving strong COL norms. In contrast, the endorsement of *Lacks pleasure* and *Detached* were dampened in the attitudinal COL group. These differences in item intercepts may have occurred due to different reasons. There may be different socialization and enculturalization processes that have facilitated the expression of certain symptoms while suppressing others. For instance, socialization experiences that emphasize relationships and interconnectedness in collectivistic cultures may suppress isolative and distant behaviors and thereby the dampened scores on *Detached* for those reporting greater COL attitudes.

It is also possible that differences in item intercepts are artefacts that result from the way people from different cultures respond to self-report measures. Specifically, two potential sources of contamination have been identified to be particularly problematic in cross-cultural research: response style bias and reference group effects (Church, 2010). Response style bias (RSB) is the tendency to respond to items in particular ways that are unrelated to the content or the intended construct (Baumgartner & Steenkamp, 2001). Previous research has shown robust associations between particular types of response styles and cultural orientations (Baumgartner & Steenkamp, 2001; G.W. Cheung & Rensvold, 2000; He, Bartram, Inceoglu, & van de Vijver, 2014; T. Johnson, 2005; Morren, Gelissen, & Vermunt, 2011). Some commonly cited response styles include acquiescence or disacquiescence bias, extreme or middle response style, ambivalent or inconsistent responding, and social desirability and self-enhancement bias. Specifically, Asians and individuals from collectivistic cultures have been known to exhibit less self-enhancement and greater self-effacing tendencies compared to North Americans (Boucher, 2009; Heine & Hamamura, 2007). The second potential source of contamination is known as the reference group effect (RGE). Because people rate their attributes by comparing

themselves with others familiar to them, people of different cultural backgrounds might use different groups of individuals and different sets of norms as reference when they are rating themselves (Heine, Lehman, Peng, & Greenholtz, 2002). This is akin to measuring themselves using different rulers and can significantly skew the ratings. For example, Heine and colleagues (2002) found North American respondents rated themselves more independent and less interdependent than Japanese respondents when explicitly asked to rate themselves relative to the other cultural group than when they rated themselves with no explicit reference group. Thus, the greater endorsement on items such as *Lacks Perseverance, Lacks Planfulness,* and *Lacks Concentration* by East Asians and those who reported perceiving strong COL norms may be the result of these responding biases.

Importantly, RSB and RGE can impact item scores differentially, resulting in item-level bias, or DIF, such as those discussed above. It can also have a uniform impact, affecting all the items in the same way, in which case MACS techniques will not be able to detect the bias. In the former case, RSB and RGE may interact with item content, item wording, or format to result in DIF. In the latter case, the RSB and RGE have pervasive effects on all the items, and they uniformly affect each indicator to more or less the same degree. As a result, instead of showing item-level biases, the latent mean and variance of the factor would be affected (Little, 1997; Meredith, 1993).To parse out the effects of uniform RSB and RGE, these two response styles would have to be measured independently and be included in the model as covariates.

4.2. Cultural Influences

The second aim of this study was to unpack the influence of culture on the expression of PPD by studying IND-COL at various levels. The idea was that by focusing on IND-COL from a subjective norm perspective and contrasting it from IND-COL as an individual attitude, it will allow inferences to be drawn about the cultural processes and how group norms and individual attitudes may be differentially associated with PPD. As was hypothesized, results from the regression analyses suggest CAPP Total and factor scores were significantly associated with individual's IND orientation, suggesting PPD is,

to an extent, a manifestation of an individual's IND orientation. This finding confirms, to an extent, Cooke's (1996) speculation that PPD, particularly its core interpersonal and affective features, are associated with IND. A closer examination of the multiple regression models of the three CAPP factors suggested different aspects of PPD may be shaped and influenced by culture in different ways, although the direction of the associations was contrary to expectations. Specifically, those from countries that are considered to be more COL based on Hofstede's IDV index had higher DOM and DA scores whereas being East Asian was significantly associated with higher DIS scores, even after controlling for ATT. Additionally, no interaction effects between individual's IND-COL attitudes and broader cultural syndrome and social norms on CAPP Total and factor scores were found, which is again not what was expected.

As demonstrated in this study, not only is the measurement of culture necessarily complex and multi-levelled, its effect on PPD is likely also multiplexed, making the unpacking of cultural influences challenging. As such, it is not clear the reasons for such unexpected findings. Further, although the measurement of INDCOL at each level was significantly correlated in the expected direction to the next level in the hierarchical order, the magnitudes of the correlations were small. In fact, the individual-level ATT measure was not associated with the group-level measures of IND-COL. This finding is consistent with other cross-cultural research that showed IND-COL was not isomorphic across levels (Fischer, 2009; Hofstede, 1980; Taras, Rowney, & Steel, 2009). There was also no clear pattern to the ATT and NORM IND-COL scores across the three ethnic groups, and it is not clear how the different levels of culture relate to each other. Although perplexing, such findings highlight the need for more nuanced understanding of culture; single numeric index or category label is insufficient for any meaningful description or study of culture. Further, as the results of this study demonstrated, findings cannot be generalized across the different facets and levels of the culture.

4.3. Strengths and Limitations

Methodologically, the present study provides an example of how MACS (Sörbom, 1974) can be used to examine measurement equivalence and detect uniform and non-uniform DIF on unidimensional polytomous data. Unlike most IRT models which often require sample sizes of over 500 per group to obtain accurate parameter estimates, especially for polytomous cases (Reise et al., 1993), MACS analysis can be used with sample sizes as low as 200 per group and thus provides an accessible method for examining measurement equivalence in cross-cultural studies (González-Romá & Hernández, 2006; Hernández & González-Romá, 2003; J. Lee et al., 2011; Stark et al., 2006). Further, as exemplified in this study, when conducting such measurement equivalence tests, the referent item should not be selected arbitrarily as a non-invariant indicator can greatly bias the invariance conclusion (G.W. Cheung & Rensvold, 1999). Factor-ratio test, although tedious, performs well to identify invariant items to act as the anchor (French & Finch, 2006).

4.3.1. Use of Undergraduate Sample

The use of a convenient undergraduate sample comes with several limitations. Foremost, the findings may not be generalizable to other populations of interest, like forensic and clinical populations, although recent studies have supported the validity and utility of PPD research using non-instutionalized, college samples (Falkenbach, Stern, & Creevy, 2014; Z. Lee & Salekin, 2010; Salekin, Trobst, & Krioukova, 2001; Sellbom, 2011). The prevalence of severe psychopathic traits was low among in this sample of undergraduate students, as would be expected. This resulted in range restriction issues, which in turn attenuates the strength of the associations and lowers the communalities when extracting the common factor. Nevertheless, the use of such sample circumvents other potential confounds such as literacy issues or the need for translation. It is likely that for a substantial minority of the participants, and perhaps a greater number in the collectivistic group, English was not their first language. Although English language proficiency was not directly assessed in this study, between group differences in the CAPP ratings were unlikely attributable to this given that the participants were undergraduate

students at an English university. Moreover, the items that did show DIF did not appear to be lexically more difficult.

4.3.2. Use of Self-Report Measures

Both a strength and a weakness of this study is that it does not utilize the "gold standard" instrument, the PCL-R, but instead uses the CAPP. This avoids the problem of mono-operation bias that Skeem and Cooke (2010a, 2010b) cautioned against. Using the CAPP, which was developed as a comprehensive model of PPD, this study circumvents the problems of conflating the measure with the construct and using operationalizations of PPD that are too narrow and potentially culturally-biased. That said, given that the PCL-R is the most widely accepted instrument used in clinical practice (Singh et al., 2014), it is crucial that the cross-cultural validity of the PCL-R be examined to provide direct evidence for its use or misuse.

The sole reliance on using self-report measures like the CAPP further presents with a number of limitations from both personality disorder and cross-cultural research standpoints. From a personality disorder research standpoint, there is the issue of using self-report measures in the assessment of a personality disorder whose cardinal features are dishonesty, egocentrism, and poor insight (Lilienfeld, 1994). Moreover, the CAPP was used in this study as a lexical self-rating of psychopathic personality traits, rather than ratings of symptoms of PPD per se, as functional impairments associated with the CAPP symptoms were not assessed. Nevertheless, recent studies have found satisfactory validity for using self-report measures to assess PPD (e.g., Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld & Andrews, 1996; Marcus, John, & Edens, 2004; Riopka, Coupland, & Olver, 2015; Sellbom, 2011; Vitacco, Neumann, & Pardini, 2014). Statistically, there is the issue of shared method variance, which would artificially inflate the correlations; although, this should have no effects on the pattern of associations or the items showing DIF.

The use of such self-report rating scales is also not ideal from a cross-cultural research standpoint. Cross-cultural researchers have previously eschewed the use of such scales, arguing that personality and trait attributes self-report measures are less

reliable and valid in collectivistic cultures compared to individualistic cultures because self-referential behaviors and thinking are less natural and intuitive (e.g., Heine, Buchtel, & Norenzayan, 2008; Markus & Kitayama, 1998; Sul et al., 2012). Furthermore, they contend that personality traits are likely less predictive of behavioral outcomes in collectivistic cultures given the greater influence of social roles, relationships, and norms (Markus & Kitayama, 1998). Another issue with using such measures is that valid self-report ratings assumes the individual only responds to the substantive meaning of the item. However, as discussed above, this is rarely the case. In addition to causing bias and DIF to select items, RSB and RGE can introduce systematic sources of measurement error and confound cross-cultural comparisons (Baumgartner & Steenkamp, 2001). Although MACS analysis is able identity items that are differentially affected by these measurement artifacts, it cannot distinguish between systematic RSB and RGE and cultural effects (Little, 2000). To examine the systematic impact of these various possible forms of biases, they have to be measured independently and be included in the model as covariates (Little, 2000).

Using observer or expert rating scales, such as the PCL-R or the CAPP-IRS (Cooke, Hart, Logan, et al., 2004), may address some of these issues. However, they are not without their own set of challenges. For one, there is the potential issue of rater effects. Depending if the raters are of the same cultural background, there could be potential misdiagnosis of symptoms due to raters' unfamiliarity with the examinee's language, interpersonal style, culture, values, and expressions. On the other hand, if the raters are of the same cultural background, then there is still the issue of reference group effects. Despite the known problems with diagnostic reliabilities and clinical subjectivity (Boccaccini, Murrie, Rufino, & Gardner, 2014), only one study has specifically investigated this issue of cross-cultural rater bias in PPD assessment. Cooke and colleague (2004) compared the ratings of Canadian and Scottish raters on six Canadian and Scottish offenders each. Although they found no evidence for a rater effect, the authors cautioned against generalizing this lack of rater effects to other cultures.

4.3.3. Other Limitations

Another limitation of this study is that it does not look at the predictive validity of PPD. Given that it is its relationship with serious criminality and violence that had spurred such great interest, it is crucial for future studies to investigate if PPD is equally predictive of violence and serious criminality across cultures. Further, this study has investigated cross-cultural differences only on one dimension, IND-COL. Future studies should replicate this with the different dimensions of culture such as power distance, cultural constraints, long-term versus short-term orientation, indulgence versus restraint, and so forth (Taras et al., 2009). Indeed, even IND-COL has been differentiated into horizontal and vertical individualism and collectivism (Singelis et al., 1995).

The sample in this study was drawn from a single setting, and it is likely that the participants would be more similar than dissimilar in terms of their cultural orientation despite their different ethnicities. Ideally, samples should be drawn from across different nations and cultural groups to maximize cross-cultural variance. Nevertheless, despite potentially restricted culture variance, differences in item functioning were observed for a handful of items. It is possible that if compared across more extreme groups drawn from more distinct cultural backgrounds, there would be more items showing DIF or the same items showing even greater DIF.

4.3.4. Future Directions for Cross-Cultural PPD Research: Etic-Emic Approaches

One of the main deficiency of using this approach to use a Western model and impose it on other cultures—despite the finding of cross-cultural generalizability—is that it may still omit important culture-specific, or emic, constructs. That is, it is still possible that the CAPP missed symptoms that are relevant to PPD in other cultures since the episteme it was based on was heavily North American or European. Such approach, also known as the etic approach, has been greatly criticized for it assumes that the imported model or instrument is not only applicable, but also complete (F.M. Cheung, van de Vijver, & Leong, 2011; Church & Lonner, 1998). It has been argued that Western psychology may not be

relevant or applicable in non-Western contexts. Western ideological orientation to the individual and the self, for example, flies in the face of Asian ethos (Ho, 1998). Thus, a blind “transport-and-test” strategy would lead to incomplete, and distorted, understanding of cross-cultural PPD.

Instead, there is a growing movement of indigenous psychology, especially in the Philippines, Hong Kong, Taiwan, China, Korea, and Japan, that emphasizes for a more cultural-specific understanding of psychology, personality, and psychopathology (F.M. Cheung et al., 2011). A key aspect of indigenous psychology and the emic approach is the emphasis on contextualizing understanding within certain setting and time, and making discoveries using natural language and taxonomies (Kim, Park, & Park, 2000). It adopts a bottom-up approach to build theories, but is based on local phenomena and experiences within the ecological context (F.M. Cheung et al., 2011). The coming of age in indigenous psychology in many parts of the world like Asia meant the emic approach is now a viable and sustainable method that can be used in the study of cross-cultural PPD to understand which symptoms may be culture-specific versus those that may be pan-cultural. This approach to studying PPD might involve developing a conceptual map of PPD using similar developmental process as the CAPP, but with different set of literature, and then comparing it with the original English CAPP. Such a project is feasible today with many researchers who are bilingual and bi-cultural. Additionally, emic researchers who do study PPD within their local culture, may be using their own locally developed assessment tools, should also be encourage integrate them into mainstream psychological research to test their applicability to other cultures and contexts to bridge this etic-emic gap.

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