

Untangling the Relations Between the Five Factor Model and Schizotypal Personality:
Two Aspects of Openness to Experience Make Opposite Predictions

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Abstract

Untangling the Relations Between the Five Factor Model and Schizotypal Personality: Two Aspects of Openness to Experience Make Opposite Predictions

Angela J. Ring, MA
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There is growing evidence to support the use of dimensional models for the classification of personality disorders (PDs). The Five Factor Model (FFM) is one such model that has been proposed as a unifying system for both normal and abnormal personality description; however, the Openness to Experience (OE) domain remains problematic. Some studies fail to replicate the domain when taking into account PD pathology, while others find inconsistent results regarding schizotypal personality disorder (SZPD). These inconsistencies have led some authors to suggest that the OE domain may not be useful in describing PD pathology. The following studies examine a two-aspect structure of OE as one possible explanation for the previously inconsistent findings. It is suggested that OE can be decomposed into two distinct yet correlated aspects. There is evidence to suggest that OE relates to both a willingness, and capacity to be open to sensory awareness and subtle cues from the environment on the one hand, and the capacity to organize and integrate that information on the other hand. The current series of studies propose that inconsistent findings between OE and SZPD are the result of the facets of OE grouping together into two separate but related aspects. As such, the Openness Aspect (OA) is hypothesized to relate in a positive manner to SZPD, while the Intellect Aspect (IA) is hypothesized to relate in a negative manner to SZPD. This hypothesis was tested in both student and clinical samples using multiple regression

analysis, confirmatory factor analysis and structural equation modeling. As predicted, results revealed consistent and unique associations for each aspect with SZPD, regardless of sample. Taken together, the studies described add to growing evidence that the FFM is a useful dimensional model for the integration of normal and abnormal personality description. Moreover, the findings presented here highlight the importance of considering multiple levels of personality structure, in that both facet and aspect level analysis revealed associations that domains were unable to capture.

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Introduction

A current paradigm shift is underway in the conceptualization and classification of Personality Disorders (PDs; Widiger & Trull, 2007). Proponents of this shift point to both theoretical rationale as well as empirical evidence to suggest that the current categorical system is inadequate, and that a more dimensionally based system for PD description and diagnosis is warranted (Samuel & Widiger, 2008). Many researchers have proposed The Five-Factor Model (FFM; Costa & McCrae, 1992) as an appropriate dimensional system to unify the normal and abnormal personality literatures. The FFM is useful as a system for personality classification in that it consists not only of five broad personality domains, but also allows for a nuanced description of personality traits through the subdivision of domains into 30 distinct facets. Indeed, in their meta-analytic review of facet level research examining the relations between the FFM and personality pathology, Samuel and Widiger (2008) found consistent facet-level profiles for the majority of PDs. Despite strong evidence to suggest that the majority of FFM domains are useful in describing personality pathology, the Openness to Experience (OE) domain has remained problematic. For example, many studies find little to no relations between this domain and any of the current DSM-IV PDs (Saulsman & Page, 2004; Samuel & Widiger, 2008), leading some authors to suggest that OE may not play a role in personality pathology (O'Connor, 2005).

Adding to the controversy surrounding OE, other studies have found inconsistent relations between the domain and Schizotypal Personality Disorder (SZPD), making SZPD the PD with the least consistent profile of FFM traits (Ross, Lutz, & Bailey, 2002). For example, studies conducted with non-clinical samples appear to show a positive

association between OE and SZPD, whereas the association disappears with the use of clinical samples (Ross et al., 2002; Tien, Costa, & Eaton, 1992). These inconsistent findings are striking given the theoretical evidence suggesting a link between OE and SZPD. Both OE and schizophrenia spectrum disorders (SSDs) have been associated with reduced latent inhibition, and all three of these constructs have been associated with the dopaminergic system (Camisa et al., 2005; DeYoung, Peterson, & Higgins, 2005). Moreover, the odd and eccentric characteristics of SZPD, such as belief in the paranormal and other esoteric thinking would suggest a high amount of “openness” to a wide range of beliefs, values, and experiences.

Given the theoretical links between OE and SZPD via both reduced LI and the dopaminergic system, as well as the behavioural characteristics of SZPD that suggest a high amount of “openness”, it is surprising that no consistent associations between OE and SZPD have yet been established. More recent literature on the conceptualization of OE suggests that the domain is better thought of as representing two distinct yet related aspects (DeYoung, Quilty, & Peterson, 2007). As such, the inconsistent finding between OE and SZPD may be the result of examining the domain as a whole.

Dimensional Models of Personality Disorder

Growing discontent with the current DSM-IV categorical system for Axis II PDs has led some researchers to suggest that dimensional models may be a more valid means of locating PDs within the context of overall personality structure (Widiger & Simonsen, 2005). The system employed by the DSM-IV-TR is largely based on a medical model in which symptoms are assessed in a dichotomous manner as present or absent, leading to a similarly dichotomous diagnosis. This approach to classification is based on a

hierarchical system of three clusters in which descriptive characteristics reflecting largely behavioural, cognitive or interpersonal difficulties form the basic units for diagnostic assessment (Trull & Widiger, 2008).

Cluster A is comprised of the Paranoid, Schizoid, and Schizotypal PDs. Similarity among these PDs is thought to lie within the odd and eccentric behaviours and thoughts often associated with these disorders. Cluster B, is concerned with the dramatic, emotional, and erratic symptomatology, and is comprised of the Antisocial, Borderline, Histrionic, and Narcissistic PDs. Lastly, Cluster C is comprised of the Avoidant, Dependant, and Obsessive-Compulsive PDs, characterized by anxious and fearful symptomatology. Each of the ten main-text PDs are classified based on a list of symptoms that varies in number with each PD. Depending on the PD in question, a set number of these symptoms must be present in order to warrant a diagnosis. For example, in order to receive a diagnosis of SZPD, at least five out of a possible nine symptoms must be present (DSM-IV-TR).

In contrast to this system, dimensional models view personality pathology as reflecting maladaptive or pathological extremes of traits found within normal personality structure (Ryder, Bagby, & Schuller, 2002; Widiger, Trull, Clarkin, Sanderson, & Costa, 2002). The trend towards adopting a dimensional model approach is largely the result of: a) difficulties in differentiating personality traits unique to each PD; b) low rates of inter-rater diagnostic agreement; c) a high degree of comorbidity among the various PDs; d) categories that themselves reflect a huge amount a variability in symptom presentation; e) a lack of long-term stability in diagnosis; and f) the lack of overlap with normal personality structure (Clark, & Watson, 1999; Clark, Livesley, & Morey, 1997; Trull &

Durrett, 2005; McGlashen, Grilo, & Sanislow, 2005). Together, these issues have raised doubts as to whether most PDs have categorical properties, leading to many studies demonstrating that both abnormal and normal personality may co-exist within the same overall structure (Markon, Krueger, & Watson 2005; O'Connor & Dyce, 2002; Ryder, Bagby, & Schuller, 2002; Widiger & Trull 2007).

To date, the vast majority of research investigating dimensional models of PDs has drawn on one of the following instruments: The NEO-PI-R (Costa & McCrae, 1992), the Dimensional Assessment of Personality Pathology (DAPP; Livesley 2001, 2003), and the Schedule for Nonadaptive and Adaptive Personality (SNAP; Clark, McEwan, Collard, & Hickok, 1993). The NEO PI-R draws directly from the FFM, and approaches personality pathology from the standpoint of normal personality structure. Within this framework, the identification of personality pathology begins with an examination of traits found within normal populations, and attempts to identify maladaptive extremes of these traits thought to characterize specific PDs. In contrast, both the DAPP and the SNAP were developed specifically with personality pathology in mind. Using descriptions of PD symptoms the respective authors were able to identify underlying personality pathology dimensions. More specifically, work with both the DAPP and the SNAP has resulted in the identification of four factors, which have been labelled emotional dysregulation, dissocial behaviour, inhibitedness, and compulsivity. These factors are respectively analogous to the neuroticism, agreeableness, extraversion, and conscientiousness domains of the FFM; however, attempts to extract a PD structure with these instruments have failed to replicate the OE domain of the Big Five.

This failure to replicate OE may in part be the result of the inconsistencies between the current categorical system and normal personality structure, such that PD classification as it stands does not adequately capture or represent elements of normal personality. As such, the FFM may be a more useful dimensional model that can be used to unify the normal and abnormal personality literatures. Unlike the current categorical system, the FFM has been well established within the normal personality literature, across a range of samples and in a variety of cultural groups (Costa & McCrae, 1992). Each of the five domains of the FFM, including the majority of the 30 facets have been shown to be highly heritable, with genetic effects accounting for between 25-65% of variance (Jang, McCrae, Angleitner, Riemann, & Livesley, 1998). Moreover, the inclusion of 30 lower-order facets that make up the five domains of the FFM may allow for a more nuanced description of personality pathology (Markon et al., 2005; O'Connor & Dyce, 2001; Trull & Widiger, 2008; Widiger, et al., 2002).

Five Factor Model

Predominant opinion in personality theory suggests that there are five major domains of human personality. The Big Five include Extraversion / Surgency, Agreeableness, Conscientiousness, Emotional Stability / Neuroticism, and Openness to Experience / Intellect (Digman, 1990; Goldberg, 1990; McCrae & Costa, 1987). This consensus is the result of convergence between both the psycho-lexical approach of trait identification, and a more theoretically based approach in which questionnaire scales are developed in order to measure constructs suggested by theory. The psycho-lexical approach (Goldberg, 1990) is based on the assumption that important trait-descriptive adjectives of personality are encoded in natural language. As such, analysis of trait

adjectives within a language will reveal the underlying structure of human personality. Over the course of decades of research, this approach resulted in the identification and replication of the Big Five (Goldberg, 1993; Tupes & Christal, 1961).

The second line of research from which five factors of personality have been extracted comes from the analysis of questionnaires based on a variety of personality theories. As McCrae and John (1992) point out, the diversity of personality theories may, at first glance, appear to have hindered the possibility of identifying any common factors; however, there is in fact a great amount of overlap between constructs from different theories. For example, many theories and their corresponding scales deal with elements of emotional instability, while others focus on elements of social interaction. It is thus not surprising that the first two domains of personality identified within this tradition were Eysenck, and Eysenck's (1964) Neuroticism and Extraversion. Further research led to the identification of a third factor, first labelled "Absorption" (Tellegen & Atkinson, 1974), and later "Openness to Experience" by Costa and McCrae (1976). However, it was not until the integration of these two approaches to the study of personality that the contemporary FFM began to emerge with the addition of the Agreeableness and Conscientiousness domains (Costa & McCrae, 1992).

There are several advantages to using the FFM to characterize PDs. Each of the five domains within Costa and McCrae's (1992) FFM is further subdivided into six lower order facets. The existence of these lower-order facets allows for a more nuanced description of PDs, as well as greater specificity, such that it may be possible to isolate the contributions made by specific aspects or facets of a given personality domain (De Fruyt, De Clercq, van de Wiele, & Van Heeringen, 2006; Dyce & O'Connor, 1998).

Moreover, sound psychometric measures for the FFM and related traits already exist and have been in use in both research and clinical setting for many years (Trull & Widiger, 2008). Widiger and Lowe (2007) also point to the construct validity of this model, and its use within the fields of health psychology, aging, and developmental research as further reasons to support its use for PDs. Lastly, the FFM displays excellent convergent-discriminant validity across self, peer, and spouse ratings, and cross-cultural support using both emic and etic approaches (Allik, 2005; Ashton & Lee, 2001; Costa & McCrae, 1992)

There is sufficient evidence to suggest that the FFM is indeed a useful dimensional model when considering PDs. In the first study to examine facet level associations with PDs, Dyce and O'Connor (1998) found a substantial increase in specificity over domains in predicting various PDs. These findings were supported by Reynolds and Clark (2001), who found a strong relation between PDs and facets of the FFM above and beyond those offered by a domain-level analysis. Moreover, using both self-report and interview methods to obtain FFM ratings, Bagby and colleagues have found support for the FFM structure in psychiatric samples (1999, 2005), with facet-level analyses accounting for a greater amount of variance than domain-level analyses (Bagby et al., 2005). These findings lend support for the use of the FFM as a viable system for PD description. Nonetheless, the OE domain remains problematic as it has yet to be consistently associated with any PD. For example, in a meta-analysis of 33 studies examining the relations between the FFM and symptoms of PDs, Malouff, Thorsteinsson, and Schutte (2005) found that all domains save OE demonstrated significant effect sizes in relation to PD symptomatology. Before the FFM can fully be adopted as a dimensional

system for PD classification and diagnosis, the relations between OE and personality pathology must be clarified.

Openness to Experience

There has been considerable conceptual debate surrounding the OE domain. Within the lexical approach, the fifth factor is typically labeled Intellect (Goldberg, 1990), while more recent questionnaire-based models have employed the label Openness to Experience (Costa & McCrae, 1992). "Openness (to experience) is seen in the breadth, depth, and permeability of consciousness, and in the recurrent need to enlarge and examine experience" (McCrae & Costa, 1997, p. 826). As such, individuals who score high on OE are thought to not only enjoy new experiences for their own sake, but also relish seeking them out. More specifically, within the FFM, OE is comprised of six facets, representing a tendency to fantasize (Fantasy), aesthetic sensitivity (Aesthetics), awareness of one's emotions (Feelings), preference for novelty (Actions), intellectual curiosity (Ideas), and a preference or willingness to tolerate non-traditional values (Values) (Costa & McCrae, 1985, 1992). In contrast, within the lexical tradition, Factor V, labeled "Intellect", is related to artistic imagination, introspective reflection, intellectual knowledge, independence, and nonconformity. It is represented by such adjectives as creative, intellectual, smart, and curious. (Capara & Perugini, 1994; Goldberg, 1994; Saucier, 1994).

In contrast, there is considerable evidence suggesting a significant amount of overlap between Factor V and intelligence (Ackerman & Heggstad 1997), as the "Intellect" label within the lexical tradition inherently suggests. However, McCrae (1994) contends that given the richness of the construct, intelligence is too narrow a term to fully

represent OE, and specifically points to evidence showing that OE is correlated with a variety of aspects of an individuals' life that go beyond intelligence, such as political attitudes, musical interests, and attitudes towards sexuality. Given this wide variety of associations, McCrae (1994) suggests that the overlap between OE and measures of intelligence is best understood as representing an open individuals' interest in pursuing intellectual activity, above and beyond actual ability.

This debate is fueled largely by studies demonstrating a strong and consistent association between OE and measures of cognitive ability (Ackerman & Heggestad 1997; Zeidner & Mathews, 2000). Brand (1994) has suggested that this association is primarily the result of correlations with crystallized versus fluid intelligence, as individuals who demonstrate high scores on measures of OE may be prone to seek out the kind of information that is typically associated with crystallized intelligence; however, in a meta-analysis of 135 studies, OE was found to correlate both with crystallized (.30), and general intelligence (.33) (Ackerman & Heggestad 1997). More recent evidence supports the notion that OE correlates more highly with measures of crystallized intelligence than of fluid intelligence, with correlations ranging from .32-.37 (Ashton, Lee, Vernon, & Jang, 2000; Bates, & Shields, 2003). This empirical overlap has lead more recent authors to suggest the compound label of O/I (Peterson, Smith, & Carson, 2002; DeYoung, Peterson, & Higgins, 2005; DeYoung, Quilty, & Peterson, 2007). As suggested by this more recent conceptualization, the current paper will aim to further investigate OE from the perspective of two related but distinct construct, namely "openness" and "intellect", however, in keeping with popular nomenclature, the label of OE will be retained.

With respect to dimensional systems for PDs classification, OE has proven to be the most problematic. Studies attempting to develop such a system using the SNAP and the DAPP, which are based on symptom description from the current categorical approach, typically extract four rather than five factors, with OE being the missing factor (Clark, Livesley, Schroeder, & Irish, 1996; Livesley, Jang, & Vernon, 1998). As previously mentioned, the development of both the SNAP and the DAPP was based on the use of factor analysis to extract factors based on descriptions of symptoms and traits relevant to the current categorical system. As such, the SNAP and the DAPP both assume that the current system accurately captures personality pathology. However, a four-factor structure fails to account for many of the symptoms found in Cluster A disorders such as cognitive or perceptual aberrations. On the other hand, when the FFM is selected as the model for investigating dimensional models of personality pathology, the OE domain appears to correlate with some elements of personality pathology, albeit in an inconsistent manner. For example, some authors (Coolidge et al., 1994; Wiggins & Pincus, 1989) have found a positive association between SZPD and OE in student samples, while others have failed to replicate this finding (Blais, 1997; Trull, 1992). In order for the FFM to be adopted as a unifying system for personality structure that accounts for both normal and abnormal personality, clear and consistent associations between pathological and normal personality structure must be demonstrated.

Schizotypal Personality Disorder

Schizotypal Personality Disorder (SZPD) is characterized by acute discomfort with, and reduced capacity for, close relationships. Moreover, cognitive or perceptual distortions and eccentricities of behavior are thought to be hallmarks of individuals

diagnosed with the disorder. According to the DSM-IV, symptoms include ideas of reference, odd beliefs or magical thinking that influence behaviour and is inconsistent with sub-cultural norms, such as excessive superstitiousness, belief in clairvoyance, telepathy or a “sixth sense”. In addition, individuals may experience unusual perceptual experiences, odd thinking and speech such as being vague, circumstantial, metaphorical or stereotyped, paranoid ideation, inappropriate or constricted affect, social anxiety that leads to a lack of close friends or confidants, and behaviour or appearance that is odd, eccentric or peculiar. Given many of the similarities between symptoms of SZPD and Schizophrenia, SZPD is thought to reflect a lesser form of the latter disorder within the context of SSDs.

The notion that symptoms and traits related to schizophrenia exist on a continuum of severity can be traced back as early as the turn of the century (O’Reilly, Dunbar, & Bentall, 2001). More recently, this continuum has been referred to as “schizotypy” at the most general level, and to SSDs within a clinical context (Claridge, 1997). This continuum encompasses everyday traits and experiences, from daydreaming as a non-disordered form of dissociation all the way to full-blown psychosis. Within the context of personality, the Cluster A PDs of Schizoid, Schizotypal, and Paranoid PDs are thought to lie at some point on the continuum between everyday non-disordered experiences and psychosis. This is largely the result of shared symptomatology with schizophrenia, such as unusual perceptual and cognitive aberrations.

As such, Schizotypal Personality Disorder (SZPD) reflects both an extreme variant of normally distributed individual differences in personality, as well as a premorbid or prodromal stage of schizophrenia (Chapman, Chapman, Kwapil, Eckblad,

& Zinser, 1994; Fernandes & Miller 1995; Raine, 2006). The link with schizophrenia is twofold in nature. First, the symptomatology of SZPD reflects the same cognitive-perceptual disturbances and interpersonal difficulties often associated with schizophrenia. Secondly, there is convincing evidence to suggest a genetic link with schizophrenia and related spectrum disorders and first-degree relatives of probands with these disorders (Appels, Sitskoorn, Vollema, & Kahn, 2004; Calkins, Curtis, Grove, & Iacono, 2004; Siever & Davis, 2004). However, while SZPD and schizophrenia do share a considerable amount of overlap at the symptom level, Camisa et al (2005) found that SSD participants scored lower than did schizophrenia patients on measures of social anhedonia, but comparable on measures of magical ideation and perceptual aberrations, suggesting that while much of the odd and/eccentric symptomatology overlaps between the two disorders, that functioning for the former group is better.

There has been some debate in the literature surrounding the classification of the SZPD as an Axis I or Axis II disorder (First et al., 2002). Proponents of an Axis I classification argue that, given SZPDs similarities to schizophrenia, it is better classified alongside this major disorder. In addition, they point to the strong genetic and heritable links between the two disorders, the similarities in etiology from a neurobiological perspective, and similarities in effective treatments (Meehl, 1995; Raine, 2006). However, comorbidity rates between SZPD and other PDs range from 29.1% to as much as 48.8%, suggesting a common PD dimension (McGlashen et al, 2000, Raine, 2006). Unlike schizophrenia, there is evidence to suggest that childhood trauma plays a role in the development of SZPD. Berenbaum and colleagues (1999, 2003), along with others (Irwin, 2001; Janssen, et al., 2004; Startup, 1999; Yen et al., 2002), have shown that

physical, sexual, and emotional abuse, as well as neglect and symptoms of post-traumatic stress, show strong positive associations with SZPD: Lastly, recent work suggests that a dimensional structure of schizotypy is superior to the current taxonic model (Rawlings et al., 2008). Taken together, these studies support the inclusion of SZPD on Axis II.

The behavioural characteristics of SZPD such as a willingness to entertain esoteric beliefs and magical thinking lend themselves well to understanding why SZPD has been positively associated with OE. In addition to these findings, there is an abundance of evidence supporting cognitive impairments in SZPD. As Raine (2006) points out in his review, at least 254 articles have been published on this topic alone. These studies point to areas of impairment that include executive functioning, sustained attention, working memory, and verbal and spatial learning, with schizotypal spectrum disorder patients performing somewhere between that of controls and schizophrenia patients. Interestingly, while general cognitive function seems impaired in these individuals, IQ itself does not show any deficits. Raine (2006) suggests that given evidence from some studies showing a positive association between schizotypy and creativity (O'Reilly, Dunbar, & Bentall, 2001), as well as evidence for increased rare word usage by those with SZPD and related disorders (Duchene, Graves, & Brugger, 1998), that an inverse relation exists between certain forms of cognitive impairment and an enhanced ability to form broad, unusual associations that foster both creativity and cognitive flexibility. Indeed, this speculation forms the basis of the central hypothesis of the current paper.

Openness to Experience and Schizotypal PD

The relation between OE and SZPD may not at first glance seem apparent. Closer inspection of relevant literature, however, reveals that many of the phenomena known to be associated with SSDs are also related in some manner to OE. For example both SZPD and schizophrenia have been linked to reductions in latent inhibition (LI), which itself has been associated with higher scores on OE (Peterson, Smith, & Carson, 2002)

LI is a cross species sensory processing phenomenon in which repeated exposure to a given stimulus without reinforcement leads to a decrease in the speed of learning future associations to that stimulus (Lubow & Gewirtz, 1995). As such, LI serves as a “gating” mechanism that allows the individual to ignore irrelevant information from the environment, and is thus considered a biologically adaptive function of implicit attention (Lubow & Gewirtz, 1995). Given the barrage of stimuli in our environment, it is not surprising that such a mechanism would exist in order to allow us to “filter out” stimuli not relevant to the task at hand. LI is related to how individuals process and organize information at an implicit level. When reductions in LI occur, individuals are less likely to suppress future associations to a given stimuli, resulting in an increase in latent awareness of and receptivity to sensory information. Moreover, OE is related to the “permeability of consciousness” and a “softening of the rigidity of mental categories” (McCrae, 1994), suggesting at least a theoretical link with reduced LI. Peterson and Carson (2000) have hypothesized and demonstrated that reduced levels of LI are associated with higher scores on OE. In addition, de Young et al. (2005) have found evidence suggesting that the dopaminergic system, which is related to LI, may be a neuropsychological source of OE. The authors suggest that the overlap with this

neuropsychological system may be responsible for the cognitive flexibility and exploration element of OE.

The finding that reduced LI is associated with OE is notable given that this phenomenon has also been associated with susceptibility to schizophrenia and its associated features/conditions, which in turn have also been associated with abnormalities of the dopaminergic system (Baruch, Hemsley, & Gray, 1988; Lubow, & Gewirtz, 1995; Serra, Jones, Toone, & Gray, 2001). In their analysis of schizophrenia and related personality disorders, Camisa and colleagues (2005) found that patients with schizophrenia spectrum personality disorders, which reflect a phenotypic expression of a liability to schizophrenia (Battaglia, Bernardeschi, Franchini, Bellodi, & Smeraldi, 1995; Kendler, et al., 1993) demonstrated higher scores on OE than control participants, while schizophrenia patients showed lower levels of OE than controls. The authors suggest that once psychosis has set in, levels of OE may decrease. This argument is supported by the fact that when non-clinical samples are used, a positive association between OE and positive symptom measures of schizotypy is found (Dyce & O'Connor, 1998; Ross, Lutz, & Bailey, 2002). In contrast, when clinical samples are used, this association disappears (Tien, Costa, & Eaton, 1992; Yeung, Lyons, Waternaux, Faraone, & Tsuang, 1993). As will shortly be reviewed, this latter finding may be the result of the contradictory effects of two aspects of OE.

Lower intellectual functioning has been suggested as a moderating factor in the development of psychosis (David, Malmberg, Brandt, Allebeck, & Lewis, 1997). While there is some debate surrounding the relations between intelligence and psychosis, what these authors may be alluding to is the ability to process information in a cognitive

manner. Indeed, Peterson, Smith, and Carson (2002), along with others (Berenbaum & Fujita, 1994), have suggested that for individuals with relatively lower cognitive processing ability, reductions in LI may serve to “flood” the individual with an excess of affectively tagged information that they are unable to process or organize in a coherent manner, thus leading to psychosis. In other words, the combination of reduced LI and relatively lower cognitive processing ability may make certain individuals more susceptible to psychosis and/or related symptoms since they are unable to handle the “extra load” placed on their cognitive systems by the additional information they receive from their environment.

Moreover, Trull and Widiger (2008) point out that many of the primary symptoms of SZPD involve cognitive-perceptual aberrations, which may be explained by an inability to organize the extra load of information received by the cognitive system by greater openness to environmental stimuli. Some authors have suggested that the failure to find any relation between SZPD and OE may be the result of the low frequency of associated symptomatology, such that cognitive perceptual aberrations represent too small a grouping of symptoms to emerge as a significant factor (Trull & Widiger, 2008; Widiger & Simonsen, 2005). In order to address the possibility that cognitive-perceptual aberrations can in fact be represented in a five-factor structure of maladaptive personality, Tackett, Silberschmidt, Krueger, and Sponheim (2008) administered the DAPP (Livesley, 2001, 2003) as well as measures designed to assess psychosis proneness and SZPD to first degree relatives of schizophrenia and/or associated spectrum disorders, and bipolar probands. Their results supported a five-factor model of personality pathology. In addition to the four-factor structure that typically emerges for PD

pathology, they also found evidence for a substantial fifth factor characterized by the cognitive-perceptual aberrations often associated with SZPD and other Cluster A PDs.

This notion that cognitive-perceptual aberrations may represent maladaptive variants of OE is also supported by Camisa et al. (2005), who found that both Chapman's Magical Ideation and Perceptual Aberration scales along with OE loaded onto a single factor in their analysis of FFM domains. These same Chapman scales also showed significant positive correlations with OE in a study by Ross and colleagues (2002). Taken together, these studies lend empirical support the link between OE and SZPD. Despite these findings, the relation between SZPD and OE remains the most controversial. According to Ross, et al., (2002), this controversy stems from the fact while some researchers have found a positive association between SZPD and OE (Coolidge, et al., 1994; Wiggins & Pincus, 1989), many other studies have failed to replicate this finding (Blais, 1997; Trull, 1992).

The inconsistent findings may in large part due to the type of sample being examined (Camisa et al., 2005). For example, when student samples are used, a positive association is found, yet when clinical samples are used, this association disappears (Blais, 1997; Coolidge et al., 1994; Trull, 1992; Wiggins & Pincus, 1989). Some authors have suggested that the positive association found in non-clinical samples may in fact reflect higher levels of OE, but that once psychosis has set in, individuals may "close" themselves off in an attempt to regulate the extra load of information they were previously receptive to, although no explanation or hypotheses have been offered as to how or why this might occur. As will be reviewed in the following section, the answer may lie within the structure of OE itself.

Aspects

Recent evidence suggests that single domain of OE is better represented by two related yet distinct components, referred to in for the remainder of this paper as *aspects* (deYoung, Quilty, and Peterson, 2007). As such, it is possible that the interplay between these two aspects is responsible for the inconsistent findings between OE and schizotypy across different samples. For example, both Peterson, Smith, and Carson (2002), and Berenbaum, and Fujita (1994) have suggested that the way in which information is received and processed may play a role in the development of psychosis and related symptomatology, and point directly to OE as one possible source of this relation.

Closer inspection of McCrae and Costa's (1997) definition further supports the notion that OE may in fact be comprised of two key aspects; the first is motivational in nature, reflected in an interest in novelty and complexity. The second, on the other hand is more cognitive in nature, represented in the way in which individuals process and organize information. The notion that OE comprises an element of how individuals process and organize information is supported by the long-standing debate and evidence suggesting that OE is associated in part with intellectual functioning. Indeed, the plethora of studies examining the relation between OE and intellect in its many measured forms only serves to solidify the fact that OE and cognitive functioning are related on some level.

There is sufficient evidence from a variety of sources to suggest that OE may in fact break down into separate aspects. For example, using an orthogonal components analysis on the six facets of the OE domain, Gignac, and colleagues (2004) found evidence for a "General" openness component, as well as what they labeled an

“Objective” openness component, accounting for 44.2% and 16.0% of the variance respectively. The general openness component showed positive loadings from all six of the OE facets, while the “Objective” openness component showed positive loadings from the Ideas, Values, and Actions facets, and negative loadings from the Feelings, Fantasy, and Aesthetics facets. These findings are supported by previous studies that found the same breakdown of OE into two components when they examined OE in relation to a standardized measure of intelligence or to the Dissociative Experience Scale (Holland, Dollinger, Holland, and McDonald, 1995; Watson & Slack 1993). Moreover, Gignac et al. (2004) found that “Objective” openness (Ideas, Values, and Actions) correlated significantly (.43) with self-report measures of general intelligence, whereas the correlation with general openness was non-significant. Cross-cultural research on OE also seems to point to a two component breakdown. In a joint factor analysis of an indigenously developed measure of personality, and the NEO PI-R, Cheung, Leung, Zhang, Sun, Gan, et al. (2001) failed to replicate the OE domain in their Chinese sample. In fact, their analysis revealed a six-factor solution, with the Fantasy, Aesthetics, and Feelings facets from the OE domain of the NEO PI-R loading together onto one factor. Of note, the remaining three facets of OE failed to load onto any factor.

DeYoung and colleagues (2005) have proposed that the dopaminergic system, which has been associated with response to novelty and cognitive flexibility, and its associated projections to the prefrontal cortex (PFC) and anterior cingulate, constitute unique neuropsychological underpinnings of OE. The authors have found support for the notion that the cognitive functions associated with these regions of the brain, also known to be associated with fluid intelligence, constitute unique sources of OE. They go on to

suggest that OE may be associated with both fluid intelligence and PFC function in that the ability to imagine different worldviews, for example, may be aided by the cognitive flexibility, novelty processing, and abstract thinking that is sub-served by these areas of the brain. More specifically, they reconceptualize the OE domain as, “motivated flexibility, or cognitive exploration, emerging from multiple levels of brain function, all potentially modulated by dopamine” (pp. 850/851). On the one hand, there is evidence to suggest that OE is somehow linked to cognitive flexibility and exploration sub-served by the above mentioned brain systems. On the other hand, McCrae (1994) has argued that OE comprises an aspect of how elements of consciousness are processed or integrated into the system. More specifically, he refers to the fluidity of organization and “permeability of consciousness”. Indeed, other authors have also drawn attention to the “open mind” (Rokeach, 1960), “absorbing experience” (Tellegen & Atkinson, 1974), and “openness to sense perception” (Kaplan & Singer, 1963), suggesting that OE cannot solely be accounted for by Intellect or cognitive flexibility.

The most extensive work to address the “permeability of consciousness” element of OE has been conducted by Hartmann (1991), who suggested that in some individuals, the contents of consciousness are separated by much thinner boundaries than in others, and that the “thickness” of these boundaries constitute “a broad dimension of personality and an aspect of the overall organization of the mind” (pp. 49; McCrae, 1994). In fact, Hartmann’s Boundary Questionnaire (Hartmann, 1991), developed to assess the thinness or thickness of “boundaries in the mind”, shows the strongest correlations with the OE domain. Of particular interest is the finding that the strongest associations between OE and boundaries was with the Fantasy, Aesthetics, and Feelings facets, again suggesting

that these three facets group together in a distinct manner from the other facets of this domain. This notion is further supported by Glisky and colleagues (1991) who found that the Fantasy, Aesthetics, and Feelings facets of OE were more strongly related to absorption than were the other three facets.

Drawing on evidence both from behaviour genetics studies and the personality literature, DeYoung and colleagues (2007) have suggested that each of the Big Five domains can in fact be subdivided into two lower order components or aspects, which the authors link to distinct neurobiological systems. With respect to OE, the authors point to the long-standing debate as to whether this domain is better represented as “openness” or “intellect”. As previously mentioned, some authors have proposed that the compound label of O/I may be an appropriate means by which to draw attention to the distinct yet equally important aspects of the domain (DeYoung, Peterson, & Higgins, 2005). De Young and colleagues (2007) went on to demonstrate that each of the Big Five domains is in fact divisible into two distinct yet related aspects, and have developed the Big Five Aspect Scale (BFAS; deYoung, Quilty, & Peterson, 2007) as a means of measuring them. Backed by these results, deYoung et al (2007) suggest that the long-standing debate regarding “openness” vs. “intellect” may simply represent two sides of the same domain.

Summary and hypotheses

The use of dimensional models to conceptualize personality pathology has been gaining attention both within the research and clinical fields. One of the major obstacles in the full scale acceptance of dimensional models, however, has been difficulty in demonstrating any relation between PDs and OE. SZPD in particular has not yielded consistent findings in relation to any of the Big Five, either at the domain or facet level.

One explanation for the lack of findings may be related to the structure of OE. There is evidence to suggest that OE may in fact be better conceptualized as comprising two lower order aspects, each with their own unique contributions to personality in general and personality pathology in particular. On the one hand OE represents the ability to be “open” to one's surroundings and internal workings, while on the other hand it also relates to cognitive processing of information. Research in the area of Schizophrenia spectrum disorders suggests that once psychosis has set in, individuals may become more “closed” and as such score relatively lower on measures of OE when compared to both individuals at the lower end of this spectrum as well as healthy controls. Some authors suggest that relatively lower cognitive functioning may predispose some individuals to psychosis and/or related symptoms (Camisa et al., 2005). Once psychotic like symptoms begin to emerge, highly open individuals may begin to close off their receptiveness – resulting in lower scores on measures of OE – as a means by which to cope with the excess flow of stimuli into their conscious awareness.

Along the continuum of SSDs, SZPD, which includes a proneness towards psychotic like symptoms, would exist at a less extreme point than would psychotic disorders per se. As such, a similar process between the ability to access greater amount of stimuli from the environment, and the ability to integrate that information in a coherent manner may be taking place. More specifically, the first hypothesis is that the openness aspect of OE is related in a positive manner to SZPD, whereas the second hypothesis is that the intellect aspect is related in a negative manner. The opposing relations between these two components of OE and SZPD may help explain the previous lack of findings for OE and PDs general, as well as the inconsistent findings between SZPD and the FFM.

In Study 1, we test these hypotheses using multiple regression in a student sample, and address the issue of measurement overlap between the two proposed aspects. In Study 2, we elaborate on Study 1 using a clinical sample, taking into account the comorbidity of PDs as well as the overlap between domains of the FFM. Finally, in Study 3, we compare a two-factor model of OE to the traditional one factor model using confirmatory factor analysis in both a student and clinical sample, and present a structural equation model of the aspects of OE in relation to SZPD in each sample.

Study 1: Overlap Among Aspects of Openness / Intellect

Introduction

There is much theoretical evidence to suggest that OE may better be conceptualized by two related yet distinct aspects, namely, “openness” and “intellect”. Furthermore, some authors have suggested that the interplay of being both greatly sensitive to and aware of aspects of consciousness, as would be suggested by RLI, and an inability to manage or structure the influx of this sensory input may predispose some individuals to psychotic-like symptomatology, as would be seen in SZPD.

Thus far, the literature examining the association between OE and SZPD and related disorders has yielded inconsistent findings. These inconsistencies may be the result of the differential effects of each of the aspects of OE (OA, and IA), such that in different samples the aspects may exert a differing effect.

The current study sought to reveal the unique effects of two related yet distinct aspects of OE and SZPD. Given that these components are subdivisions of a single domain, by definition, they contain a large amount of shared variance. Moreover, here is both empirical and theoretical evidence suggesting that the latent construct of intellect is inherently measured by items of OA. As such, the current analysis employed multiple regression analysis in order to control for the shared variance among the two components. It is hypothesized that OA will be positively related, while IA will be negatively related to SZPD.

Method

Participants

The sample consisted of 234 Concordia University undergraduate students (190 women, 44 men), all of whom received course credit for their time. They ranged in age from 18 to 73 years ($M = 24.25$, $SD = 6.46$), and in year of undergraduate study from less than one year to seven years ($M = 2.18$, $SD = 1.14$). The sample was ethno-culturally heterogeneous, with 57.7% reporting a Western European or North American cultural heritage; 7.7% Eastern European; 7.3% East Asian; 8.1% Middle Eastern; 5.1% South Asian; and 14.1% reporting a mixed or “other” ethno-cultural heritage.

Procedure

Recruitment. Participants were recruited directly through their psychology courses. A research assistant briefly visited classrooms and described the study, asking students to volunteer by means of a class sign-up sheet in which they provided email contact information. An invitation email containing the URL for the study was then sent to all interested students. Alternatively, an advertisement describing the study with a direct link to the study’s URL was placed on the Department of Psychology’s Participant Pool website.

Data collection. All data was collected by means of an on-line questionnaire, implemented using Quask Form Artists. Once students had reached the appropriate URL, they were presented with a brief description of the study’s purpose, informed of both their right to withdraw at any point without fear of academic consequences and assured about the anonymity of their responses. If they agreed to continue, they were then presented with an on-line consent form after which they could either agree or decline to

participate. Students who declined to provide informed consent were not able to access the on-line questionnaires, but were informed that they could return to the study should they choose to at a later date. Students who agreed to participate were first presented with a demographic questionnaire intended to provide general demographic information regarding age, sex, program, and year of study, as well as questions pertaining to cultural heritage. All participants then completed the questionnaire battery, followed by an on-line debriefing form which outlined the study's goals and hypotheses in greater detail. All data were stored on a firewall-protected computer in the Culture, Health and Personality Lab, Department of Psychology, Concordia University.

Measures

Big Five Aspect Scale (BFAS; DeYoung, Quilty, & Peterson, 2007). The BFAS is a 100-item questionnaire that assesses two distinct factors for each of the Big Five personality domains, and has been shown to be both reliable and valid (DeYoung et al., 2007). For the current study, only the 20 items pertaining to the OE Domain were administered, allowing OE to be subdivided into the Openness Aspect (OA) and the Intellect Aspect (IA). In the current sample, OA and IA showed internal consistency, Cronbach's α 's=.765 and .806, mean inter-item r s=.252 and .308, respectively.

Structured Clinical Interview for DSM-IV Axis II Disorders – Self-Report (SCID-II-SR; (First, Gibbon, Spitzer, Williams, & Benjamin, 1997). The SCID-II-SR assesses for the presence of main text PDs by way of 119 self-report items using a *Yes/No* format. Each of the 119 items corresponds to a diagnostic criterion for one of the main text PDs or one of the two additional PDs from Appendix B of the DSM-IV (Depressive and Passive-Aggressive PDs). The SCID-II-SR allows for the calculation of dimensional PD

scores by summing the self-reported symptom endorsement for each disorder. Previous studies have shown these self report dimensional scales to be both valid (Carey, 1994; Huprich 2003) and stable (Ouimette & Klein, 1995). For the current study, only the 11 items pertaining to SZPD were administered. The self-report measure in the current sample showed low internal consistency with Cronbach's $\alpha = .542$ ¹ and mean inter-item $r = .103$.

¹ The removal of 4 items from the SCID-II-SR SZPD scale increased reliability to .600. Re-analysis of the data yielded the same pattern of results, and as such all reported results are based on the full scale.

Results – Study 1

Unless otherwise specified, all analyses employed $p < .05$ alpha level of significance. Outliers were identified and brought in to within ± 3 standard deviations from the mean on a given measure according to the method proposed by Tabachnick and Fidell (2001, p.71). All data were screened for skewness and/or kurtosis to ensure normality. Table 1.1 presents descriptive information for all study variables. Intercorrelations revealed that only IA was significantly negatively associated with SZPD (Table 1.2). In order to account for measurement overlap between aspects of OE, both aspects were entered into a regression analyses so that the unique contribution of each could be assessed. SZPD was entered as the outcome variable, while both OA and IA were entered as predictor variables. As expected, the overall model was significant, $R = .272$, $F(2,231) = 9.206$, $p < .01$, and each aspect was uniquely related to SZPD, with OA being positively related to SZPD, and IA negatively related (see Table 1.3).

Table 1.1

Descriptive Data for Scores on Measures of Schizotypal Personality and Openness to Experience (N = 234)

Scale	<i>M</i>	<i>SD</i>	Min	Max
SCID – SZPD	2.85	1.90	0.00	8.29
Openness to Experience	3.76	0.47	1.75	4.85
Openness Aspect	3.80	0.56	2.15	5.00
Intellect Aspect	3.72	0.56	2.13	5.00

Table 1.2

*Pearson R Intercorrelations Among Schizotypal Personality and Openness to Experience**(N = 234)*

Scale	1	2	3	4
1. Openness to Experience	-	.832*	.834*	-0.130
2. Openness Aspect		-	.391*	0.023
3. Intellect Aspect			-	-.240*
4. SCID SZPD				-

Note. * $p < .008$ (2-tailed), Bonferroni corrected

Table 1.3

Summary of Regression Analysis for Variables Predicting Schizotypal Personality (N =234)

Model	<i>B</i>	<i>SE B</i>	β	<i>Correlations</i>	
				Zero-Order	sr^2
Step 1	4.81	0.985			
Openness Aspect	0.47	0.235	.138*	0.023	0.016
Intellect Aspect	-1.01	0.236	-.294*	-0.240	0.073

*Note. * $p < .05$ (2-tailed)*

Discussion

The results of the current study support the hypothesis that the two aspects of OE relate to SZPD in an opposing manner. Of particular note was the emergence of a suppression effect for IA. When measurement overlap was not accounted for, no significant associations for either aspect were found. In contrast, once the measurement overlap between the two aspects was controlled, not only were significant associations found for each aspect, but the association for OA rose in strength, suggesting that the presence of IA in measured OA masks any relationships. However

Despite these findings, analyses employed failed to take into consideration both domain and PD overlap resulting from the complexity of both normal and abnormal human personality. Despite the categorization of five distinct domains, there exists a large amount of covariability among domains, both at the theoretical and empirical levels, as well as a great deal of empirical variability among PDs (de Clercq, & de Fruyt 2003; Markon et al., 2005). As such, the following study was designed to control for the shared variance among domains and PDs in a clinical sample. Moreover, the sample for Study 1 consisted entirely of undergraduate students, and it remains unclear if the results would replicate in a clinical sample.

Study 2: Accounting for Domain and PD Covariance in a Clinical Sample

The previous study demonstrated that each aspect of OE was differentially related to symptoms of SZPD in a student sample. However, the method employed failed to account for the covariation among both PDs and domains of the FFM. As noted above, both among domains of the FFM and among PDs there exists theoretical and empirical overlap. As such, controlling for the shared variance would clarify whether the association found were in fact the result of unique effects rather than covariation, and should reveal consistent relations between OE and SZPD similar to those found in study 1. As such, it is hypothesized that the OA will be positively associated, while IA will be negatively associated with SZPD. Moreover, the previous study employed a student sample, and it remains unclear whether the findings will replicate in a clinical sample. Given previous inconsistencies in the literature when examining student versus clinical samples, it would be important to extend the findings of Study 1 to a clinical sample.

Method

Participants

The sample consisted of 102 outpatients (59 women, 43 men) recruited in a clinical research department of a university-affiliated teaching and research hospital in a large Canadian metropolitan area. All participants were initially assessed and screened for treatment and/or inclusion in various research protocols by a licensed physician or psychiatrist. They ranged in age from 20 to 67 years ($M = 39.93$, $SD = 11.64$) and in years of education from 2 to 26 years ($M = 14.28$, $SD = 4.14$), and were primarily of European descent. Thirty-nine percent of participants were single and never married; 43% married; 16% divorced or separated; and 2% widowed. Most participants met diagnostic criteria for anxiety, mood, or substance abuse disorders, reflecting the diagnostic heterogeneity of the sample.

Procedure

Participants were approached about the study by one of three participating psychiatrists. Once informed consent was obtained, all participants completed both the SCID-II self-report questionnaire, and the Revised NEO Personality Inventory (Costa & McCrae, 1992).

Measures

For a description of the companion self-report questionnaire (SCID-II-SR) to the *Structured Clinical Interview for DSM-IV Axis II Disorders – Patient Edition* (First, et al., 1997) please refer to Study 1. For the current study, only scores for the ten main text PDs were considered. The SZPD scale was reliable in the current sample, Cronbach's α 's = .721 and mean inter-item $r = .203$. The scales for Dependant PD and Schizoid PD were

the least reliable, Cronbach's α 's = .480 and .522, mean inter-item r = .120 and .153, respectively. For all other PD scales, Cronbach's α 's ranged from .660 to .838, and mean inter-item r s between .169 and .351.

The Revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1992) consists of 240 self-report items. Each of the five personality domains (Neuroticism, Extraversion, Openness to Experience, Conscientiousness, and Agreeableness) are measured by a separate scale consisting of six lower order facets scales, which together result in a total of 30 trait facet scales. Items are answered using a 5-point Likert type scale ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. The five domains and their corresponding facets have been validated in both clinical and non-clinical samples, and stability estimates remain satisfactory across a variety groups (Bagby, et al., 1999; Costa, & McCrae, 1992; Harkness, Bagby, Levitt, & Joffe, 2002).

Statistical Analysis

In accordance with the two-aspect model of OE, Principal Component Analysis (PCA) with Promax rotation was used to create factor scores for each aspect respectively. For OA, scores for the Fantasy, Aesthetics and Feelings facets were entered into the PCA in order to extract a single factor. Component loadings for OA factor were .756, .660 and .830 respectively, with 56.5% of variance explained. For IA, scores for the Ideas, Actions, and Values facets revealed component loadings of .690, .795 and .664 respectively, with 51.7% of variance explained. The regression method was used to save component loading scores for the two aspects, and these scores were used in all subsequent analyses.

Results

Unless otherwise specified, all analyses employed $p < .05$ alpha level of significance. Outliers were identified and brought in to within ± 3 standard deviations from the mean on a given measure according to the method proposed by Tabachnick and Fidell (2001). All data was screened for skewness and/or kurtosis to ensure normality.

Table 2.1 shows descriptive information for all study variables, and Table 2.2 shows the zero-order correlations of PDs and OE. As expected, there was a high degree of inter-correlation among PDs. In addition, only Schizoid PD showed a significant relation with OE, while IA was significantly associated with only two PDs. There were no significant associations between OA and any of the PDs.

Given that domains of the FFM share a certain amount of variance (Costa & McCrae, 1992), as well as the high degree of overlap among PDs both in previous research (Bagby, Schuller, Marshall, & Ryder, 2004) and in the current study, a hierarchical multiple regression analysis was conducted in order to account for the shared variance among these constructs. All domains of the FFM save OE were entered into step one of the regression analysis, while all main text PDs save SZPD were entered into step two. For step three, the two aspects of OE were entered separately. For all steps of the analysis, SZPD was entered as the outcome variable. Step 1 (Appendix A) of the analyses revealed a significant association between two of the four domains and SZPD $R^2 = .200$, $F(4,97) = 6.06$, $p < .05$, with Neuroticism being positively associated, $B = .058$, $\beta = .328$, $p < .05$, and Agreeableness negatively associated, $B = -.056$, $\beta = -.303$, $p < .05$. When all PDs save SZPD were entered into Step 2 (Appendix B), the model remained significant $R^2\Delta = .287$, $F\Delta(9,88) = 5.48$, $p < .05$; only Schizoid PD was a significant

Table 2.1

*Descriptive Data for Measures of Five Factor Model Domains and Personality Disorders**(N = 102)*

Scale	<i>M</i>	<i>SD</i>	Min	Max
<i>FFM Domains</i>				
Neuroticism	62.87	11.58	33.32	90.51
Extraversion	44.24	13.03	5.82	78.10
Conscientiousness	41.42	10.48	13.09	60.84
Agreeableness	48.02	11.25	22.57	77.27
Openness to Experience	51.30	11.53	16.86	78.49
Openness Aspect	51.41	8.47	30.90	71.19
Intellect Aspect	50.16	8.40	26.28	71.17
<i>Personality Disorders</i>				
Avoidant PD	2.69	2.15	0.00	7.00
Dependant PD	1.58	1.42	0.00	5.46
Obsessive-Compulsive PD	3.97	1.97	0.00	9.00
Paranoid PD	2.54	2.35	0.00	8.00
Schizoid PD	1.69	1.48	0.00	5.00
Schizotypal PD	2.21	2.06	0.00	9.00
Histrionic PD	1.52	1.63	0.00	6.00
Borderline PD	4.66	3.71	0.00	14.00
Narcissistic PD	3.86	3.08	0.00	12.66
Antisocial PD	1.09	1.65	0.00	6.08

Table 2.2

*Pearson R Intercorrelations Among Personality Disorders and Openness to Experience**(N = 102).*

	Schizotypal PD	Openness to Experience	Openness Aspect	Intellect Aspect
Schizotypal PD	-	-.033	.145	-.247
Avoidant PD	.406*	-.313	-.157	-.428*
Dependant PD	.310	.050	.089	-.006
Obsessive- Compulsive PD	.214	.089	.149	-.042
Paranoid PD	.536*	-.148	-.004	-.261
Schizoid PD	.432*	-.363*	-.283	-.398*
Histrionic PD	.168	.177	.256	.088
Borderline PD	.520*	.029	.172	-.130
Narcissistic PD	.502*	.005	.128	-.130
Antisocial PD	.348*	.023	-.025	.055
Openness to Experience		-	.889*	.869*
Openness Aspect			-	.561*
Intellect Aspect				-

Note: * $p < .001$ (2-tailed), Bonferroni corrected

predictor of SZPD $\beta = .364, p < .05$. Lastly, after controlling for the shared variance among and between personality domains and PDs, OA and IA were entered into Step 3 of the analysis. Inclusion of these aspects significantly improved overall explained variance, $R^2\Delta = .056, F\Delta(2,86) = 5.29, p < .05$, with each aspect significantly associated with SZPD in the predicted manner (see Table 2.3). Schizoid PD remained the only other significant predictor of SZPD (Table 2.3).

Table 2.3

*Summary of Hierarchical Regression Analysis for Variables Predicting Schizotypal**Personality (N = 102)*

Predictors (Step 3)	B	SE B	β	Correlations	
				Zero Order	sr ²
<i>FFM Domains</i>					
Neuroticism	-0.002	0.022	-0.014	0.334	0.000
Extraversion	0.000	0.023	0.002	-0.130	0.000
Agreeableness	-0.010	0.019	-0.055	-0.341	0.002
Conscientiousness	0.007	0.020	0.033	-0.139	0.001
<i>Personality Disorders</i>					
Avoidant PD	0.010	0.125	0.011	0.402	0.000
Dependent PD	0.151	0.129	0.104	0.304	0.007
OCPD	-0.190	0.100	-0.181	0.209	0.019
Paranoid PD	0.175	0.096	0.199	0.537	0.017
Schizoid PD	0.510	0.151	0.362*	0.426	0.061
Histrionic PD	0.055	0.120	0.043	0.173	0.001
Narcissistic PD	0.103	0.075	0.154	0.496	0.010
Borderline PD	0.017	0.067	0.030	0.523	0.000
Antisocial PD	0.218	0.114	0.174	0.356	0.019
<i>Aspects of OE</i>					
Openness Aspect	0.774	0.244	.375*	0.146	0.053
Intellect Aspect	-0.499	0.220	-.242*	-0.241	0.028

Discussion

The results of the current study replicate those of Study 1 in a clinical sample. Each aspect of OE was significantly associated with SZPD. Moreover, the analyses employed took into account the overlap among domains and PDs, suggesting that the relations demonstrated are unique contributions of the individual aspects. That said, both the traditional FFM and the NEO PI-R conceptualize OE as a single construct, and it remains unclear whether the two-aspect structure imposed in the current analyses reflect a better conceptualization of the domain. Moreover, prior empirical studies, and the previous findings from the current series of studies suggest that a two-aspect structure of OE may be of greater quality to the current one domain structure when examining psychopathology. However, to date, the dissection of OE into two distinct aspects remains largely theoretical in nature, and no empirical model supporting this structure has been tested. As such, the following studies aim to contrast the empirical validity of the two-aspect to that of the current one domain model.

Study 3: A Structural Equation Model of the Relation Between Openness/ Intellect and Schizotypal Personality Disorder

The previous two studies lend support to the notion that the two aspects of OE differentially relate to SZPD; however, it remains unclear whether this two-aspect structure is superior to the traditional one-factor structure. Structural Equation Modeling (SEM) is one method that can be used to test the strength of hypotheses about the direction of relationships. However, before any such models can be assessed, it is first important to determine if the two aspect structure suggested in studies 1 and 2 is in fact empirically sound. Confirmatory Factor Analysis (CFA) can be used to test a priori hypotheses regarding the theoretical structure of a construct. As such, CFA analysis was conducted with both student and clinical samples in order to test whether the two-aspect structure of OE is significantly better than the traditional one factor structure. Furthermore, in order to assess the hypothesis that the interplay between high OA and low IA may predispose some individuals to psychotic-like symptomatology as seen in SZPD, a Structural Equation Model (SEM) was constructed based on our a priori theory. SEM allows one to test the probability that the given theoretical model is accurate, and as such allows one to test the goodness of fit of the a priori model to a given set of data. In the current analysis, SEM was employed to test the goodness of fit of our model suggesting unique associations between each aspect of OE and SZPD.

Method

Participants

Student Sample. The sample consisted of 331 Concordia University undergraduate students (259 female, 72 male), all of whom received course credit for their time. They ranged in age from 17 to 54 years ($M = 23.55$, $SD = 6.11$), and in year of undergraduate study from less than one year to 6 years ($M = 2.28$, $SD = 1.11$). The sample was ethno-culturally heterogeneous, with 78 % reporting a Western European or North American cultural heritage; 6 % Eastern European; 2 % East Asian; 5 % Middle Eastern; 2% South Asian; 4% Latin American; and 3% reporting a mixed or “other” cultural heritage.

Clinical Sample. The sample consisted of 264 outpatients (143 women, 121 men) from a university-affiliated psychiatric consultation service in a large Canadian metropolitan area. Initial referrals and subsequent consultations were conducted by licensed physicians and psychiatrists. All participants were initially assessed and screened for treatment and/or inclusion in various research protocols. They ranged in age from 13 to 73 years ($M = 39.6$, $SD = 12.73$), and in years of education from 3 to 26 years ($M = 14.37$, $SD = 3.4$). Participants were primarily of European descent. Forty-five percent of participants were single and never married; 35% married; 17% divorced or separated; and 3% widowed. Most participants met diagnostic criteria for anxiety, mood, or substance abuse disorders, reflecting the diagnostic heterogeneity of the sample.

Procedure

Student Sample. All recruitment and data collection procedures described for Study 1 were employed for the current study. All participants completed both the SCID-II

self-report questionnaire (First et al., 1997), and the OE scale from the International Personality Item Pool (IPIP; Goldberg, 1999, 2006; *IPIP website*, <http://ipip.ori.org/>)

Clinical Sample. Participants were approached about the study by one of three participating psychiatrists. Once informed consent was obtained, all participants completed both the SCID-II self-report questionnaire (First et al., 1997), and the NEO PI-R (Costa, & McCrae, 1992).

Measures

As with the previous studies, the SZPD scale of the SCID-II-SR (First et al., 1997) was used to assess SZPD symptomatology (see Study 1 for a detailed description of this measure). The SZPD scale was reliable in both student and clinical samples, Cronbach's α s = .710 and .809, mean inter-item r s = .187 and .281, respectively.

For the student sample OE was measured using the *Openness to Experience Scale from the International Personality Item Pool (IPIP; Goldberg, 1999; 2006; IPIP website, <http://ipip.ori.org/>)*. Developed as a public domain resource for the measurement of personality and other individual differences, the IPIP consists of a database of over 2000 personality related items that correspond to established commercial inventories such as the NEO PI-R. For the current study, only items corresponding to the facets of the NEO PI-R OE scale were administered. IPIP scales correlate with the original NEO PI-R at .90 for the full scale including all domains, and .91 for the OE domain scale in particular. Cronbach's α and mean inter-item correlations for the 6 facets of the IPIP OE scale range from .77 to .86 and .24 to .38 respectively (IPIP website: <http://ipip.ori.org/>). In the current sample, Cronbach's α s ranged from .715 to .842, and mean inter-item correlations

from .200 to .351 for the facets of OE. For the clinical sample the NEO PI-R (Costa, & McCrae, 1992) was the measure of OE (see Study 2 for a more detailed description).

Statistical Analyses

Given that the goal of the current study was both to construct a good fitting model representing the relation between OE and SZPD, as well as to replicate this model, all of the analyses described below were conducted in both the student and clinical samples.

Confirmatory factor analyses. In order to assess the appropriateness of separating the six facets of OE into two latent aspects, confirmatory factor analyses (CFA) were conducted. Traditionally, exploratory factor analysis (EFA) is employed in an attempt to build hypotheses about data whose structure is unknown. In contrast, CFA is better suited when specific a priori hypotheses about the structure of data are proposed based on theoretical and/or empirical grounds (Kline, 1998; Tabachnick, & Fidell, 2001).

The current study tested two separate models regarding the underlying latent structure of the manifest facets of OE. Model A (1-factor model) tested the traditional assumption that the six facets are best represented by the single, uni-dimensional construct of OE. Model B, an alternative 2-factor model, tested whether the six manifest facets were better structured into two latent factors of openness and intellect, respectively. For this model, the manifest facets of Fantasy, Aesthetics and Feelings were allowed to load onto the latent openness factor, while the manifest facets of Ideas, Actions and Values were allowed to load onto the latent intellect factor. Correlated latent factors were specified for Model B. The a priori hypothesis for a 2-factor structure in

Model B was based on both pre-existing theoretical and empirical work suggesting such a structure.

Structural equation model (SEM). In order to test our hypothesis that the two aspects of openness predict SZPD symptomatology in an opposing manner, a formal SEM was constructed in which the two-factor model was used to create the two latent factors of OE. As such, the three facets of Fantasy, Aesthetics, and Actions were indicators of the latent openness factor, and the Ideas, Actions, and Values facets were indicators for latent intellect factor. A latent SZPD factor was created using 4 random parcels from the 11-item SCID-II-SR SZPD scale (Catell, 1956). Parcel 1 included items 1, 2, and 5, Parcel 2 items 3, 6, and 8, Parcel 3 items 4, 7, and 10, and Parcel 4 items 9 and 11. In both the student and clinical samples, the strongest indicator for SZPD was Parcel 2 and therefore this parameter was fixed to 1.00. For the model, latent SZPD was predicted by both latent factors of OE.

Goodness-of-fit. Given that different fit indices address either different conceptual issues or employ different statistical approaches in order to determine “goodness-of-fit”, as well as to demonstrate a consistently good-fitting model, a total of four different indices were examined for both the CFA and SEM models. Fit indices can be conceptualized as fitting into the three broad categories of absolute, relative, or non-centrality based (Ullman, 1996). As such, the following indices were examined: (a) chi square (χ^2) and chi square / degrees of freedom ratio (χ^2 / df) were employed as absolute fit indices; (b) Bentler’s Comparative Fit Index (CFI) was employed as a relative fit index; and (c) the Root Mean Square Error of Approximation (RMSEA) was employed as the non-centrality-based index. As recommended by Byrne (1994), Kline (1998), and

Ullman (1996), the following criteria were used to assess fit: non-significant χ^2 ; the ratio of χ^2 / df adequate if <5.0 and good if < 2.0 ; CFI adequate if $>.90$ and good if $>.94$; and RMSEA adequate if $<.10$ and good if $<.05$. For the CFA models, in order to assess whether Model B was a significant improvement over Model A, the χ^2 test of difference was employed.

Results

Unless otherwise specified, all analyses employed $p < .05$ alpha level of significance. All models were tested with the SE Path module of STATISTICA (Statsoft, 2005). Outliers were identified and brought in to within ± 3 standard deviations from the mean on a given measure according to the method proposed by Tabachnick and Fidell (2001). All data was screened for skewness and kurtosis to ensure normality. Zero-order correlations between OE, its aspects and facets, and SZPD are shown in Tables 3.1 and 3.2 for the student and clinical samples, respectively.

Confirmatory factor analysis

Table 3.3 depicts the parameter estimates indicating the association between each manifest facet and hypothesized latent factor(s) for each model in both samples. Fit indices for each CFA are summarized in Table 3.4.

Student Sample. Model A produced a significant χ^2 , and an inadequate fit for the χ^2 / df ratio and RMSEA. The CFI was the only parameter to yield an adequate fit. In contrast, Model B, the two-factor model, produced a significant χ^2 , a good fit for the CFI, and an adequate fit for both the χ^2 / df ratio and RMSEA. The χ^2 test of difference revealed that Model B was a significantly better fit than Model A $\chi^2_{diff}(1) = 18.32, p < .05$.

Clinical Sample. Model A produced a significant χ^2 , and an inadequate fit for the χ^2 / df ratio. Both the CFI and RMSEA had an adequate fit. In contrast, Model B, the two-factor model, produced a non-significant χ^2 , and a good fit for all three remaining

Table 3.1

*Correlation Analysis for Variables Predicting Schizotypal Personality in a Student**Sample (N =264)*

	Openness to Experience	Openness Aspect	Intellect Aspect	Schizotypal PD
Openness to Experience	-	.882*	.864*	.137
Openness Aspect	-	-	.526*	.294*
Intellect Aspect	-	-	-	-.066
<i>NEO Facets</i>				
Fantasy	.661	.799*	.340*	.369*
Aesthetics	.708*	.725*	.505*	.140
Feelings	.681*	.799*	.376*	.198*
Actions	.664*	.403*	.769*	-.095
Ideas	.721*	.464*	.806*	-.105
Values	.607*	.343*	.730*	.053

*Note: *p < .001 (2-tailed), Bonferroni corrected*

Table 3.2

*Correlation Analysis for Variables Predicting Schizotypal Personality in a Clinical**Sample (N =264)*

	Openness to Experience	Openness Aspect	Intellect Aspect	Schizotypal PD
Openness to Experience	-	.904*	.857*	.056
Openness Aspect	-	-	.560*	.136
Intellect Aspect	-	-	-	-.060
<i>NEO Facets</i>				
Fantasy	.680*	.781*	.380*	.120
Aesthetics	.792*	.831*	.510*	.114
Feelings	.726*	.832*	.467*	.099
Actions	.627*	.390*	.786*	-.039
Ideas	.703*	.461*	.772*	.048
Values	.610*	.419*	.707*	-.155*

*Note: *p < .001 (2-tailed), Bonferroni corrected*

Table 3.3

Parameter estimates and factor loadings for CFA.

	Model A	Model B	
		Factor 1	Factor 2
<i>Student Sample</i>			
Fantasy (O1)	.539	.592	
Aesthetics (O2)	.681	.691	
Feelings (O3)	.587	.649	
Ideas (O4)	.600		.653
Actions (O5)	.645		.697
Values (O6)	.498		.526
Factor <i>r</i>		.787	
<i>Clinical Sample</i>			
Fantasy (O1)	.611	.628	
Aesthetics (O2)	.744	.763	
Feelings (O3)	.691	.702	
Ideas (O4)	.524		.603
Actions (O5)	.588		.654
Values (O6)	.510		.539
Factor <i>r</i>		.821	

Note. All parameter estimates were significant ($p < .05$) for both models.

Table 3.4

Summary of Goodness of Fit Indices of the Confirmatory Factor Analysis for Openness to Experience.

Model	χ^2	df	χ^2/df	CFI	RMSEA	Confidence Interval	
						Lower	Upper
<i>Student Sample</i>							
A	46.07	9.00	5.12	0.911	0.115	0.084	0.148
B	27.75	8.00	3.47	0.953	0.089	0.056	0.125
<i>Clinical Sample</i>							
A	23.08	9.00	2.56	0.961	0.079	0.041	0.119
B	12.09	8.00	1.51	0.989	0.045	0.000	0.092

Note. CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation. Indices meeting criteria for adequate fit are indicated in boldface.

indices. The χ^2 test of difference revealed that Model B was a significantly better fit than Model A $\chi^2_{\text{diff}}(1) = 10.99$. As with the student sample, these results suggest a two-factor model; nonetheless, the inter-correlation between the two latent factors of openness and intellect was high, suggesting a strong relation between these factors (Table 3.3).

Structural Equation Model

Student Sample. Figure 1 depicts the path model including all relevant parameter estimates. As predicted, OA was a significant positive predictor of SZPD symptomatology, and IA was a significant negative predictor. All remaining parameter estimates were significant. The model produced a significant χ^2 , and a good χ^2 / df ratio. Both the CFI and the RMSEA were adequate (Table 3.5). Confidence intervals for the model are presented in Appendix C.

Clinical Sample. Figure 2 depicts the path model including all relevant parameter estimates. As predicted, OA was a significant positive predictor of SZPD symptomatology, while there was a trend in the expected direction for IA ($p=.058$). With the exception of the error term for SZPD Parcel 2, all remaining parameter estimates were significant. The model produced a significant χ^2 , and an adequate χ^2 / df ratio. Both the CFI and the RMSEA were adequate (Table 3.5). Confidence intervals for the model are presented in Appendix D.

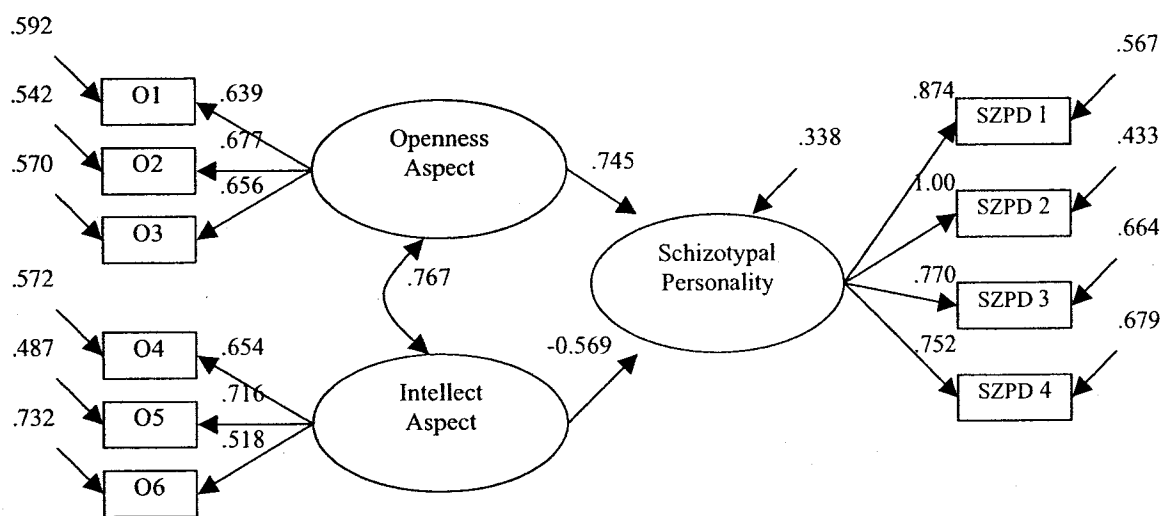


Figure 1. Structural Equation Model: Aspects of OE Predicting SZP in a Student sample ($N = 331$).

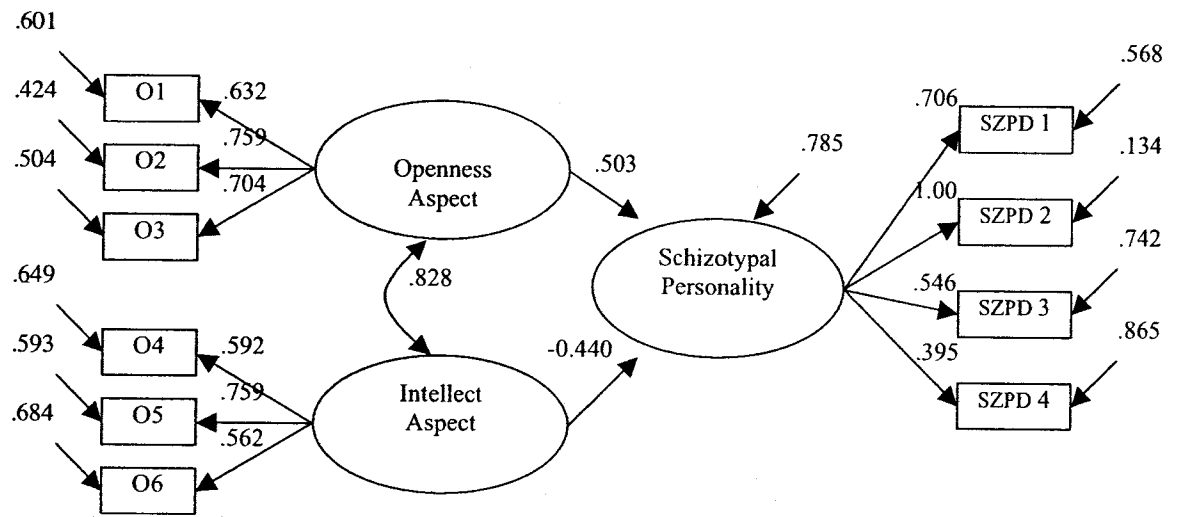


Figure 2. Structural Equation Model: Aspects of OE Predicting SZP in a Clinical sample ($N = 264$).

Table 3.5

Summary of Goodness of Fit Indices for Structural Equation Model of Aspects of OE

Predicting SZPD

	χ^2	df	χ^2/df	CFI	RMSEA	Confidence Interval	
						Lower	Upper
Student Sample	64.39	32.00	2.01	0.955	0.058	0.038	0.077
Clinical Sample	79.93	32.00	2.49	0.924	0.075	0.055	0.096

Note. CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation. Indices meeting criteria for adequate fit are indicated in boldface.

Discussion

The results presented above demonstrate that the two-aspect structure of OE is superior to the traditional one factor structure. Moreover, the SEM model revealed that each aspect significantly predicts SZPD symptom severity in both student and clinical samples, with a positive relationship between OA and SZPD and a negative relationship between IA and SZPD. These findings replicate those of studies 1 and 2, adding to the strength of the proposed hypotheses. Moreover, the replication of these findings within both CFA and SEM analyses support the a priori theoretical assumptions about the direction of the hypothesized relationships, and these with a variety of different samples, both clinical and non-clinical.

It is of note that in the clinical sample, the negative association between IA and SZPD was not statistically significant. This was the only instance in which the expected findings were not replicated, although a clear trend was noted. This may in part be due to sample size, as the IA SZPD relationship was consistently the weakest in all analyses, particularly when clinical samples were the source of data. The nature of clinical samples is such that there is an inherent amount of variability in sample data due to comorbidity of clinical disorders, and once this comorbidity is controlled for one is left with less robust data for analyses. Moreover, the clinical sample in question was taken from outpatient samples, which, by definition, are functioning relatively better than what one would expect with inpatient samples, and well enough to maintain relatively independent living. It may be that in outpatient samples that the relative level of IA is slightly higher than one might see in more severely ill individuals, and as such the negative relationship with SZPD is attenuated. In student samples, who function the best out of the groups

examined in the current study, symptom endorsement rates of SZPD are relatively low, while the level of IA would remain relatively high compared to clinical samples. As such, in student samples, the negative relationship between IA and SZPD symptomatology would be attenuated, resulting in a weaker association between SZPD and IA than would be found in clinical samples.

Conclusions

The current series of studies sought to clarify what relations, if any, exist between OE and SZPD. An FFM-based two-aspect structure of OE was proposed as a means to resolve the previously inconsistent findings between the two constructs. Study One demonstrated that both aspects relate in significant and opposing ways to SZPD in a student sample. This finding was replicated in a clinical sample in study Two, which also accounted for the shared variance among PDs. Study Three confirmed that a two-aspect structure of OE is superior to the traditional one factor structure, and finally SEM suggests that both aspects significantly predict SZPD symptomatology in opposing manners.

These results help resolve one of the major weaknesses of the FFM in describing personality pathology. The OE domain consistently relates to SZPD in a predictable manner, across both student and clinical samples. What remains unclear, however, is what underlies each aspect, or why they might predispose some individuals to psychotic-like symptoms. In order to understand this association better, one must turn to research that has revealed significant relations between OE and both the ability to attend to conscious awareness on the one hand, and measures of intelligence on the other.

Two Aspects of Openness to Experience

Openness Aspect. Hartmann (1991) suggests that in some individuals, the contents of consciousness are separated by much thinner boundaries than in others and that the permeability or fluidity of consciousness may constitute, “a broad dimension of personality and an aspect of the overall organization of the mind” (pp. 49). Further, McCrae (1994) has argued that OE comprises an aspect of how elements of

consciousness are organized. More specifically, he refers to the fluidity of organization and “permeability of consciousness”. Other authors have drawn attention to the notion that for some individuals, there appears to be a greater capacity to access both the internal and external material of conscious awareness. For example, terms such as the “open mind” (Rokeach, 1960), “absorbing experience” (Tellegen, & Atkinson, 1974), and “openness to sense perception” (Kaplan, & Singer, 1963) all suggest that some individuals may possess a greater capacity to allow information to enter conscious awareness, and that the boundary between conscious and unconscious awareness may be less rigid (McCrae, 1994).

The notion that an element of OE can be thought to represent the capacity to allow information to enter conscious awareness is supported by studies investigating the relations between Hartmann’s Boundaries Questionnaire (BQ; Hartman, 1991), and OE. For example, McCrae (1994) found that the total BQ score showed the strongest correlations with the OE domain (.66), most notably with the Fantasy, Aesthetics, and Feelings facets. Moreover, Van Hiel and Mervielde (2004) also investigated the structure of the BQ in relation to personality. Principal components analysis (PCA) revealed that a two-component solution for the BQ facets was most stable. Notably, one component of the BQ was best represented by opinion about or preferences for certain social objects, such as opinions about peoples, nations, groups, organizations and relationships. In contrast, the second component was concerned with the bizarre and eccentric elements of the boundaries concept, such as having unusual experiences, and awareness of thoughts, feelings and moods. Furthermore, component two of the BQ was significantly and positively associated with all three facets of OA (fantasy, aesthetics and feelings), but not

with the three facets that comprise IA, further supporting the division of OE into two distinct aspects. It seems likely that the fantasy, aesthetics and feelings facets represent the “openness” or “low boundary” element that many authors have ascribed to OE; moreover, these three facets have also been associated with Absorption (Tellegen & Atkinson 1974).

Absorption has been characterized by Tellegen and Atkinson (1974) as representing a readiness to both go beyond one’s familiar cognitive maps, as well as a capacity to restructure how one sees the self and both the inner and outer world. Pointing to the conceptual overlap between Absorption and OE, Glisky and colleagues (1991) investigated the joint factor loadings between the two constructs, and found a strong correlation (.68). A joint PCA using facets of the NEO PI-R for OE and subscales of the TAS for Absorption revealed a two-factor structure. Notably, the three facets that comprise OA loaded together on the first factor, which the authors labeled “openness” while the second three facets loaded onto the second factor, which the authors labeled “liberalism”. Moreover, all the subscales of the TAS loaded together on the “openness” factor. These findings were replicated in two separate samples, as well as when examining the two samples as a whole.

While openness and absorption have been strongly associated with one another, they do not conceptually appear to represent the same phenomenon. Openness appears to be related more to the ability to loosen the boundaries of awareness, while absorption appears to relate more to the ability to hone in and attend in a focussed manner. The commonality between the two may lie in the ability to control the contents of conscious awareness. This ability would stem from the capacity to regulate and organize the flood

of information coming into consciousness, and as such would be related to general cognitive functioning. Given the associations between intellectual functioning and OE, it is likely that the facets of Ideas, Actions and Values may be an indirect measure of this capacity.

Intellect aspect. McAdams and colleagues (2004) have found evidence to suggest that OE is related to complexity of thought. In their investigation of dispositional traits and life narratives, the authors found that the structural complexity of life narratives was one of only two dispositional traits significantly associated with OE in a student sample. Narrative complexity, according to the authors, refers to the complexity of the narratives such that complex stories may have more characters, interwoven plots, and suggest more than one meaning and ambiguous resolutions. Correlations in the student sample revealed a positive association between OE and narrative complexity (.52). Furthermore, when the authors investigated the same associations in an adult sample, narrative complexity was the only trait significantly associated with OE ($r = .46$). That said, examined these association at the higher order domain level, and did not specifically examine the facet level associations, thus masking any differential association between the facets of Ideas, Actions and values versus those of Fantasy, Aesthetics and Feelings.

The dispositional trait of narrative complexity may result from integrative complexity. Suedfeld, Tetlock, and Streufert (1992) describe integrative complexity (IC) as "...complexity of information processing, and decision making...in terms of degrees of differentiation and integration" (p. 393). The authors suggest that differentiation is concerned with not only the perception of various dimensions in any given domain of awareness, but also the ability to consider a variety of perspectives. In contrast,

integration refers to the development of conceptual connections among differentiated dimensions or perspectives. Differentiation is necessary, but not sufficient for integration. The connections made through integration are the result of the evaluation of trade-offs between, or a synthesis of various alternatives. Returning to the concept of narrative complexity, narrative complexity may be the result of the ability to integrate and/or tolerate conflicting and ambiguous information much as would be expected if a high degree of integrative complexity were present. Although Suedfeld and colleagues (1992) do not conceptualize integrative complexity as a trait per se, there appears to exist much theoretical similarity between integrative complexity as an organizational phenomenon of conscious awareness and IA.

Further support for the association between integrative complexity and the OE domain comes from Jost and colleagues (2003). In a meta analysis conducted with 88 samples from 12 countries, the authors found that political conservatism was predicted by, among other things, intolerance of ambiguity (.34) and need for order, structure and closure (.26) on the one hand, and low openness to experience (-.32), low uncertainty tolerance (-.27), and low integrative complexity (-.20) on the other hand. This pattern of results is consistent with the notion that OE is related to integrative complexity in general, as well as the ability to handle ambiguous information and less rigid structure. These latter two points may in turn be related to the notion of "liberalism as labelled by Glisky and colleagues (1991).

One drawback to the studies reported above is the lack of results at the facet level. McAdams and colleagues (2004) obtained their measure of OE using the Big Five Inventory (BFI; John, & Srivastava, 1999), which was designed as a short instrument for

measuring the five domains, but does not allow for the calculation of facet scores, while Jost and colleagues failed to report any associations at the facet level. As such, relations between integrative complexity and OE at the facet level remain unclear. That said, there is preliminary evidence to suggest that OE is related to the ability to integrate information and resolve ambiguities amongst various possibilities. Although a direct link between integrative complexity and IA remains to be investigated, future studies may wish to further investigate the associations between integrative complexity and its related constructs and the facets ideas, actions and values.

OA/IA: It remains unclear why these two distinct aspects would correlate in such a way as to consistently group together as a single OE domain. One explanation arises from the stance that OA represents the filter to conscious awareness, while IA represents the organizational structure of conscious awareness. Indirect support for this idea comes from literature supporting a link between creativity and OE. Indeed, of all the personality domains, OE is most strongly related to creativity. For example, McCrae (1987) found that divergent thinking, a commonly used measure for assessing creativity, was consistently associated in a positive manner with OE, but none of the other four domains. Indeed, there is a plethora of studies demonstrating a consistent association between these two constructs (Batey & Furnham, 2008).

Although definitions vary, creativity is related, at least in part, to the ability to solve previously unsolved problems, or to develop novel solutions to problems with existing solutions (Parkhurst, 1999). In order to be able to generate solutions to previously unsolvable problems or to generate novel solutions, one must somehow integrate information about the problem in a more sophisticated manner. People who are

aware of, and able to integrate, more information from the environment might also be better equipped to generate novel solutions. There is sufficient evidence to suggest that creativity, at least in part, is the result of cognitive processing abilities that allow for greater access to information. Research investigating the cognitive processing abilities of creative individuals has found a negative association between LI and creativity, such that highly creative individuals display reduced levels of LI compared to controls (Peterson, & Carson, 2000; Peterson, Smith, & Carson, 2002). As previously mentioned, LI is a cross-species phenomenon that acts as a gating mechanism to conscious awareness, such that individuals with reduced levels of LI are said to have greater access to information. Moreover, research stemming from an interest in the cognitive capacity of creative individuals dates back at least to the turn of the 20th century, and correlations between the two constructs have ranged from .20 to .40 (Batey & Furnham, 2008). In their comprehensive review of the literature surrounding creativity, intelligence, and personality, Batey and Furnham (2008) conclude that the link between these two constructs may be the result of an efficient neural system that underlies the two. Thus, it seems reasonable to assume that the combination of relatively high OA, which allows for greater access of information into conscious awareness, along with relatively higher IA, which underscores the capacity to integrate and organize that information, may result in the capacity for high creative potential.

Schizotypal PD

The data presented here demonstrate convincing evidence towards an inverse relation between the two aspects of OE and SZPD. On the one hand, SZPD is characterized by an openness and willingness to entertain fantasy and emotions, as well

as artistic sensitivity. It has been suggested here that this constellation of traits are the manifestation of an ability to loosen the boundaries of conscious awareness and gain access to a greater amount of information both internally and externally. On the other hand, SZPD is also characterized by lesser willingness to entertain a variety of ideas or try new approaches, as well as conservative values. These traits may well be the result of relatively lower integrative complexity.

Given the hypothesis that IA or integrative complexity is responsible for the organization and integration of information, it is not surprising that individuals who are able to lessen the boundaries of conscious awareness and gain access to greater amounts of information, but who do not retain a similar capacity to organize and integrate that information, would suffer from difficulties interpreting and interacting with their environment. This inability to moderate the influx of information in a coherent manner may be a predisposition towards cognitive and perceptual aberrations. Laroi, DeFruyt, van Os, Aleman, and Van der Linden (2005) have suggested that the positive association between hallucination proneness and OE supports the notion that higher scores on OE may predispose some individuals to unusual cognitive and perceptual aberrations. Moreover, there is evidence to suggest that both reductions in LI and lower intellectual functioning are associated with the development of psychosis. Lower intellectual functioning has been suggested as a moderating factor in the development of psychosis (Baruch, Hemsley, & Gray, 1988; David, et al., 1997; Lubow, Ingberg-Sachs, Zalstein-Orda, & Gewitz, 1992). Further support for this hypothesis that reduced LI is associated with psychotic-like symptomatology comes from literature demonstrating a link between dissociation and OE.

The positive association between SSDs and dissociation has been well documented (Irwin, 2001; Giesbrecht, Merckelbach, Kater, & Sluis, 2007). Notably, dissociation is most strongly associated with the OE trait of fantasy in individuals across a wide range of the SSD continuum. (Merckelbach, Campo, Hardy, & Giesbrecht, 2005). Building on these findings, Kwapil, Wrobel, and Pope (2002) conducted one of the few studies to investigate facet level relations between OE and dissociative experiences. Dissociative experiences include, among other things, feeling disconnected from reality, feeling absorbed in an experience or activity, as well as a sense of detachment from the self and others, and are conceptualized as existing on a continuum from everyday experiences such as losing track of time to more pathological extremes such as a complete loss of identity. Using the Dissociative Experiences Scale (DES; Bernstein, Carlson, & Putnam, 1993), Kwapil et al. (2002) found modest positive correlations between the DES and both the fantasy and aesthetics facets of OE. Notably, the absorption and depersonalization subscales of the DES accounted for these relations, while the amnesic subscale was unrelated.

Interpretations of these findings, however, should be made with caution. Once covariation among domains was accounted for, the associations were not replicated. Furthermore, using exploratory factor analysis, the authors entered all 33 measures (30 facets of the FFM, plus the three subscales of the DES), which revealed a joint six-factor solution. Each of the five domains of personality was approximated by the first five factors, while factor six appeared to constitute an independent dissociation factor. One possible explanation for these findings may be the use of a non-clinical student sample. While elements of dissociation may be present in this kind of sample, they are not likely

to be the more extreme pathological variants. As such the associations found would be weaker than those found in clinical samples. The weaker correlations would not survive the more stringent statistical analyses employed by Kwapil and colleagues (2002). It is plausible that if the same analyses were conducted in a clinical sample, the facet level correlations would survive a more stringent analysis above and beyond simple zero-order correlations.

According to Raine (2006), the nine symptoms of SZPD identified by the DSM-IV can be divided into three factors. The first factor, reflects cognitive-perceptual aberrations, and includes magical thinking, unusual perceptual experiences, ideas of reference, and paranoid ideation. The second factor reflects interpersonal difficulties, and includes a lack of close interpersonal relationships, constricted affect, and undue social anxiety. The third factor reflects disorganized features such as odd or eccentric behaviour and speech. This structure has been supported by some authors (Calkins et al., 2004; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003; Reynolds, Raine, Mellingen, Venables, & Mednick, 2000), although more recent evidence has suggested that a five-factor structure is preferable (Rawlings, Williams, Haslam, & Claridge, 2008). Moreover, there is some debate as to whether SZPD should be retained as an Axis II disorder, or whether it is better classified on Axis I along with schizophrenia.

Strengths and Limitations

Until now, one of the major weaknesses of the FFM in regards to personality pathology was the OE domain. Studies examining student samples found positive associations with this domain and schizotypy, whereas studies conducted with clinical samples often failed to find any significant associations. In addition, studies employing

measures constructed from symptom descriptions drawn from the current categorical system typically find four rather than the traditional five factors of personality, with OE being absent. As such, a particular strength of the current research is the demonstration of a consistent pattern of relations between OE and SZPD across student and clinical samples, underscoring the complex link between OE and personality pathology. Moreover, all of the measures employed in the current analyses were dimensional, adding to a growing body of literature suggesting that dimensional models can be useful in describing personality pathology. The measure of SZPD was based on current DSM-IV symptomatology; however, symptom counts were used as a dimensional analogue of symptom severity. In addition, measures of OE were drawn from a variety of FFM-based scales from both the lexical and questionnaire methods (NEO PI-R, Goldberg's Item Pool, BFAS).

There remain, however, important limitations to the current series of analyses. First, both OE and SZPD were measured via self-report instruments. Future studies may wish to investigate the proposed relations between aspects of OE and SZPD using interview-based measures. With regards to sample selection, replication of these findings with community or relatives of SSD patients would add strength to the current findings. Moreover, the data presented here was exclusively psychometric in nature. Future studies should aim to incorporate experimental methods into the investigation of the aspects of OE and their relations to SZPD. For example, it has been proposed that cognitive processing capacity may be related to IA. As such, studies obtaining measures cognitive processing ability would clarify this relation. Furthermore, it has been suggested that reduced levels of LI may be related to OA. Future studies may reveal that there is a

stronger association between OA and reduced LI. Finally, the current series of studies took a unidimensional approach to SZPD. In contrast, many authors have investigated the multi-factorial nature of schizotypy (Bentall, Claridge, & Slade, 1989; Claridge, et al., 1996; Ross, Lutz, & Bailey, 2002). As such, the relations of OE aspects with various factors of schizotypy remain unclear. It seems plausible that OA would be related to positive symptoms and/or perceptual aberrations, while IA may relate more to the cognitive disorganization often associated with these disorders.

Dimensional Models of Personality Disorders

The notion that dimensional models of PDs are adequate for capturing the full spectrum of personality pathology has been gaining momentum. Recently, Tackett, Silberschmidt, Krueger, and Sponheim (2008) investigated the relations between dimensiona models and Cluster A characteristics in an attempt to incorporate cognitive and perceptual aberrations into the proposed four-factor dimensional structure (First et al., 2002). Using the DAPP to obtain a dimensional measure of maladaptive traits, along with a 298-item measure of psychosis proneness, the authors successfully extracted a five-factor structure that was superior to the typical four-factor structure. Furthermore, four of the five factors corresponded to the four factors typically extracted from the DAPP, while the fifth factor, which the authors labelled “Peculiarity” was best represented by the Ideas of Reference, Unusual Perception, and Magical Ideation scales. Odd behaviours and speech also emerged as significant contributors to the fifth factor. The authors suggest that these findings support a five-factor structure of personality pathology that includes important characteristics that a four-factor structure would omit. Drawing on previous work suggesting a link between many of the traits on the peculiarity

scale and OE, Tackett and colleagues (2008) tentatively suggest that this factor may represent the pathological variant of this domain. The findings of the current series of studies suggesting that OE is consistently associated with SZPD in a variety of samples support this hypothesis. Although Tackett and colleagues' (2008) findings are based on the DAPP, which has had little validation as a measure of normal personality traits, one might speculate that peculiarity would be positively associated with OA and negatively with IA.

The current series of studies demonstrated consistent relations between OE and personality pathology using a variety of measures drawn from the FFM. There has been growing interest in unifying these literatures (Krueger, 2005; Widiger & Lowe, 2007), and studying personality pathology outside of the context of normal personality structure hardly seems parsimonious or even valid. The integration of these two lines of research now appears possible, and even preferable with growing support for the clinical utility of this model. In a review of the clinical utility of dimensional models, Verheul (2005) suggests that the adoption of a dimensional system will greatly improve the clinical utility of the psychiatric classification system, particularly in relation to coverage, reliability, subtlety, and clinical decision-making. For example, several instruments already exist covering self-report, interview, and brief rating scales to aid the clinician in personality assessment and procedures for their use in the diagnosis of PDs in a clinical context has been clearly outlined (Widiger & Lowe, 2007). Moreover, Samuel and Widiger (2006) have reported that in a group of 245 clinical psychologists, the FFM was considered to have greater clinical utility than the current categorical system. In light of this, the FFM appears to be the most useful model for integrating both normal and

· abnormal personality description, as well as integrating empirical findings with clinical practice.

References

- Ackerman, P.L., & Heggestad, E.D. (1997). Intelligence, personality and interests: evidence for overlapping traits. *Psychological Bulletin*, 121, 219-245.
- Allik, J. (2005). Personality dimensions across cultures. *Journal of Personality Disorders*, 19, 212-232.
- Appels, M.C.M., Sitskoorn, M.M., Vollema, M.G., & Kahn, R.S. (2004). Elevated levels of schizotypal features in parents of patients with a family history of schizophrenia spectrum disorders. *Schizophrenia Bulletin*, 4, 781-790.
- Ashton, M.C., & Lee, K. (2001). A theoretical basis for the major dimensions of personality. *European Journal of Personality*, 15, 327-353.
- Ashton, M.C., Lee, K., Vernon, P.A., & Jang, K.L. (2000). Fluid intelligence, crystallized intelligence, and the Openness/Intellect factor. *Journal of Research in Personality*, 34, 197-207.
- Bagby, R.M., Costa, P.T., McCrae, R.R., Livesley, W.J., Kennedy, S.H., et al., (1999). Replicating the Five-Factor model of personality in a psychiatric sample. *Personality and Individual Differences*, 27, 1135-1139.
- Bagby, R.M., Costa, P.T., Widiger, T.A., Ryder, A.G., & Marshall, M. (2005). DSM-IV personality disorders and the Five-Factor model of personality: A multi-method examination of domain and facet level predictions. *European Journal of Personality*, 19, 307-324.
- Bagby, R.M., Schuller, D.R., Marshall, M.B., & Ryder, A.G. (2004). Depressive

- personality disorder: rates of comorbidity with personality disorders and relations to the five-factor model of personality. *Journal of Personality Disorders*, 18, 542-554.
- Baruch, I., Hemsley, D.R., & Gray, J.A. (1988). Differential performance of acute and chronic schizophrenics in a latent inhibition task. *Journal of Nervous and Mental Disease*, 176, 598-606.
- Bates, T.C., & Shields, A. (2003). Crystallized intelligence as a product of speed and drive for experience: The relationship of inspection time and openness to g and gc. *Intelligence*, 31, 275-287.
- Batey, M. & Furnham, A. (2008). The relationship between measures of creativity and schizotypy. *Personality and Individual Differences*, 45, 816-821.
- Battaglia, M., Bernardeschi, L., Franchini, L., Bellodi, L., & Smeraldi, E. (1995). A family study of schizotypal disorder. *Schizophrenia Bulletin*, 21, 33-45.
- Bentall, R.P., Claridge, G., & Slade, P.D. (1989). The multi dimensional nature of schizotypal traits: a factor analytic study with normal subjects. *British Journal of Clinical Psychology*, 28, 363-375.
- Berenbaum, H. (1999). Peculiarity and reported childhood maltreatment. *Psychiatry: Interpersonal and Biological Processes*, 62, 21-35.
- Berenbaum, H., & Fujita, F. (1994). Schizophrenia and personality: exploring the boundaries and connections between vulnerability and outcome. *Journal of Abnormal Psychology*, 103, 148-158.
- Berenbaum, H., Valera, E.M., Kerns, J.G. (2003). Psychological trauma and schizotypal symptoms. *Schizophrenia Bulletin*, 29, 143-152.

- Bernstein, E.M., Carlson, E., & Putnam, F.W. (1993). An update of the dissociative experiences scale. *Dissociation*, 11, 16-25.
- Blais, M., (1997). Clinical ratings of the five-factor model of personality and the DSM-IV personality disorders. *Journal of Nervous and Mental Disease*, 185, 388-393.
- Brand, C.R. (1994). Open to experience – closed to intelligence: Why the “Big Five” are really the “Comprehensive Six”. *European Journal of Personality*, 8, 299-310.
- Butler, J.C.R. (2000). Personality and emotional correlates of right-wing authoritarianism. *Social Behavior and Personality*, 28, 1-14.
- Byrne, B.M. (1994). Testing for the factorial validity, replication, and invariance of a measuring instrument: a paradigmatic application based on the Maslach burnout inventory. *Multivariate Behavioral Research*, 29, 289--311
- Calkins, M. E., Curtis, C. E., Grove, W. M., & Iacono, W. G. (2004). The multiple dimensions of schizotypy in the first-degree biological relatives of schizophrenia patients. *Schizophrenia Bulletin*, 30, 317-25.
- Camisa, K.M., Backbrader, M.A., Lysaker, P., Rae, L.L., Brenner, C.A., & O'Donnell, B.F. (2005). Personality traits in schizophrenia and related personality disorders. *Psychiatry Research*, 133, 23-33.
- Capara, G.V., & Perugini, M. (1994). Personality described by adjectives: The generalizability of the Big Five to the Italian lexical context. *European Journal of Personality*, 8, 357-369.
- Cattell, R. B. (1956). Validation and intensification of the sixteen personality factor questionnaire. *Journal of Clinical Psychology*, 12, 205–214.
- Chapman, L.J., Chapman, J.P., Kwapil, T.R., Eckblad, M., & Zinser, M.C. (1994).

- Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology, 103*, 171-83.
- Cheung, F.M., Leung, K., Zhang, J.X., Sun, H.F., Gan, Y.Q., Song, W.Z., & Xie, D. (2001). Indigenous Chinese personality constructs: Is the five factor model complete? *Journal of Cross-Cultural Psychology, 32*, 407-433.
- Claridge, G. (1997). *Schizotypy: Implications for Illness and Health*. Oxford: Oxford University Press.
- Claridge, G., McCreery, C., Mason, O., Bentall, R., Boyle, G., Slade, P., et al. (1996). The factor structure of 'schizotypal' traits: A large replication study. *British Journal of Clinical Psychology, 35*, 103-115.
- Clark, L.A., Livesly, W.J., & Morey, L. (1997). Personality disorder assessment: The challenge of construct validity. *Journal of Personality Disorders, 11*, 205-231.
- Clark, L. A., Livesley, W. J., Schroeder, M. L., & Irish, S. L. (1996). Convergence of two systems for assessing specific traits of personality disorder. *Psychological Assessment, 8*, 294-303.
- Clark, L. A., McEwen, J. L., Collard, L. M., & Hickok, G. (1993). Symptoms and traits of personality disorder: Two new methods for their assessment. *Psychological Assessment, 5*, 81-91.
- Clark, L.A., & Watson, D. (1999). Personality, disorder, and personality disorder: Towards a more rational conceptualization. *Journal of Personality Disorders, 13*, 142-151.
- Coolidge, F. L., Becker, L. A., Dirito, D. C., Durham, R. L., Kinlaw, M. M., & Philbrick,

- P. B. (1994). On the relationship of the five-factor personality model to personality disorders: four reservations. *Psychological Reports, 75*, 11-21.
- Costa, P.T. Jr., & McCrae, R.R. (1976). Age differences in personality structure: A cluster analytic approach. *Journal of Gerontology, 31*, 564-570.
- Costa, P.T. Jr., & McCrae, R.R. (1985). NEO Personality Inventory manual. Odessa, FL: Psychological Assessment Resources.
- Costa, P.T. Jr., & McCrae, R.R. (1992). Revised NEO Personality Inventory and Five Factor Inventory professional manual. Odessa, FL: Psychological Assessment Resources.
- David, A.S., Malmberg, A., Brandt, L., Allebeck, P., & Lewis, G. (1997). IQ and risk of schizophrenia: A population-based cohort study. *Psychological Medicine, 27*, 1311-1323.
- De Clercq B., & De Fruyt., F. (2003). Personality disorder symptoms in adolescence: a five-factor model perspective. *Journal of Personality Disorders, 17*, 269-292.
- DeFruyt, F., DeClercq, B., van de Wiele, L., & Van Heeringen, K. (2006). The validity of Cloninger's psychobiological model versus the five-factor model to predict DSM-IV personality disorders in a heterogeneous psychiatric sample: domain facet and residualized descriptions. *Journal of Personality, 74*, 479-510.
- DeYoung, C.G., Peterson, J.B., & Higgins, D.M. (2005). Sources of Openness/Intellect: Cognitive and neuropsychological correlates of the fifth factor of personality. *Journal of Personality, 73*, 825-858.
- DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology, 93*, 880-

896.

- Digman, J.M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417-440.
- Duchene, A., Graves, R.E., & Brugger, P. (1998). Schizotypal thinking and associative processing: a response commonality analysis of verbal fluency. *Journal of Psychiatry and Neuroscience*, 1, 56-60.
- Dyce, J.A., & O'Connor, B.P. (1998). Personality disorders and the five-factor model: A test of facet-level predictions. *Journal of Personality Disorders*, 107, 3-16.
- Eysenk, H.J., & Eysenk, S.B.G. (1964). *Manual of the Eysenk Personality Inventory*. London: University Press.
- Fernandes, L.Q. L., & Miller, G. A. (1995). Compromised performance and abnormal psychophysiology associated with the Wisconsin psychosis-proneness scales. In G. A. Miller (Ed.), *The behavioral high-risk paradigm in psychopathology* (pp. 47-87). New York: Springer-Verlag.
- First, M.B., Bell, C.C., Cuthbert, B., Krystal, J.H., Malison, R., et al. (2002). Personality disorders and relational disorders: a research agenda for addressing crucial gaps in DSM. D.J Kupfer, M.J. First, & D.A. Regier (Eds.), *A Research Agenda for DSM-V* (p. 123-200). Washington, D.C.: American Psychiatric Association.
- First, M.B., Gibbon, M., Spitzer, R.L., Williams, J.B.W., & Benjamin, L.S. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders*. Washington DC: American Psychiatric Press.
- Fisher, J.E., Mohatny, A., Herrington, J.D., Koven, N.S., Miller, G.A., & Heller, W. (2004). Neuropsychological evidence for dimensional schizotypy: Implications

- for creativity and psychopathology. *Journal of Research in Personality*, 38, 24-31.
- Fossati, A., Raine, A., Carretta, I., Leonardi, B., & Maffei, C. (2003). The three-factor model of schizotypal personality: Invariance across age and gender. *Personality and Individual Differences*, 35, 1007-1019.
- Giesbrecht, T., Merckelbach, H., Kater, M., & Sluis, A. (2007). Why Dissociation and Schizotypy Overlap: The Joint Influence of Fantasy Proneness, Cognitive Failures, and Childhood Trauma. *Journal of Nervous and Mental Disease*, 195, 812-818.
- Gignac, G.E., Stough, C., & Loukomitis, S. (2004). Openness, intelligence, and self-report intelligence. *Intelligence*, 32, 133-143.
- Glisky, M.L., Tataryn, D.J., Tobias, B.A., Kihlstrom, J.F., & McConkey, K.M. (1991). Absorption, openness to experience, and hypnotisability. *Journal of Personality and Social Psychology*, 60, 263-272.
- Goldberg, L.R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology*, 59, 1216-1229.
- Goldberg, L.R. (1993). The structure of phenotypic personality traits. *American Psychologist*, 48, 26-34.
- Goldberg, L.R. (1994). Resolving a scientific embarrassment: A comment of the articles in this special issue. *European Journal of Personality*, 8, 351-356.
- Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe, Vol. 7* (pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.

- Goldberg, L.R., Johnson, J.A., Eber, H.W., Hogan, H., Ashton, M.C., et al. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*, 84-96.
- Harkness, K.L., Bagby, R.M., Levitt, A.J., & Joffe, R.T. (2002). Major depression, minor depression and the five factor model of personality. *European Journal of Personality, 16*, 1-11.
- Hartmann, E. (1991). *Boundaries in the mind: A new psychology of personality differences*. New York, NY: Basic Books.
- Hodson, G., & Sorrentino, R.M. (1999). Uncertainty orientation and the Big Five personality structure. *Journal of Research in Personality, 33*, 253-261.
- Holland, D.C., Dollinger, S.J., Holland, C.J., & MacDonald, D.A. (1995). The relationship between psychometric intelligence and the Five-Factor Model of personality in a rehabilitation sample. *Journal of Clinical Psychology, 51*, 79-88.
- International Personality Item Pool: A Scientific Collaboratory for the Development of Advanced Measures of Personality Traits and Other Individual Differences (<http://ipip.ori.org/>). Internet Web Site.
- Irwin, H. (2001). The relationship between dissociative tendencies and schizotypy: An artifact of childhood trauma? *Journal of Clinical Psychology, 57*, 331-342.
- Jang, K.L., McCrae, R.R., Angleitner, A., Riemann, R., & Livesley, W.J. (1998). Heritability of facet level traits in a cross-cultural twin sample: Support for a hierarchical model of personality. *Journal of Personality and Social Psychology, 74*, 1556-1565.
- Janssen, I., Krabbendam, L., Bak, M., Hanssen, M., Vollebergh, W., et al., (2004).

Childhood abuse as a risk factor for psychotic experiences. *Acta Psychiatrica Scandinavica*, 109, 38-45.

- John, O.P., & Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives. In L. Pervin, & O.P. John (eds.), *Handbook of personality: Theory and research*. Vol. 2, pp. 102-138. New York: Guilford Press.
- Jost, J.T., Glaser, J., Kruganski, A.W., & Sulloway, F.J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin*, 129, 339-375.
- Kaplan, M.F., & Singer, E. (1963). Dogmatism and sensory alienation: an empirical investigation. *Journal of Consulting Psychology*, 27, 486-491.
- Kendler, K.S., McGuire, M., Gruenberg, A.M., O'Hare, A., Spellman, M., & Walsh, D. (1993). The Roscommon family study. I. Methods, diagnosis of probands, and risk of schizophrenia in relatives. *Archives of General Psychiatry*, 50, 527-540.
- Kline, R.B. (1998). *Principles and practice of structural equation modeling*. NY: Guildford Press.
- Krueger, R. F. (2005). Continuity of axis I and axis II: Towards a unified model of personality, personality disorders, and clinical disorders. *Journal of Personality Disorders*, 19, 233-261.
- Kwapil, T.R., Wrobel, M.J., & Pope, C.A. (2002). The five-factor structure of dissociative experiences. *Personality and Individual Differences*, 32, 431-443.
- Laroi, F., DeFruyt, F., van Os, J., Aleman, A., & Van der Linden, M. (2005). Associations between hallucinations and personality structure in a non-clinical sample: Comparison between young and elderly samples. *Personality and Individual Differences*, 39, 189-200.

- Livesley, W.J. (2001). Conceptual and taxonomic issues. In W.J. Livesley (Ed), *Handbook of Personality Disorders. Theory, Research and Treatment* (pp. 3-38). New York: Guilford Press.
- Livesley, W.J. (2003). Diagnostic dilemmas in classifying personality disorder. In K.A. Phillips, M.B. First, & H.A. Pincus (Eds.), *Advancing DSM. Dilemmas in Psychiatric Diagnosis* (pp. 153-190). Washington, DC: American Psychiatric Association.
- Livesley W.J., Jang, K.L., & Vernon, P.A. (1998). Phenotypic and genetic structure of traits delineating personality disorder. *Archives of General Psychiatry*, 55, 941-8.
- Lubow, R.E., & Gewirtz, J.C. (1995). Latent inhibition in humans: data theory, and implications for schizophrenia. *Psychological Bulletin*, 117, 87-103.
- Lubow, R., Ingberg-Sachs, Y., Zalstein-Orda, N., & Gewirtz, J. (1992). Latent inhibition in low and high "psychotic-prone" normal subjects. *Personality and Individual Differences*, 13, 563-572.
- Markon, K. E., Krueger, R. F., & Watson, D. (2005). Delineating the structure of normal and abnormal personality: An integrative hierarchical approach. *Journal of Personality and Social Psychology*, 88, 139- 157.
- Malouff, J.M. Thorsteinsson, E.B., & Schutte, N.S. (2005). The relationship between the Five-Factor Model of personality and symptoms of clinical disorders: A meta-analysis. *Journal of Psychopathology and Behavioral Assessment*, 27, 101-114.
- McAdams, D.P., Anyodoho, N.A., Brown, C., Huang, Y.T., Kaplan, B., & Machado, M.A. (2004). Traits and stories: Links between dispositional and narrative features of personality. *Journal of Personality*, 72, 761-784.

- McCrae, R.R. (1994). Openness to experience: Expanding the boundaries of Factor V. *European Journal of Personality Psychology*, 8, 251-272.
- McCrae, R.R. (1996). Social consequences of experiential openness. *Psychological Bulletin*, 120, 323-337.
- McCrae, R.R., & Costa, P.T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52, 81-91.
- McCrae, R.R., & Costa, P.T. (1997). Conceptions and correlates of openness to experience. In R. Hogan, & J.A. Johnson (Eds.). *Handbook of Personality Psychology* (pp. 825-847). San Diego: Academic Press.
- McCrae, R.R., & John, O.P. (1992). An introduction to the Five-Factor model and its applications. *Journal of Personality*, 60, 175-215.
- McGlashen, T.H., Grilo, C.M., Sanislow, C.A., Ralevski, E., Morey, L.C., et al. (2005). Two-year prevalence and stability of individual DSM-IV criteria for schizotypal, borderline, avoidant, and obsessive-compulsive personality disorders: toward a hybrid model of axis II disorders. *American Journal of Psychiatry*, 162, 883-889.
- McGlashen, T.H., Grilo, C.M., Skodol, A.E., Gunderson, J.G., Shea, M.T., et al (2005). The collaborative longitudinal personality disorders study: Baseline axis I/II and II/III diagnostic co-occurrences. *Acta Psychiatrica Scandinavica*, 102, 256-264.
- Meehl, P.E. (1995). Bootstarpes taxometrics: Solving the classification problem in psychology. *American Psychologist*, 50, 266-275.
- Merckelbach, H., a Campo, J., hardy, S., & Giesbrecht, T. (2005). Dissociation and

- fantasy proneness in psychiatric patients: A preliminary study. *Comprehensive Psychiatry*, 46, 181-185.
- Neuberg, S.L., Judice, T.N., & West, S.G. (1997). What the need for closure scale measures and what it does not: Towards differentiating among related epistemic motives. *Journal of Personality and Social Psychology*, 72, 1396-1412.
- O'Connor, B. P., & Dyce, J.A. (2002). Tests of general and specific models of personality disorder configuration. In P. T. Costa & T. A. Widiger (Eds.), *Personality disorders and the five-factor model of personality* (pp. 223-246). Washington, DC: American Psychological Association.
- O'Reilly, T., Dunbar, R., & Bentall, R. (2001). Schizotypy and creativity: An evolutionary connection? *Personality and Individual Differences*, 31, 1067-1078.
- Parkhurst, H. B. (1999). Confusion, lack of consensus, and the definition of creativity as a construct. *Journal of Creative Behavior*, 33, 1-21.
- Peterson, J.B., & Carson, S. (2000). Latent inhibition and openness to experience in a high achieving student population. *Personality and Individual Differences*, 28, 323-332.
- Peterson, J.B., Smith, K.W., & Carson, S. (2002). Openness and extraversion are associated with reduced latent inhibition: Replication and commentary. *Personality and Individual Differences*, 33, 1137-1147.
- Raine, A. (2006). Schizotypal personality: neurodevelopmental and psychosocial trajectories. *Annual Review of Clinical Psychology*, 2, 291-326.
- Rawlings, D., Williams, B., Haslam, N., & Clarisge, G. (2008). Taxometric analysis

supports a dimensional latent structure for schizotypy. *Personality and Individual Differences*, 44, 1640-1651.

Reynolds, C. A., Raine, A., Mellingen, K., Venables, P.H., & Mednick, S. A. (2000).

Three-factor model of schizotypal personality: Invariance across culture, gender, religious affiliation, family adversity, and psychopathology. *Schizophrenia Bulletin*, 26, 603-618.

Reynolds, S.K., & Clarke, L.A. (2001). Predicting personality disorder dimensions from domain and facets of the Five-Factor Model. *Journal of Personality*, 69, 199-222.

Rokeach, M. (1960). *The open and closed mind*. New York, NY: Basic Books.

Ross, S.R., Lutz, C.J., & Baily, S.E., (2002). Positive and negative symptoms of schizotypy and the five factor model: A domain and facet level analysis. *Journal of Personality Assessment*, 79, 53-72.

Ruiz, M.A., Pincus, A.L., & Ray, W.J. (1999). The relationship between dissociation and personality. *Personality and Individual Differences*, 27, 239-249.

Ryder, A.G., Bagby, R.M., & Schuller, D.R. (2002). The overlap of depressive personality disorder and dysthymia: A categorical problem with a dimensional solution. *Harvard Review of Psychiatry*, 10, 337-352.

Samuel, D.B., & Widiger, T.A. (2006). A meta-analytic review of the relationships between the five-factor model and DSM-IV-TR personality disorders: A facet level analysis. *Clinical Psychology Review*, 28, 1326-42.

Saucier, G. (1994). Mini-markers: A brief version of Goldber's unipolar Big-Five markers. *Journal of Personality Assessment*, 63, 506-516.

Saucier, G. (1994). Trapnell versus the lexical factor: More ado about nothing? *European*

- Journal of Personality, 8, 291-298.
- Saulsman, L. M., & Page, A. C. (2004). The Five-Factor Model and personality disorder empirical literature: A meta-analytic review. *Clinical Psychology Review, 23*, 1055-1085.
- Schuldberg, D. (2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal, 13*, 5-16.
- Serra, A.M., Jones, S.H., Toone, B., & Gray, J.A. (2001). Impaired associative learning in chronic schizophrenics and their first degree relatives: a study of latent inhibition and the Kamin blocking effect. *Schizophrenia Research, 48*, 273-289.
- Siever LJ, Davis KL. (2004). The pathophysiology of schizophrenia disorders: perspectives from the spectrum. *American Journal of Psychiatry, 161*, 398-413.
- Stadler, D.R. (2007). Need for closure, the Big Five, and public self-consciousness. *The Journal of Social Psychology, 147*, 91-94.
- Startup, M. (1999). Schizotypy, dissociative experiences and childhood abuse: Relationships among self-report measures. *British Journal of Clinical Psychology, 38*, 333-344.
- Suedfeld, P., Tetlock, P. E., & Streufert, S. (1992). Conceptual/integrative complexity. In C. P. Smith, J. W. Atkinson, D. C. McClelland, & J. Veroff (Eds.), *Motivation and personality: Handbook of thematic content analysis* (pp. 393-400). New York: Cambridge University Press.
- Tabachnick, B.G., & Fidell, L.S. (2001). *Using Multivariate Statistics, Fourth Edition*. Needham Heights, MA: Allyn & Bacon.
- Tackett, J.L., Silberschmidt, A.L., Krueger, R.F., & Sponheim, S.R. (2008). A

- dimensional model of personality disorder: incorporating DSM Cluster A characteristics. *Journal of Abnormal Psychology*, 117, 454-459.
- Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences (“absorption”), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, 83, 268-277.
- Tien, A.Y., Costa, P.T., & Eaton, W.W. (1992). Covariance of personality, neurocognition, and schizophrenia spectrum traits in the community. *Schizophrenia Research*, 7, 149-158.
- Trull, T. J., (1992). DSM-III-R personality disorders and the five-factor model of personality: an empirical comparison. *Journal of Abnormal Psychology*, 101, 553-560.
- Trull, T.J., & Durrett, C.A. (2005). Categorical and dimensional models of personality disorder. *Annual Review of Clinical Psychology*, 1, 355-380.
- Trull, T., & Widiger, T. (2008). Geology 102: More thoughts on a shift to a dimensional model of Personality Disorders. *Social and Personality Psychology Compass*, 2, 949 – 967.
- Tupes, E.C., & Christal, R.E. (1961). Recurrent personality factors based on trait ratings. (USAF ASD Tech. Rep. No. 61-97). Lackland Air Force Base, TX: U.S. Air Force.
- Ullman, J.B. (1996). Structural equation modeling. In: *Using Multivariate Statistics*, Third Edition, B.G. Tabachnick and L.S. Fidell, (Eds.). HarperCollins College Publishers. New York, NY. pp. 709-819.
- Van Hiel, A., Kossowska, M., & Mervielde, I. (2000). The relationship between openness

- to experience and political ideology. *Personality and Individual Differences*, 28, 741-751.
- Van Hiel, A., & Mervielde, I., (2004). Openness to experience and boundaries in the mind: Relationships with conservative economic beliefs. *Journal of Personality*, 72, 659-686.
- Verheul, R. (2005). Clinical utility of dimensional models for personality pathology. *Journal of Personality Disorders*, 19, 283-302.
- Watson, D., & Slack, A.K. (1993). General factors of affective temperament and their relation to job satisfaction over time. *Organizational Behavior and Human Decision Process*, 54, 181-202.
- Webster, D.M., & Kruglanski, A.W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, 67, 1049-1062.
- Widiger, T.A., & Lowe, J.R. (2007). Five-factor model assessment of personality disorders. *Journal of Personality Assessment*, 89, 16-29.
- Widiger, T.A., & Simonsen, E. (2005). Alternative dimensional models of personality disorder: Finding a common ground. *Journal of Personality Disorders*, 19, 110-130.
- Widiger, T.A., & Trull, T.J. (2007). Plate tectonics in the classification of personality disorder: Shifting to a dimensional model. *American Psychologist*, 62, 71-83.
- Widiger, T.A., Trull, T.J., Clarkin, J.E., Sanderson, C., & Costa, P.T. (2002). A description of the DSM-IV personality disorders with the five-factor model of personality. In P.T. Costa and T.A. Widiger (Eds.), *Personality disorders and the*

five factor model of personality (pp. 89-99). Washington, DC: American Psychological Association.

Wiggins, J., Pincus, A. L., 1989. Conceptual of personality disorders and dimensions of personality. *Psychological Assessment*, 1, 305-316.

Yen, S., Shea, M.T., Battle, C.L., Johnson, D.M., Zlotnick, C., et al., (2002). Traumatic exposure and posttraumatic stress disorder in borderline, schizotypal, avoidant, and obsessive-compulsive personality disorders: Findings from the collaborative longitudinal personality disorders study. *Journal of Nervous and Mental Disease*, 190, 510-518.

Yeung, A.S., Lyons, M.J., Wateraux, C.M., Faraone, S.V., & Tsuang, M.T. (1993). The relationship between DSM-III personality disorders and the five-factor model of personality. *Comprehensive Psychiatry*, 34, 227-234.

Zeidner, M., & Matthews, G. (2000). Intelligence and personality. In R. Sternberg (Ed.), *Handbook of intelligence* (pp.581-610). New York: Cambridge University Press.

Appendix A

Summary of Hierarchical Regression Analysis for Domains Predicting Schizotypal Personality (N = 102)

Predictors (Step 1)	<i>B</i>	<i>SE B</i>	β	<i>Correlations</i>	
				Zero Order	sr^2
<i>FFM Domains</i>					
Neuroticism	0.058	0.020	-0.328	0.334	0.071
Extraversion	0.006	0.016	0.039	-0.130	0.001
Agreeableness	-0.056	0.017	-0.303	-0.341	0.087
Conscientiousness	0.011	0.020	0.056	-0.139	0.003

Appendix B

*Summary of Hierarchical Regression Analysis for Domains and Personality Disorders
Predicting Schizotypal Personality (N =102)*

Predictors (Step 2)	<i>B</i>	<i>SE B</i>	β	<i>Correlations</i>	
				Zero Order	sr^2
<i>FFM Domains</i>					
Neuroticism	0.027	0.021	0.151	0.334	0.009
Extraversion	0.026	0.022	0.165	-0.130	0.008
Agreeableness	-0.012	0.019	-0.067	-0.341	0.002
Conscientiousness	0.026	0.020	0.131	-0.139	0.010
<i>Personality Disorders</i>					
Avoidant PD	0.062	0.130	0.064	0.402	0.001
Dependent PD	0.120	0.134	0.083	0.304	0.005
OCPD	-0.192	0.104	-0.183	0.209	0.019
Paranoid PD	0.167	0.101	0.191	0.537	0.016
Schizoid PD	0.513	0.153	0.364*	0.426	0.065
Histrionic PD	0.054	0.125	0.043	0.173	0.001
Narcissistic PD	0.117	0.078	0.174	0.496	0.013
Borderline PD	0.057	0.068	0.102	0.523	0.004
Antisocial PD	0.126	0.115	0.101	0.356	0.007

Appendix C

Confidence Intervals for Parameter Estimates for a Structural Equation Model: Aspects of OE Predicting SZP in a Student sample (N = 331).

Variable	Parameter Estimate	Standard Error	Confidence Interval	
			Lower	Upper
Fantasy Facet	.639	.044	.553	.725
Aesthetics Facet	.677	.042	.595	.759
Feelings Facet	.656	.043	.572	.740
Ideas Facet	.654	.045	.565	.743
Actions Facet	.716	.043	.632	.800
Values Facet	.518	.051	.419	.617
Fantasy Error	.592	.056	.483	.701
Aesthetic Error	.542	.057	.431	.653
Feelings Error	.570	.056	.461	.679
Ideas Error	.572	.059	.456	.688
Actions Error	.487	.062	.365	.609
Values Error	.732	.053	.628	.836
Intellect – Openness	.767	.054	.661	.873
SZPD Parcel 1	.874	.078	.694	1.02
SZPD Parcel 2	1.00	FIXED		
SZPD Parcel 3	.770	.076	.621	.919
SZPD Parcel 4	.752	.076	.603	.901
SZPD Parcel 1 Error	.567	.058	.453	.681
SZPD Parcel 2 Error	.433	.061	.314	.552
SZPD Parcel 3 Error	.664	.055	.556	.772
SZPD Parcel 4 Error	.679	.055	.571	.787
SZPD Error	.338	.078	.185	.491
Openness - SZPD	.745	.157	.437	1.05
Intellect - SZPD	-.569	.159	.257	.881

Appendix D

Confidence Intervals for Parameter Estimates for a Structural Equation Model: Aspects of OE Predicting SZP in a Clinical sample (N = 264).

Variable	Parameter Estimate	Standard Error	Confidence Interval	
			Lower	Upper
Fantasy Facet	.632	.047	.540	.724
Aesthetics Facet	.759	.040	.681	.837
Feelings Facet	.704	.043	.620	.788
Ideas Facet	.592	.054	.486	.698
Actions Facet	.638	.052	.536	.740
Values Facet	.562	.055	.454	.670
Fantasy Error	.601	.059	.485	.717
Aesthetic Error	.424	.061	.305	.543
Feelings Error	.504	.060	.386	.692
Ideas Error	.649	.064	.524	.774
Actions Error	.593	.067	.462	.742
Values Error	.684	.062	.562	.806
Intellect – Openness	.827	.056	.718	.936
SZPD Parcel 1	.706	.078	.553	.859
SZPD Parcel 2	1.00	FIXED		
SZPD Parcel 3	.546	.071	.407	.685
SZPD Parcel 4	.395	.070	.258	.532
SZPD Parcel 1 Error	.568	.064	.443	.693
SZPD Parcel 2 Error	.134	.088	-.038	.306
SZPD Parcel 3 Error	.742	.054	.636	.848
SZPD Parcel 4 Error	.865	.043	.781	.949
SZPD Error	.785	.106	.557	.993
Openness - SZPD	.503	.225	.062	.994
Intellect - SZPD	-.440	.232	-.894	.894