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# Expanding the Healthy Schizotypal Model: Profiles of Schizotypy as Predictors of Creativity, Religion and Mental Health

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UNIVERSITY OF MIAMI

EXPANDING THE HEALTHY SCHIZOTYPE MODEL: PROFILES OF  
SCHIZOTYPY AS PREDICTORS OF CREATIVITY, RELIGION AND MENTAL  
HEALTH

By

Naomi Tuchman

A DISSERTATION

Submitted to the Faculty  
of the University of Miami  
in partial fulfillment of the requirements for  
the degree of Doctor of Philosophy

Coral Gables, Florida

August 2012

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Expanding the Healthy Schizotype Model:  
Profiles of Schizotypy as Predictors of Creativity,  
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Converging evidence suggests that schizotypal personality traits exist on a continuum (Rawlings, Williams, Haslam, & Claridge, 2008). In fact, although scant research has been conducted on this topic to date, some evidence suggests that there may be a subset of schizotypes (“healthy schizotypes”) who function well in spite of unusual experiences and proneness to the development of psychosis (McCreery & Claridge, 2002). In the present study, a latent profile analysis was conducted on a sample of 420 undergraduates, using data from the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) scale. Six profiles emerged from the analysis. Confirming study expectations, with few exceptions, results indicated that participants classified in the “Healthy Schizotypy” profile (characterized by the presence of positive schizotypy indicators, in the absence of negative, disorganized or impulsive schizotypy features) demonstrated significantly better mental health than those classified in profiles dominated by negative or disorganized schizotypy indicators. Individuals in the Healthy Schizotypy profile also had similar levels of well-being when compared to those with Average or Low Average schizotypy scores. Another aim of the current study was to expand on prior research linking healthy schizotypy with greater creativity, greater intrinsic religion, and better overall mental health. Specifically, it was hypothesized that greater creativity and

greater intrinsic religion might account for the greater mental health among those in the Healthy Schizotypy profile, when compared to those in other latent profiles. While greater intrinsic religion was associated with greater mental health, contrary to expectations, no support was found for either meditational model.

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## **CHAPTER ONE: INTRODUCTION**

Schizotypy is a multidimensional construct, which includes unusual or psychotic-like symptoms (e.g. illusions, marginal hallucinations, out-of-body experiences), difficulties with attention and concentration, dislike or lack of enjoyment from social activities, and disinhibited characteristics (Mason, Claridge & Jackson, 1995).

Schizotypal features are often divided into positive and negative factors, which mirror the positive and negative symptom clusters in schizophrenia-spectrum disorders, whereby positive symptoms refer to behavioral excesses (e.g., hallucinations and delusions) and negative symptoms refer to behavioral deficits (e.g., blunted affect and avolition).

Because many of these features are subclinical forms of psychotic symptoms, the study of schizotypal personality traits informs research on schizophrenia and other psychotic disorders (Lenzenweger, 1994). Research also suggests that there are certain subclinical symptoms of schizotypy that exist among normal (non-pathological) populations. Interestingly, people who possess these schizotypy profiles often also endorse characteristics that offer mental health benefits, such as enhanced creativity and religiosity (e.g., Burch, Pavelis, Helmsley, & Corr, 2006; Maltby & Day, 2002; Nettle, 2006; White, Joseph & Niel, 1995). More specifically, studies have suggested that these profiles, referred to henceforth as “healthy schizotypy,” typically present with positive schizotypal features (i.e. unusual perceptual experiences) but not the negative schizotypal features (i.e. introvertive anhedonia) (Maier, Falkai, & Wagner, 2002; McCreery & Claridge, 2002).

To date, there is limited research devoted to understanding the potentially adaptive nature of positive schizotypal traits. The primary aim of the present study was to

expand the healthy schizotypal model by examining the relationships between schizotypal profiles (e.g., high positive symptoms and low negative symptoms), direct measures of mental health (psychological and subjective well-being) and correlates of mental health (creativity and intrinsic religion) in a large sample of undergraduates.

### ***Conceptualizing Schizotypy as Continuous versus Discrete***

There are traditionally two main conceptualizations of schizotypy. The first views schizotypy in a quasi-dimensional model (Meehl, 1962) in which there is a discrete class of people with a genetic predisposition to schizophrenia, labeled “schizotypes.”

According to this model, people who score highly on measures of schizotypy (schizotypes) are at increased risk for the development of psychotic disorders. In line with this view, schizotypy has been defined as “the predisposition to schizophrenia at the level of the organization of the personality” (Vollema & van den Bosch, 1995, p. 19). Studies have suggested that longer duration of untreated psychosis is associated with poor prognosis, which makes it essential to monitor at-risk individuals and diagnose psychotic disorders early (Bottlender et al., 2003).

Some researchers, however, do not subscribe to the view that there is a discrete class of schizotypes. Instead, they view schizotypy as a fully dimensional construct (Claridge, 1997; Eysenck, 1960; Eysenck & Eysenck, 1976), in which schizotypal features do not in and of themselves indicate psychopathology and, in fact, may be associated with adaptive traits, such as creativity or religious beliefs and values (Claridge, 1997; McCreery & Claridge, 2002). This fully dimensional model thus accounts for a

healthy form of schizotypy, characterized by unusual and odd experiences that are uncoupled from the disease process itself, in addition to the pathological presentations encountered in schizotypal personality disorder.

Research on the latent structure of schizotypy has resulted in compelling arguments for both categorical and dimensional models (for summary, see Rawlings, Williams, Haslam & Claridge, 2008). However, Rawlings et al. (2008) note that many previous taxometric studies of schizotypy led to inaccurate conclusions in favor of the categorical model. This is because the conclusions that schizotypy is taxonic in nature and has a low base rate were drawn from studies reliant on measures of schizotypy that were designed to rely on extreme scores and are thus positively skewed. More recent taxometric analyses that account for such positive skew support the fully dimensional view for most components of schizotypy (Rawlings et al., 2008). These findings suggest that there is a normal range of schizotypal features in the general population. In other words, schizotypy can describe a healthy personality dimension, which may be distinguished from the pathological presentations that emerge in schizotypal personality disorder and schizophrenia.

### ***The Healthy Schizotypy Model***

The concept of healthy schizotypy was first introduced into scientific literature by McCreery (1993), although he used the term “happy schizotypy,” to describe subjects who scored highly on measures of unusual perceptual and other experiences, but who were nonetheless well-adjusted psychologically. In his seminal study, McCreery (1993) found that individuals in the happy schizotypy group had experienced at least one out-of-body experience (a subclinical positive psychotic symptom) and simultaneously scored

higher than controls on measures of extraversion (which is correlated with happiness) and scored lower than controls on measures of neuroticism. He concluded that it was possible for individuals who had experienced unusual experiences to be well-adjusted because of their high extraversion and low neuroticism scores (McCreery, 1993).

Similarly, although they did not measure psychological adjustment, McCreery and Claridge (1996) used the healthy schizotypy model to interpret results from a study of hallucinatory experiences in normal subjects. In this study, the authors found that under conditions expected to induce hallucinations, subjects who reported at least one out-of-the-body experience were more prone to report hallucinatory experiences in the lab. Because these subjects were drawn from the normal population, the authors concluded that positive psychotic symptoms exist among healthy individuals and are not indicative of psychopathology in and of themselves (McCreery & Claridge, 1996).

The healthy schizotypy model has since been expanded in a number of studies and theoretical papers. It relies on a fully-dimensional approach and operates on the premise that the concept of schizotypy can be uncoupled from the disease concept of schizophrenia (McCreery & Claridge, 2002). According to this model, abnormal experiences occur outside of psychopathology and are not always associated with distress or adjustment difficulties (McCreery, 1993). Schizotypy is thus conceptualized as a neutral trait, which can give rise to both adaptive and maladaptive forms of similar experiences. For example, positive aspects of schizotypy overlap with mystical states, intense religious phenomena and out-of-body experiences, which may or may not be interpreted as pathological (McCreery & Claridge, 2002). In fact, some healthy participants who experience out-of-body phenomena interpret these events as reinforcing

and desirable, rather than pathological (McCreery & Claridge, 2002). The broadening of the schizophrenia spectrum to include cases in which a person experiences positive schizotypal symptoms, divorced from pathology, offers the possibility of a beneficial, or healthy, form of schizotypy (Claridge, 2002).

### ***Measuring Schizotypy***

Most early research on schizotypy focused on Chapman's four Psychosis Proneness scales (Chapman, Chapman, Kwapil, Eckblad & Zinser, 1994): Magical Ideation, Perceptual Aberration, Social Anhedonia and Physical Anhedonia. Perceptual Aberration and Magical Ideation tend to load on a "positive" schizotypy factor, while the physical and social anhedonia scales load onto a "negative" factor (Bentall, Claridge & Slade, 1989; Mason, Claridge, & Williams, 1997). Research on Chapman's scales suggests that the positive schizotypy indicators are valid predictors of psychosis proneness (Chapman et al., 1994). For some people, psychotic-like experiences are transient and may overlap with passing developmental phases or drug use. For others, they represent valid indicators of the development of serious psychopathology (Chapman et al., 1994).

Since the introduction of the Chapman scales, at least 18 other schizotypy scales have been created and researched (Vollema & van den Bosch, 1995). In a review of nine factor analytic studies of the existing schizotypy scales, Vollema and van den Bosch (1995) reported that there are three or four factors that reliably emerge from the schizotypy measures. The most consistent factors are the Positive and Negative schizotypy symptom indicators, which refer to psychotic-like experiences and anhedonia, respectively. The other two factors are less consistently addressed; they represent a

Nonconformity factor, which measures impulsive and asocial personality traits, and a Social Anxiety/Cognitive Disorganization factor, which includes aspects of paranoid ideation and problems with attention (Vollema & van den Bosch, 1995).

A more recent and comprehensive addition to the schizotypy literature is the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) questionnaire (Mason et al., 1995). The authors of the O-LIFE based their construction of the measure on previous factor analyses (for review see Vollema & van den Bosch, 1995), and designed the scale to reflect the fully dimensional model of schizotypy. It offers several advantages over previous symptom-like scales (such as the Chapman scales), which rely on extreme scores and are thus highly skewed (Mason et al., 1995). The full scale consists of four subscales that measure Unusual Experiences, Cognitive Disorganization, Introvertive Anhedonia and Impulsive Nonconformity (Mason et al., 1995). The Unusual Experiences (UE) scale aligns most closely with positive psychotic symptoms, including magical thinking and unusual perceptual experiences. The Cognitive Disorganization (CD) scale represents attention and concentration difficulties in addition to social anxiety and overall moodiness. The Introvertive Anhedonia (IA) scale taps into one's lack of enjoyment from social and other activities. Finally, the Impulsive Nonconformity (IN) scale measures impulsivity and disinhibition at the extreme, while more moderate scores measure nonconformity (Mason et al., 1995). Research with this questionnaire has found that while all four subscales are part of the schizotypy construct, UE may be a better indicator of corresponding schizophrenia symptoms than the other scales, as it correlates closely with the Scale for the Assessment of Positive Symptoms (SAPS) in schizophrenia patients (Cochrane, Petch & Pickering, 2010).



It is important to note that researchers who ascribe to the fully-dimensional view of schizotypy have shown that the negative and disorganized symptoms are more discriminating between adaptive and pathological presentations of schizotypy than the positive symptoms (Maier et al., 2002; McCreery & Claridge, 2002). For example, Kendler et al. (1995) found that Cognitive Disorganization and Negative schizotypal features strongly discriminated between relatives of schizophrenia patients and controls, while positive schizotypal features only weakly discriminated between groups. In another study, schizophrenia spectrum personality-disordered subjects with no family history of schizophrenia scored higher on positive schizotypal symptoms and Impulsive Nonconformity, while those with a schizophrenia spectrum personality disorder plus family history scored higher on negative symptoms (Thaker, Moran, Adami, & Cassafy, 1993). These findings demonstrate that negative schizotypy symptoms tend to be present in family members of those with schizophrenia, while positive symptoms are not as likely to be present, which suggests a genetic link between negative schizotypy and the onset of schizophrenia. In a review of the available literature, Maier et al. (2002) conclude that there is consistent evidence to show that the negative (and not the positive) features of schizotypy are related to the etiology of schizophrenia.

In a similar line of research, Cornblatt et al. (2003) compared the level of risk for the development of schizophrenia among three groups of young adults diagnosed as being in the prodromal phase of the disorder. One group was characterized by the presence of attenuated negative symptoms, while the other two groups were characterized by moderate to severe levels of positive symptoms. Cornblatt et al. (2003) found that, regardless of the clinical status of positive symptoms across groups, all three groups

presented with elevated negative symptoms. Because all participants were diagnosed with a prodromal form of schizophrenia, the authors concluded that negative symptoms precede the onset of the disorder and, in fact, that psychosis will not develop in the absence of negative clinical features (Cornblatt et al., 2003).

### ***Classification of Schizotypy Profiles***

Because schizotypy is a multidimensional construct, classifying individuals as “high” or “low” on total scores or factor scores may overlook important patterns that exist within samples. This approach precludes the possibility for an individual to score highly on one factor, while simultaneously scoring low on another factor. Based on prior research, those who score highly on positive schizotypal symptoms *and* score low on measures of negative schizotypal symptoms are most likely to be characterized in the “healthy schizotypy” group. A limitation of prior research, with the exception of a few studies reviewed below, is that researchers have not examined this type of schizotypy profile as it relates to mental health.

To address this issue, some researchers have employed the statistical approach of cluster analysis, which creates homogenous clusters that minimize differences within groups and maximize differences between groups (e.g. Goulding 2004; Goulding, 2005; Loughland & Williams, 1997). Unlike previous statistical approaches, cluster analysis (and the related approach of latent profile analysis, which will be discussed in the Methods section) captures profiles in which individuals may score highly on one schizotypy factor, while simultaneously scoring low on another factor. This approach is especially relevant for research on the healthy schizotypy model, as previous results have

shown that those who score highly on positive schizotypy indicators, while scoring average or below average on other schizotypy factors, are likely to experience the best mental health.

Previous cluster analyses of the O-LIFE have revealed three or four clusters. Three-factor solutions include a CD/IA cluster, a UE cluster, and a Low Schizotypy cluster (Goulding, 2004). In a sample of paranormal believers and experiencers, Goulding (2005) found three separate clusters (IA, Low Schizotypy, and CD). This study did not find an Unusual Experiences cluster, which the author attributed to the fact that the sample only included individuals who reported they had experienced paranormal phenomena. In this study, therefore, all clusters were considered to be high on the UE factor. Goulding (2005) concluded that the Loughland and Williams' (1997) four-cluster solution is likely a better representation of the clinical reality.

This four-factor solution separates CD and IA into two separate clusters and also includes an UE and Low Schizotypy cluster (Loughland & Williams, 1997). In this solution, the Low Schizotypy cluster was defined by below average scores on all O-LIFE subscales, the UE cluster included individuals with high UE scores, average CD and below average IA scores. The CD cluster was comprised of individuals with high CD scores, and average UE and IA scores. Finally, the IA cluster was defined by high IA and CD and average UE scores.

Importantly, the cluster analyses described here have not included the Impulsive Nonconformity scale of the O-LIFE. In general, the inclusion of this scale into the O-LIFE is relatively controversial, as some researchers claim that the constructs tapped by its items overlap considerably with symptoms of affective disorders. Loughland and

Williams (1997) justified their exclusion of this scale in their cluster analysis by stating that it “concerns characteristics that are not central to schizotypy *per se*” (p. 880). The authors of the O-LIFE, however, acknowledge that the biological susceptibility and core features of affective and psychotic disorders do overlap considerably and they argue that inclusion of the IN scale represents a broader conceptualization of psychosis-proneness, which they believe is a more accurate reflection of the “clinical reality” (Mason & Claridge, 2006). Therefore, although three cluster analyses of the O-LIFE have been conducted, none have used all four of the O-LIFE scales, which represents a clear obstacle in interpreting results. Nonetheless, this line of research shows that the clusters derived from the O-LIFE are comprised of combinations of scores on different subscales, which speaks to the multidimensionality of schizotypy and the coexistence of different levels of schizotypy traits within individuals.

***Viewing the Association of Schizotypy and Mental Health through the Complete State Model of Mental Health***

Although there is strong theoretical and empirical support for a dimensional model of schizotypy and researchers have examined the existence and correlates of schizotypal features in healthy populations, few studies have examined how schizotypy measures directly relate to mental health. Most studies of schizotypal features in “healthy” populations have assumed that participants are functioning well because they are college students or are drawn from a non-clinical population. A more accurate conceptualization of mental health, however, should account for the absence of pathology in addition to the presence of psychological and subjective well-being, which is referred to as “flourishing” (Keyes, 2005). Previous models of mental health have suggested that mental health and mental illness lie on a single bipolar continuum in which mental health

is defined by the absence of psychopathology (Keyes, 2005). However, the absence of psychopathology does not imply the presence of happiness or well-being (Cowen, 1991). In the words of a previous United States Surgeon General, mental health is defined as “a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with people, and the ability to adapt to change and to cope with adversity” (U.S. Public Health Service, 1999, p.4). Keyes (2005) suggested that just as depression is defined by anhedonia and dysfunction, mental health is defined by hedonia and other “symptoms” of adaptive psychological functioning. Therefore, a more complete understanding of mental health is warranted and should take into account the extent to which an individual is flourishing in terms of psychological and subjective well-being (Keyes, 2005).

In a novel structural equation model, Keyes (2005) found that mental health and mental illness are related, but distinct latent factors (correlated at  $-.53$ ). More specifically, results indicated that completely mentally healthy individuals (those with an absence of mental illness plus flourishing) show better psychosocial functioning when compared to moderately mentally healthy individuals (who are neither flourishing nor languishing in terms of psychological and subjective well-being). In addition, those who were classified as languishing (due to low well-being scores) perform as poorly as, and sometimes more poorly on measures of psychosocial functioning than those with a diagnosis of mental illness. Finally, complete mental illness (mental disorder diagnosis plus languishing) represented the most dysfunctional group in this study. Thus, research has shown that mental illness and mental health are related but distinct entities. In order to classify an

individual as completely mentally healthy, that individual should be free from mental illness and should be flourishing in terms of psychological and subjective well-being (Keyes, 2005).

Structural equation models based on the Complete State Model of Mental Health (Keyes, 2005) have revealed that subjective well-being and psychological well-being are related, but distinct components of mental health (Keyes, Shmotkin, & Ryff, 2002). Individuals who score highly on one measure are likely to score highly on the other. Subjective well-being is operationally-defined as the presence of both positive affect and global life satisfaction and is generally assessed using measures of positive and negative affect and quality of life (Keyes et al., 2002). Psychological well-being, as assessed by Ryff's (1989) Psychological Well-Being Scales, is operationally-defined as a measure of well-being in relation to more existential life challenges. Ryff (1989) created six new measures that assess different challenges people face as they strive towards adaptive psychological functioning. The six domains measured by the scales include self-acceptance (in light of one's own limitations), positive relations with others (ability to develop and maintain supportive relationships), environmental mastery (ability to shape one's environment to meet personal needs), autonomy (self-determination and sense of personal authority), purpose in life (finding meaning in life's challenges) and personal growth (ability to capitalize on one's strengths and talents). This measure thus builds upon prior conceptualizations of mental health by focusing on the individual's perception of his or her own level of thriving, in light of the particular challenges inherent in normal life (Ryff, 1989).

Currently, there is limited evidence to support the notion that positive aspects of schizotypy can exist in mentally healthy individuals (the healthy schizotypy model; e.g., Claridge, 1997; McCreery & Claridge, 2002). These studies of the healthy schizotypy typically examine the links between positive schizotypy and characteristics related to adaptive functioning (e.g., creativity), and rarely test the direct relationship between positive aspects of schizotypy and psychological and subjective well-being. For this reason, it is important to review a related body of research that has examined how schizotypy (especially subclinical positive psychotic symptoms) relates to several constructs that are generally considered to be adaptive in nature: meaning making coping, sense of coherence, talents (e.g., creativity), and beliefs (e.g., religion). A review of this research is intended to point out important gaps in the literature and to set the stage for the main study hypotheses.

### ***Associations of Schizotypy, Meaning-Making Coping, and Sense of Coherence***

As noted above, a fully dimensional model of schizotypy that includes the characterization of a healthy schizotypy should contain information about how schizotypal features relate to mental health measures. Although no studies have directly examined mental health in the context of healthy schizotypy, some related research has been conducted. For example, people may be more likely to engage in magical thinking (a positive schizotypy symptom) when under physical and/or psychological threat as a way of dealing with uncertainty (meaning-making; Keinan, 1991; Williams & Irwin, 1991). Similarly, using an experimental paradigm, Farias et al. (2005) instructed participants to look at changing patterns of dots on a screen and to describe whenever they recognized something in the pattern. Responses were categorized as simple

(geometric shapes or letters and numbers) or complex (meaningful objects, such as humans or animals, landscapes). Schizotypy and magical ideation were associated with greater frequency and variety of complex/meaningful patterns reported (Farias, Claridge, & Lalljee, 2005). Thus, individuals with positive schizotypal traits may be more likely to see connections and find meaning amidst uncertainty, which is an important element of psychological well-being domains, such as purpose in life and environmental mastery.

In addition, two studies by Goulding (2004, 2005) have examined a construct closely related to psychological well-being. The outcome measure that Goulding used was a measure of sense of coherence, which is defined as a global orientation to life characterized by a confident feeling that the demands and challenges of life are comprehensible, manageable and meaningful (Antonovsky, 1993). Although this measure doesn't directly assess psychological or subjective well-being, there are clear overlaps among the constructs tapped by this scale and the psychological well-being scales developed by Ryff (1989). Therefore, examining the sense of coherence literature as it relates to schizotypy may illuminate some of the hypotheses proposed in the current study.

Goulding (2005) conducted a study with participants who reported paranormal beliefs and experiences. The author found that sense of coherence scores in a low schizotypy group (who reported having a paranormal experience, but nonetheless scored low on UE, IA and CD) were higher than those from a normative sample. This group also scored higher on sense of coherence than two other groups, which were characterized by high IA and high CD scores. In a similar study, Goulding (2004) found that undergraduate subjects who scored high on the UE cluster had similar sense of coherence



scores to a low schizotypy group (same as above) and both groups scored significantly higher than those who scored high on a CD/IA cluster. Results from these two studies suggest that it is possible for individuals with unusual beliefs and experiences (positive schizotypy) to function well psychologically and that these beliefs and experiences might only be associated with a weaker sense of coherence for individuals with negative or disorganized schizotypy features. Results thus provide further support for the fully dimensional model of schizotypy and the notion of the healthy schizotype.

### *Associations of Schizotypy, Creativity, and Religion*

A good deal of research has also been conducted on how schizotypy indicators relate to creativity and religion. Both of these constructs have been related to mental health in the general population. For example, creativity has been shown to contribute to physical and psychological health, as well as to optimal human functioning (Runco & Richards, 1997). In addition, creativity has been related to the ability to problem-solve effectively and to be flexible in the use of coping strategies (Runco, 2004). While problem solving and coping ability are not measures of mental health in and of themselves, they are likely to be associated with adaptive psychological functioning.

Similarly, religion has been associated with mental and physical health across a wide range of studies (e.g., George, Larson, Koenig, & McCullough, 2000). For example, religious individuals present with lower rates of anxiety, depression, smoking and alcohol abuse than non-religious individuals (Kendler, Gardner, & Prescott, 1997; Kennedy, Kelman, Thomas, & Chen, 1996; Koenig, Ford, George, Blazer, & Meador, 1993; Koenig, Hays, George, & Blazer, 1997; Woods, Antoni, Ironson, & Kling, 1999). Religion has also been associated with greater longevity (George et al., 2000), and higher

quality of life (Kaczorowski, 1989; Landis, 1996). In addition, research shows that incorporating religious values and beliefs into treatment for serious mental illness confers mental health benefits, especially for patients who do not exhibit acute psychotic symptoms such as religious delusions (Weisman de Mamani, Tuchman & Duarte, 2010).

It is important to note that both creativity and religion also have the potential to be used in a maladaptive fashion, especially among psychosis-prone individuals (Brod, 1997; Eysenck, 1993; Weisman de Mamani et al., 2010). In particular, both creativity and religion may be associated with increased delusional thought patterns, which are present in psychotic individuals. The literature on schizotypy, creativity and religion will be outlined below as an illustration of why a more complete understanding of the “healthy schizotype” is warranted.

***Creativity.*** Creativity is a multidimensional construct with many known (and unknown) correlates in the field of psychology. One of the more replicable and robust predictors of creativity is positive affect (George & Brief, 1996; Isen & Baron, 1991; Isen, Daubman, & Nowicki, 1987), which is a component of subjective well-being. Individuals who excel in creative endeavors report being in a good mood, which represents a clear link between creativity and mental health.

A large body of research also links schizotypy with creativity. Psychotic and creative thinking may share an over-inclusive thinking style and a tendency toward odd or unusual ideas (Eysenck, 1993). Individuals with the presumed genetic predisposition (Meehl, 1962) are likely to exhibit schizotypal symptoms and are also likely to show

signs of extraordinary creative functioning. In fact, some researchers have hypothesized that the link between psychotic traits and creativity may explain why psychosis genes are retained in the gene pool (O'Reilly, Dunbar & Bentall, 2001).

The relationship between schizotypal features and creativity is generally more evident in non-psychiatric populations; perhaps because psychosis “blocks” productivity due to interference from more severe positive symptoms (Brod, 1997). Other evidence suggests that creative individuals are differentiated from psychotic individuals by the absence of negative features, such as anhedonia and avolition (Nettle, 2006). The lack of negative symptoms may thus be a protective factor that impedes the translation of schizotypy into psychotic illness (and in fact, may lead to benefits associated with enhanced creativity). In support of this hypothesis, Nettle (2006) found that an artistically creative group scored as high as schizophrenia patients on measures of UE and CD, but significantly lower on IA. This finding is in line with the theoretical underpinnings of the healthy schizotype model, which suggest that those with positive schizotypal symptom profiles are more likely to display adaptive psychological functioning than those with symptom profiles dominated by negative schizotypy features (Cornblatt et al., 2003; McCreery & Claridge, 2002).

Further evidence for the link between positive schizotypal features and creativity comes from research by Schuldberg et al. (1988) who found that participants who scored highly on either the Perceptual Aberration or the Magical Ideation, but not the Physical Anhedonia scale scored significantly higher on biographical and personality measures of creativity than a control group who did not score highly on any of these scales. Similarly, Batey and Furnham (2008) found that self-reports of creativity were positively related to

UE and IN and negatively related to CD on the O-LIFE. Burch et al. (2006) also reported greater UE scores among visual artists, compared to non-artists. The preponderance of evidence thus links self-reported creativity to positive schizotypy features and indicates that these variables coexist among individuals who are functioning adaptively.

In addition to self-report measures of creativity, studies have also examined performance on behavioral measures of creativity such as category fluency tasks, which ask participants to name as many objects as they can think of in a particular category. Category fluency tasks provide two measures of the creative process: a divergent thinking score, which measures the atypicality or originality of responses and a cognitive fluency score, which represents the total number of responses from each participant. Previous research has shown that divergent thinking accounts for 50% of the variance in scores of creative achievement and is unrelated to skill or intelligence (Carson, Peterson, & Higgins, 2003; Plucker, 1999).

In line with neuropsychological findings in schizophrenia patients, deficits in cognitive fluency (e.g., the total number of responses) have been found in siblings of individuals with schizophrenia (Laurent et al., 1999) and people with schizotypal personality disorder (Trestman et al., 1995). This deficit is associated with negative schizophrenia symptoms, including impoverished speech and anhedonia (Allen, Liddle & Frith, 1993; Howanitz, Cicalese & Harvey, 2000). A number of studies have also examined cognitive fluency in healthy participants who score high on schizotypy measures. These studies have found no relationship between cognitive fluency and Schizotypal Personality Questionnaire (SPQ) scores, Schizotypal Trait Questionnaire (STQ) scores, or O-LIFE dimensions (Green & Williams, 1999; Kiang & Kutas, 2006;

Morgan, Bedford, O'Regan & Rosell, 2009). Therefore, while some research suggests that individuals on the schizotypal spectrum (at familial risk) perform poorly on cognitive fluency tasks, results from other studies have found no relationship between cognitive fluency and schizotypal symptom profiles. Further research is needed to clarify and expand upon these inconclusive findings.

In a related line of research, increased verbal fluency (e.g., list as many words that start with a certain letter) has been related to positive symptoms of schizophrenia, whereas deficits in verbal fluency have been associated with negative symptoms of schizophrenia (Tsakanikos & Claridge, 2005). Verbal fluency is considered to be sensitive to dysfunction in the frontal lobe and may be a cognitive endophenotype linking underlying biological vulnerabilities to clinical symptoms of schizophrenia spectrum disorders (Tsakanikos & Claridge, 2005). Similar patterns emerge among healthy participants who score highly on schizotypy measures. Tsakanikos and Claridge (2005) found that participants who scored one standard deviation above the mean on the UE scale showed increased verbal fluency, whereas those who scored one standard deviation above the mean on the IA scale of the O-LIFE showed decreased verbal fluency. Because verbal fluency has been considered to represent an important domain of creativity, the authors interpreted these results to suggest that common cognitive features underlie the link between creativity and positive schizotypy (Tsakanikos & Claridge, 2005). Many researchers have defined these common cognitive features as representative of altered semantic memory organization, which results in differential automatic spreading activation among psychosis-prone individuals (Kiang & Kutas, 2006; Tsakanikos & Claridge, 2005)

The semantic memory theory is also invoked to explain results from a number of studies examining divergent thinking. For example, results from two of the category fluency studies reviewed above have indicated that people who scored highly on the SPQ or STQ generate more original or atypical responses (Green & Williams, 1999; Kiang & Kutas, 2006). Similarly, Mohr et al. (2001) found that individuals who score highly on a measure of magical ideation (which is a component of positive schizotypy) are more likely to consider unrelated words as being associated than those with low magical ideation scores. The authors interpreted these findings as support for the relationship between schizotypy and enhanced activation of weakly-related concepts. Mohr et al. (2001) highlight that this tendency may be related to both adaptive (creativity) and maladaptive (delusional thinking) cognitive processes. Using a correlational method, O'Reilly et al. (2001) also found a significant positive association between UE scores on the O-LIFE and divergent thinking. However, upon further analyses, they found that this association was no longer significant once degree subject (humanities vs. creative arts) was taken into account (O'Reilly et al., 2001). Nonetheless, this study provides support for the link between schizotypy and creativity at large, as positive schizotypy scores were indicative of engagement in verbal arts. Based on available research, there seems to be a potential, yet inconclusive, association between divergent thinking and schizotypal symptoms.

Taking into account the lack of consistent findings across all studies and drawing from pre-existing and original research, Schulberg (2000-2001) proposed that greater levels of positive schizotypal symptoms tend to be associated with greater creativity, while greater levels of negative schizotypal symptoms tend to be associated with lower

levels of creativity. In addition, he noted that the available evidence suggests a positive association between impulsivity and creativity (Barron, 1963; Schulberg, 2000-2001), although few studies of schizotypy and creativity include the O-LIFE Impulsive Nonconformity scale.

**Religion.** In a large and growing body of research, religion has been strongly linked to mental and physical well-being (e.g., George et al., 2000). Many studies of religion differentiate between intrinsic and extrinsic religious orientations. Allport and Ross (1967) contrasted these approaches to religion by stating that the intrinsically oriented person *lives* his religion, whereas the extrinsically oriented person *uses* his religion to achieve some other goal. Intrinsic religion reflects “religion as a meaning-endowing framework in terms of which all of life is understood” (Donahue, 1985). In turn, intrinsic religion has been positively correlated with internal locus of control, purpose in life (Donahue, 1985) and mental health and well-being (Ventis, 1995).

Some researchers argue, through empirical research and case studies, that psychotic phenomena can occur outside of psychopathology in the form of intense religious or spiritual experiences (Jackson & Fulford, 1997). Examples of such cases include individuals who receive special messages from God or hold fixed and unusual religious beliefs that are not open to doubt. In this way, religion and psychosis may intersect in the form of religious hallucinations and delusions, which may not be indicative of psychopathology when these experiences are essentially benign (Jackson & Fulford, 1997).

Literature on the relationship between religion and schizotypal features, however, is inconclusive. In one study of adolescents, there was a significant negative association

between IN and religion, indicating that participants who identified as religious were less impulsive and more conforming than non-religious peers (Joseph & Diduca, 2001). This relationship was stronger among female adolescents in the sample. In addition, there was a negative association between religion and magical ideation in this sample and a positive (but weak) relationship between religion and perceptual aberration (Joseph & Diduca, 2001). The religion measure used in this study tapped more into intrinsic religion than extrinsic, although these two orientations were not clearly delineated. Overall, this study provides the strongest support for the hypothesis that religion is related to decreased IN. It also provides preliminary support for the possibility of either positive or negative correlations between religion and positive schizotypy indicators (magical ideation and perceptual aberration).

Additional research has documented a significant positive association between religiosity and unusual perceptual experiences and a trend towards associating religiosity with magical ideation in men only (White et al., 1995). Similarly, Maltby and Day (2002) found that intrinsic religion was positively correlated with magical ideation and unusual perceptual experiences among men, but inversely correlated with paranoia and suspiciousness among women. The authors suggested that, for women at least, intrinsic religion may provide a viable means of making sense of unusual experiences that actually protects individuals from construing such experiences as threatening (Maltby & Day, 2002). This conclusion coincides with a large body of research that explains intrinsic religion as one of the more common mechanisms for making meaning out of unusual or difficult life experiences. Religious beliefs can provide an integrated and comprehensive cognitive system, which may help individuals accommodate and/or explain most events



(Spilka, Shaver, & Kirkpatrick, 1985). In addition, research has shown that religion facilitates the meaning-making process, especially in understanding stressful life events that tend to exceed the limits of human control (Davis, Nolen-Hoeksema, & Larson, 1998; Emmons, 2005).

In sum, the literature linking religion with positive schizotypal features is inconclusive to date. Nonetheless, some evidence suggests that intrinsic religious orientations may serve a protective function for individuals who experience unusual experiences by providing a means of making sense out of such experiences. In this way, intrinsic religion may play a role in the proposed relationship between healthy schizotypy and mental health, which will be examined in the present study.

### ***The Current Study***

The purpose of the present study was to expand the healthy schizotypy model by utilizing the complete state model of mental health to address the question of whether the healthy schizotype is, in fact, mentally healthy. Through the examination of adaptive mental health characteristics among individuals with different schizotypy profiles, it is hoped that this project will shed light on the potential to develop and employ a strengths-based approach for treating those who are at risk for psychotic spectrum disorders.

There were three main goals of the present study. The first goal was to conduct a latent profile analysis to statistically classify the healthy schizotypy profile within the present “normal” population. The latent profile approach allows for the analysis of discrete schizotypal profiles, while taking the multidimensional nature of the construct into account. The second goal of the project was to directly test whether the healthy schizotypy profile derived through the latent profile analysis is related to measures of

mental health (subjective and psychological well-being). If we are to consider the existence of the healthy schizotypy and conclude that the concept of schizotypy can be uncoupled from the disease process, we need more support for the hypothesis that certain schizotypy profiles are related to adaptive mental health. The third goal was to test whether two potential mediators (intrinsic religion and creativity) may help explain why the healthy schizotypy profile is mentally healthy.

### ***Hypotheses***

According to proponents of the fully dimensional model, positive schizotypal features (in the absence of negative schizotypy and psychopathology) may be associated with adaptive elements of psychological functioning (Goulding, 2004; McCreery & Claridge, 2002). Empirical research has linked positive schizotypy with correlates of psychological functioning, such as meaning-making coping, sense of coherence, creativity, and intrinsic religion, though less research has been conducted on direct measures of mental health. To address the goals detailed above, the following hypotheses are proposed:

**1. *Latent profile analysis.*** It is hypothesized that five latent profiles will emerge from the latent profile analysis of the O-LIFE, including four that emerge from schizotypal features themselves (UE, IA, and CD, and IN) and one that reflects the absence of schizotypal features (Low Schizotypy). This hypothesis is based on previous cluster analyses of the O-LIFE questionnaire, which have revealed the existence of four clusters (Goulding, 2005; Loughland & Williams, 1997). However, as the IN scale will also be included in the latent profile analysis for the first time, it is expected that an additional cluster/profile will arise to classify those who score highly on this subscale.

Based on previous cluster analyses, it is expected that each latent profile will be characterized by high scores on one O-LIFE scale and average or below average scores on the remaining scales. The main study hypotheses will involve the healthy schizotypy profile, which is expected to be characterized by high scores on the UE scale *and* average or below-average scores on CD, IA and IN. This profile will be referred to as the “healthy schizotypy” profile because of prior findings that individuals who present with positive, but not negative features of schizotypy may be in the best mental health (Goulding, 2004; Maier et al., 2002; McCreery & Claridge, 1996; McCreery & Claridge, 2002).

In addition to the healthy schizotypy profile, it is hypothesized that four other latent profiles will emerge. The CD profile is expected to be characterized by high scores on CD and average or below average scores on UE, IA and IN. The IA profile is expected to be characterized by high scores on the IA scale and average or below average scores on UE, CD and IN. The IN profile is expected to be characterized by high scores on the IN scale and average or below average scores on UE, CD and IA. Finally, the Low Schizotypy profile is expected to be characterized by below average scores on all four O-LIFE scales. While these profiles are hypothesized based on previous cluster analyses of the O-LIFE (Goulding, 2005; Loughland & Williams, 1997), it is possible that the five latent profiles will not emerge exactly as expected, as this will be the first latent profile analysis to be conducted on the O-LIFE.

**2. *Healthy schizotypy and mental health.*** Based on available research, it is hypothesized that the healthy schizotypy profile (comprised of individuals who score highly on UE and score average or below average on negative schizotypy indicators) will have greater psychological and subjective well-being (McCreery, 1993) than the profiles

dominated by negative schizotypy indicators. Individuals with the Low Schizotypy profile (low scores on all schizotypy measures) are expected to have similar psychological functioning as those in the healthy schizotypy profile (Goulding, 2004).

**3. *Potential mediators of the relationship between healthy schizotypy and mental health.*** Based on prior research linking healthy schizotypy with creativity and intrinsic religion and also linking both of these variables to mental health, creativity and intrinsic religion will be examined as potential mediators of the proposed relationships between latent schizotypy profiles and mental health. It is hypothesized that creativity and religion may be two pathways through which unusual perceptual experiences and other subclinical positive psychotic symptoms are channeled. This part of the study will help address the mechanistic question of *why* healthy schizotypy may be healthy.

## CHAPTER TWO: METHODS

### *Participants*

The sample included 420 undergraduate students at the University of Miami (264 males, 156 females), who participated in partial fulfillment of requirements for an Introduction to Psychology course. In terms of ethnicity, 191 of the participants identified as Caucasian, 95 as Hispanic, 47 as African American, 19 as Asian American and 68 participants identified as “Other.” A more complete breakdown of demographic data is presented in Table 1. This study has been approved by the University of Miami Internal Review Board and all students provided informed consent prior to participation. Measures were completed in small groups, supervised by an undergraduate research assistant.

### *Measures*

Descriptive statistics (mean, standard deviation, skew and kurtosis) and coefficient alphas for all measures (except the creativity measure) are presented in Tables 2 and 3. Procedures and reliability for the creativity measure are described below.

***Creativity.*** Following the procedures of previous research, the creativity task that was used in the present study is a modification of Wallach and Kogan’s (1965) Creativity Test, which has been used in several psychological studies of creativity (Hirt, Devers, & McCrea, 2008; Kiang & Kutas, 2006; Laurent et al., 1999; Trestman et al., 1995). All participants were provided with instructions for the task and a lined sheet of paper to list items in the first category (“modes of transportation”). The instructions were read aloud by the supervising research assistant and participants were given two minutes to list as many items in this category as possible. The instructions were as follows:

In this section, we are examining the things that spontaneously come to people's minds. Below are two categories of objects. Working with one category at a time, please think about and list as many members of that category that you can think of. There are no right or wrong answers and the examples you generate can be as commonplace or as creative and out of the ordinary as you like. You will have TWO minutes to complete each category. Please try to continue working until the time is up. At the end of two minutes, we will move onto the second category.

After two minutes, participants were instructed to put down their writing utensils. The research assistant collected Part One and handed out Part Two of the creativity measure. The instructions were read again. In Part Two, the category was "building materials." After two minutes, this paper was also collected and participants were instructed to fill out the remaining questionnaires.

Prior to calculating scores, duplicate responses, proper nouns and nonsensical responses were omitted. Nonsensical responses were identified by two independent raters, using the following interrater reliability method. I first rated participants' responses from ten percent of the total sample. Each response was rated as "appropriate" or "nonsensical." A trained undergraduate research assistant independently rated responses from this subsample. Interrater agreement was assessed using Cohen's kappa. For the Modes of Transportation category, Cohen's kappa was .85 between raters, indicating "almost perfect agreement" (Landis & Koch, 1977). Once the two raters were in agreement, the undergraduate research assistant rated responses from the remainder of the sample. Examples of nonsensical responses that were deleted from the modes of transportation category were "accidents kill, causes pollution, and various." The Building Materials category provided a greater challenge to establishing reliability. Cohen's kappa between raters was .56, which is characterized as moderate agreement by Landis and

Koch (1977). Due to the highly subjective nature of this task and the difficulty in establishing reliability, it was determined that the Building Materials category would be omitted from creativity analyses.

Therefore, cognitive fluency scores and divergent thinking scores were calculated for each participant based on their responses to the Modes of Transportation category only. Following previous research (Hirt et al.; Laurent et al., 1999; Trestman et al., 1995; Wallach & Kogan, 1965), cognitive fluency scores were calculated by adding the total number of appropriate responses that each participant generated in each category. Fluency scores ranged from 3 to 33 and the average number of responses generated was 18.07 ( $SD = 4.96$ ). Divergent thinking scores were also calculated for each individual. The typicality of each response was first determined by frequency counts (tallying the number of participants who provided a particular response). Each response was then given a typicality score based on how often it appeared in the total sample. Responses were organized into categories with typicality scores ranging from one (most common) to five (most original). A total divergent thinking score was then calculated for each participant by summing across typicality scores. The total divergent thinking score was highly correlated with cognitive fluency scores,  $r(392) = .84, p < .01$ . Following Hirt et al. (2008), the total divergent thinking score was therefore divided by the cognitive fluency score to compute a new variable that represented participants' average creativity. This average creativity variable was used in subsequent analyses.

There were 210 responses that were only generated one time. Each of these responses was coded as five (most original). Examples of words in this category included *arteries*, *levitation*, and *vine-swinging*. An originality score of four was applied to 107

words that were generated by two, three, four or five participants. Examples of words in this category were *knee board*, *monster truck*, and *UFO*. Words generated by six to 20 participants received an originality score of three. There were a total of 60 words in this category, including *chair lift*, *bullet train*, and *ambulance*. An originality score of two was applied to 43 words that were generated by 21 to 100 participants, including *teleporting*, *hot air balloon*, and *submarine*. Finally, words generated by 101 to 376 participants received an originality score of one (most common). There were 18 words in this category, including *subway*, *motorcycle*, and *bus*.

**Schizotypy.** The Oxford-Liverpool Inventory of Feelings and Experiences (Mason et al., 1995) is a 104-item true/false self-report measure of schizotypy, comprised of four scales. The Unusual Experiences scale measures positive schizotypy (perceptual aberrations, magical thinking and hallucinations; e.g., *Have you ever felt you have special, almost magical powers?*). The Cognitive Disorganization scale assesses disordered thinking and deficits in attention, concentration and decision-making (e.g., *Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make any sense?*). The Introvertive Anhedonia scale measures negative schizotypy, including lack of social and physical enjoyment and avoidance of intimacy (e.g., *Are people usually better off if they stay aloof from emotional involvements with people?*). Items on the Impulsive Nonconformity scale tap into impulsive, anti-social and eccentric behaviors (e.g., *Do you ever have the urge to break or smash things?*). Scores for each of the O-LIFE scales range from 0 to 1 and were calculated by averaging responses across items in each scale. Internal reliability coefficients for each O-LIFE scale were adequate to high: UE ( $\alpha = .87$ ), CD ( $\alpha = .86$ ), IA ( $\alpha = .80$ ), IN ( $\alpha = .70$ ).



**Religion.** The intrinsic subscale of the Religious Orientation Scale – Revised (Gorsuch & McPherson, 1989) is comprised of eight items measured on a one (*I strongly disagree*) to five (*I strongly agree*) Likert-type scale. The intrinsic subscale assesses the extent to which respondents “live their religion” (Donahue, 1985). An example of an item from the intrinsic subscale is: “It is important to me to spend time in private thought and prayer.” Total scores on the intrinsic subscale range from 1 to 5 and were calculated by averaging across responses on all eight items. Internal reliability for this scale was very good ( $\alpha = .90$ ).

**Psychological well-being.** The Psychological Well-Being Scale (Ryff, 1989) consists of 84 items from six subscales: Self-Acceptance (e.g., *In general, I feel confident and positive about myself*), Positive Relations with Others (e.g., *I feel like I get a lot out of my friendships*), Autonomy (e.g., *My decisions are not usually influenced by what everyone else is doing*), Environmental Mastery (e.g., *If I were unhappy with my living situation, I would take effective steps to change it*), Purpose in Life (e.g., *I have a sense of direction and purpose in life*), and Personal Growth (e.g., *I enjoy seeing how my views have changed and matured over the years*). Items are scored on a six point Likert-type scale from one (*strongly disagree*) to six (*strongly agree*). Scores for each of the Psychological Well-Being scales range from 1 to 5 and were calculated by averaging responses across items in each scale. Internal reliability coefficients for each PWB scale were high: Self-Acceptance ( $\alpha = .91$ ), Positive Relations ( $\alpha = .90$ ), Autonomy ( $\alpha = .85$ ), Environmental Mastery ( $\alpha = .88$ ), Purpose in Life ( $\alpha = .87$ ), Personal Growth ( $\alpha = .84$ ).

**Subjective well-being.** Subjective well-being was assessed with the 22-item Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva & Retzlaff, 1992), which

measures respondents' perceived importance and satisfaction with different domains of life (e.g., health, self-esteem, and love). The QOLI is related to other measures of subjective well-being and has negative correlations with measures of general psychopathology (Frisch et al., 1992). The scale first defines a life domain (e.g., *HEALTH is being physically fit, not sick, and without pain or disability*) and then asks participants to respond to two related questions. Importance items (e.g., *How important is HEALTH to your happiness?*) are rated on a three-point Likert type scale that ranges from zero (*not important*) to two (*extremely important*). Satisfaction items (e.g., *How satisfied are you with your HEALTH?*) are rated on a six-point Likert type scale ranging from zero (*very dissatisfied*) to five (*very satisfied*). Total scores are calculated in two steps. First, importance items are multiplied by satisfaction items for each domain to obtain 11 separate sub-scores that correspond to the 11 domains assessed by the QOLI. Total scores range from 0 to 10 and are derived by averaging across all 11 sub-scores to obtain a mean QoL score for each participant. In the present study, internal reliability for this scale was adequate ( $\alpha = .78$ ).

***Alcohol and drug use.*** Based on research that has found a relationship between cannabis use and schizotypy scores (Dumas et al., 2002) and the fact that drug use is known to exacerbate positive psychotic symptoms in schizophrenia spectrum disorders, alcohol and drug use were measured and included as control variables (when necessary). Relevant items were selected from the core alcohol and drug survey, which was developed in 1989 by the U.S. Department of Education in conjunction with advisors from several universities and colleges. It is now administered by the CORE Institute at Southern Illinois University, Carbondale (<http://www.core.siuc.edu/>). The survey is

specifically tailored for use by two and four year institutions. It contains 23 questions that inquire about first drug/alcohol use, current drug/alcohol use and associated consequences. The survey is not designed to diagnose substance-related disorders, but to assess the level and impact of drug and alcohol use among college students. Item 18 inquires about alcohol and drug use in the past month. While this item provides important information about current drug use, a frequency analysis revealed that data in our sample was highly skewed (see Table 3). Item 17 inquires about alcohol and drug use in the past year. A frequency analysis of this item indicated that alcohol and marijuana use were normally distributed. The use of all other drugs (cocaine, amphetamines, sedatives, hallucinogens, opiates, inhalants, designer drugs, steroids, other) was endorsed by a very small portion of the sample and were thus not included in analyses. Total alcohol and marijuana use scores for the past year range from 0 to 8 and were calculated by averaging responses across items in each scale.

### ***Statistical analysis***

***Preliminary data analysis.*** Prior to conducting primary analyses, the relationships between demographic variables (age, gender and ethnicity) and dependent variables were tested to identify potential covariates. Drug and alcohol use were also examined as potential covariates, given that substance use is known to influence subclinical and clinical psychotic symptoms (Dumas et al., 2002). For continuous variables (age and substance use), Pearson correlation coefficients were calculated and tested for significance. Independent sample t-tests were used to test gender differences and one-way ANOVAs with Bonferroni post-hoc analyses were used to examine differences between

ethnic groups on variables of interest. If any demographic variable or substance abuse was found to relate to dependent variables, it was statistically controlled for in primary analyses.

**1. Latent profile analysis.** The first step in expanding the healthy schizotypal model involved classifying profiles of schizotypy that exist in the present (healthy) population using Mplus version 6.0 (Muthén & Muthén, 1998-2010). In this study, the latent profile analysis (LPA) approach was applied to the O-LIFE measure in order to classify participants as they exhibit levels of schizotypy in different ways (e.g. positive vs. negative) rather than as exhibiting more or less schizotypal indicators. LPA provides an advantage over previous methods because it allows researchers to group individuals based on naturally-occurring patterns within the sample and then to use those patterns as independent variables (Magidson & Vermunt, 2002; Muthén, 2001; Vermunt & Magidson, 2002). LPA is a person-centered and model-based cluster analytic approach. It is person-centered (rather than variable-centered, like multiple regression) because differences in variables are examined for different subgroups, which consist of individuals with similar profiles (in this case, profiles of schizotypy scores). Variable-centered approaches, by contrast, examine how variables predict outcomes separately, which makes it difficult to understand multidimensional constructs, in which such a separation may be misleading (Pastor, Barron, Miller & Davis, 2007).

In addition, LPA is model-based. Unique model parameters are estimated for each cluster based on maximum likelihood estimation, which approximates parameters with the highest likelihood of having given rise to the sample data. In this approach, each

person is a member of a particular profile to a certain degree (based on probabilities), which provides an additional advantage over traditional cluster analysis approaches that operate on an all-or-none basis (Pastor et al., 2007).

**2. *Latent profiles and mental health.*** Once the latent profiles were derived, a variable was extracted from the Mplus program that indicated profile membership (based on highest probability) for each participant. This variable was then used as the independent variable in a series of ANCOVA analyses to examine the differences between profiles on dependent variables, while controlling for differences on the relevant covariates identified in the preliminary analyses.

Before conducting ANCOVAs, the homogeneity-of-slopes assumption was tested. If results indicated a significant interaction between the covariate and the dependent variable, ANCOVA was not conducted. Instead, simple main effects were evaluated to assess differences between groups on the dependent variables at particular levels of the covariate. If the interaction was non-significant, then ANCOVA was conducted assuming homogeneity of slopes. If the ANCOVA was significant, follow-up tests with Bonferroni corrections were conducted to assess differences in adjusted means.

**3. *Potential mediators of the relationship between latent profiles and mental health.*** The final set of analyses tested whether creativity and intrinsic religion account for the mental health of those in the Healthy Schizotypy profile, when compared to those in the other schizotypy profiles. To test mediation effects, Shrout and Bolger's (2002) procedure for mediation analysis was followed. Step one of this approach statistically tests the effect of  $X$  (independent variable) on  $Y$  (dependent variable), which will have already been tested in Hypothesis 1. Step two estimates the path from the independent

variable ( $X$ ) to the mediators ( $M$ ). In step three, the path from the mediators ( $M$ ) to the dependent variable is estimated, while holding the  $X \rightarrow Y$  path constant. The third step tests the indirect path from  $X$  to  $Y$  through  $M$ . The final step in mediation tests the path from  $X$  to  $Y$  with  $M \rightarrow Y$  held constant.

One-way ANOVAs were first conducted to examine whether there were differences among latent profiles on the proposed mediator variables (step two). In the case that the mediators (intrinsic religion and creativity scores) differed between the Healthy Schizotypy group and another latent profile, conditions for mediation were considered met and a non-parametric re-sampling approach was used to test indirect effects (Preacher & Hayes, 2008). Shrout and Bolger (2002) recommend the bootstrap approach as it is more sensitive in mediation analyses. The SPSS Indirect Macro provided by Preacher and Hayes (2008) was used to conduct this bias-corrected bootstrap analysis with 5,000 re-samples to derive the 95% confidence interval for the indirect effects. The Indirect Macro generates syntax that allows SPSS to estimate the path coefficients in a mediator model and generates bootstrap confidence intervals for total and specific indirect effects of  $X$  on  $Y$  through the mediator variable  $M$  (Preacher & Hayes, 2008). This Macro was chosen because it allows for the inclusion of covariates and adjusts all paths for the potential influence of covariates in the mediation model.

## CHAPTER THREE: RESULTS

### *Preliminary analyses*

Pearson correlation coefficients were conducted to evaluate relationships between age and dependent variables. Age was not significantly associated with scores on any of the dependent variables (see Table 4a). Pearson correlation coefficients were also conducted to evaluate the relationship between alcohol and marijuana use and dependent variables. Greater alcohol use was significantly and inversely related to the Purpose in Life scale ( $r = -.15, p < .01$ ) and the Environmental Mastery scale ( $r = -.10, p < .05$ ). Greater marijuana use was significantly and inversely related to QoL ( $r = -.13, p = .10$ ), Purpose in Life ( $r = -.21, p < .01$ ) and Environmental Mastery ( $r = -.13, p < .01$ ). All other relationships between substance use and dependent variables were non-significant (see Table 4a).

A series of independent samples t-tests were conducted to compare SWB and PWB scores in males and females. Results confirmed that females scored significantly higher than males on the QoL Inventory [ $t(418) = -2.55, p = .01$ ] and on several of the Psychological Well-Being Scales [Positive Relations,  $t(418) = -4.00, p < .01$ ]; Personal Growth,  $t(418) = -4.61, p < .01$ ]; Purpose in Life,  $t(418) = -2.70, p < .01$ ]. No significant gender differences were noted on the remaining three Psychological Well-Being Scales (Autonomy, Environmental Mastery, and Self-Acceptance). See Table 4b for results.

One-way ANOVAs were conducted to compare scores on SWB and PWB among ethnic groups. No differences among ethnic groups were noted on the QoL Inventory or on several of the Psychological Well-Being Scales (Positive Relations, Environmental Mastery, and Personal Growth). There were significant differences among ethnic groups

on the Autonomy scale of the Psychological Well-Being Scales [ $F(4, 419) = 3.62, p < .01$ ]. Bonferroni post-hoc analyses revealed that Hispanic participants scored significantly higher than Caucasian participants on the Autonomy scale ( $M$  difference = .29,  $p < .05$ ). There were significant differences among ethnic groups on the Purpose in Life scale [ $F(4, 419) = 3.19, p < .05$ ]. Bonferroni post-hoc analyses revealed that Hispanic participants scored significantly higher than participants in the “Other” ethnicity category on the Purpose in Life scale ( $M$  difference = .40,  $SE = .12, p < .05$ ). There were also significant differences among ethnic groups on the Self-Acceptance scale [ $F(4, 419) = 3.40, p < .01$ ]. Bonferroni post-hoc analyses revealed that Hispanic participants scored significantly higher than participants in the “Other” ethnicity group on this scale ( $M$  difference = .48,  $SE = .14, p < .01$ ). Caucasian participants also scored significantly higher than participants in the “Other” category on the Self-Acceptance scale ( $M$  difference = .36,  $SE = .13, p < .05$ ). See Table 4c for results.

It was determined that primary analyses evaluating differences among latent profiles on dependent variables would be conducted with and without the ethnicity variable included as a covariate. Results were effectively the same in both cases (see Results section below). However, separating analyses by ethnic group made the results difficult to interpret and less reliable due to very small cell sizes. In some cases, post-hoc analyses could not be conducted due to the small cell sizes.

### ***1. Latent profile analysis***

The LPA tested profile solutions of one class to seven classes. Class enumeration was guided by a combination of statistical information criteria, including Akaike’s Information Criterion (AIC), Bayesian Information Criterion (BIC), the Lo-Medell-Rubin



test (LMRT) and the bootstrap likelihood ratio test (BLRT). The BIC has been found to be the most consistent test for identifying the correct number of classes when compared to all other information criteria (Nylund, Asparouhov & Muthen, 2007). However, the BLRT performs even more consistently than the BIC in determining the correct number of classes (Nylund et al., 2007). Following the recommendations of Nylund et al. (2007), the BIC and LMRT values were used to narrow down the profile solutions. Once two plausible models were identified using these criteria (a 5-class and a 6-class solution), the models were reanalyzed including requests for the BLRT.

All measures of model fit favored the 6-class model. Goodness-of-fit measures are shown in Table 5. Lower AIC and BIC values represent better model fit. In addition, the LMRT for the 6-class model was statistically significant, which indicates that the addition of a sixth class improved model fit compared to the 5-class solution. Entropy values were closest to one in the 6-class model as well, indicating that this model provided the most accurate assignment of cases to subgroups. Finally, the 6-class model was reanalyzed with the inclusion of a request for the BLRT. Results confirmed that the 6-class LPA provided the best fit to the data (Loglikelihood value = 682.837,  $p < .01$ ).

Table 6 provides the model-based means and standard errors for the six profiles. Figure 1 provides a graphic representation of the six profiles. The first profile ( $n = 40$ ) was labeled “High Introvertive Anhedonia” because it was characterized by a mean Introvertive Anhedonia score that was greater than one standard deviation above the overall sample mean on Introvertive Anhedonia. This profile was also characterized by mean scores that fell within  $\pm$  one standard deviation of the sample mean on the three remaining O-LIFE scales. Profile 2 ( $n = 138$ ) and Profile 5 ( $n = 163$ ) made up the

majority of the sample and were both characterized by mean scores that fell within  $\pm$  one standard deviation of the sample means on all four O-LIFE scales. Profile 2 was labeled “Low Average” because O-LIFE means within this profile were lower than the overall sample means on all four scales. Profile 5 was labeled “Average” because means within this subscale very closely resembled overall sample means on all four O-LIFE scales. Profile 3 ( $n = 7$ ) was labeled “High Schizotypy” because it was characterized by mean scores on all four O-LIFE scales that were greater than one standard deviation above the overall sample means for each scale. Profile 4 ( $n = 42$ ) was labeled “High Cognitive Disorganization and High Introvertive Anhedonia” because it was characterized by mean Introvertive Anhedonia and Cognitive Disorganization scores that were greater than one standard deviation above the overall sample mean on these scales. This profile was also characterized by mean scores that fell within  $\pm$  one standard deviation of the sample mean on the two remaining O-LIFE scales. Finally, profile 6 ( $n = 30$ ) was labeled “Healthy Schizotypy” because it was characterized by a mean Unusual Experiences score that was greater than one standard deviation above the overall sample mean on this scale. As hypothesized, the Healthy Schizotypy profile was also characterized by mean scores that fell within  $\pm$  one standard deviation of the sample mean on the three remaining O-LIFE scales.

## ***2. Latent profiles and mental health***

***Latent profiles and QoL.*** An ANCOVA was conducted to assess differences among profiles on QoL scores, while controlling for gender and marijuana use. The interactions between covariates and the factor (latent profile) were non-significant, indicating that the homogeneity-of-slopes assumption was met. Results from the

ANCOVA indicated that latent profiles differed on QoL scores,  $F(5, 412) = 24.00, p < .01$ , and the partial  $\eta^2$  of .23 indicates a strong relationship between latent profile and QoL, controlling for gender and marijuana use.

Follow-up tests with Bonferroni corrections revealed that participants in the Low Average profile scored significantly higher on the QoL scale than participants in the High IA (adjusted mean difference = 1.93,  $SE = .26$ ), High Schizotypy (adjusted mean difference = 2.88,  $SE = .56$ ) and High IA/CD (adjusted mean difference = 1.90,  $SE = .25$ ) profiles. Participants in the Average profile also scored significantly higher on the QoL scale than participants in the High IA (adjusted mean difference = 1.65,  $SE = .26$ ), High Schizotypy (adjusted mean difference = 2.61,  $SE = .55$ ) and High IA/CD (adjusted mean difference = 1.62,  $SE = .25$ ) profiles. In addition, participants in the Healthy Schizotypy profile scored significantly higher on the QoL scale than participants in the High IA (adjusted mean difference = 1.59,  $SE = .35$ ), High Schizotypy (adjusted mean difference = 2.54,  $SE = .60$ ) and High IA/CD (adjusted mean difference = 1.56,  $SE = .34$ ) profiles. Results are depicted in Figure 2.

***Latent profiles and Positive Relations.*** An ANCOVA was conducted to assess differences among profiles on the Positive Relations scale, while controlling for gender. The interaction between gender and the factor (latent profile) was non-significant, indicating that the homogeneity-of-slopes assumption was met. Results from the ANCOVA indicated that latent profiles differed on Positive Relations scores,  $F(5, 413) = 49.93, p < .01$ , and the partial  $\eta^2$  of .38 indicates a strong relationship between latent profile and Positive Relations, controlling for gender.

Follow-up tests with Bonferroni corrections revealed the same pattern of results found with the QoL scale; participants in the Low Average profile scored significantly higher on the Positive Relations scale than participants in the High IA (adjusted mean difference = 1.26,  $SE = .12$ ), High Schizotypy (adjusted mean difference = 2.05,  $SE = .26$ ) and High IA/CD (adjusted mean difference = 1.32,  $SE = .13$ ) profiles. Participants in the Average profile also scored significantly higher on the Positive Relations scale than participants in the High IA (adjusted mean difference = 1.04,  $SE = .12$ ), High Schizotypy (adjusted mean difference = 1.83,  $SE = .26$ ) and High IA/CD (adjusted mean difference = 1.09,  $SE = .12$ ) profiles. In addition, participants in the Healthy Schizotypy profile scored significantly higher on the Positive Relations scale than participants in the High IA (adjusted mean difference = 1.00,  $SE = .16$ ), High Schizotypy (adjusted mean difference = 1.80,  $SE = .28$ ) and High IA/CD (adjusted mean difference = 1.06,  $SE = .16$ ) profiles. Results are depicted in Figure 3.

***Latent profiles and Personal Growth.*** An ANCOVA was conducted to assess differences among profiles on the Personal Growth scale, while statistically controlling for the effects of gender. The interaction between gender and the factor (latent profile) was non-significant, indicating that the homogeneity-of-slopes assumption was met. Results from the ANCOVA indicated that latent profiles differed on Personal Growth scores,  $F(5, 413) = 24.92, p < .01$ , and the partial  $\eta^2$  of .23 indicates a strong relationship between latent profile and Personal Growth, controlling for gender.

Follow-up tests with Bonferroni corrections revealed a similar pattern of results as that found with the QoL and Positive Relations scales; participants in the Low Average profile scored significantly higher on the Personal Growth scale than participants in the

High IA (adjusted mean difference = .86,  $SE = .10$ ) and High IA/CD (adjusted mean difference = .69,  $SE = .10$ ) profiles. Participants in the Average profile also scored significantly higher on the Personal Growth scale than participants in the High IA (adjusted mean difference = .87,  $SE = .10$ ) and High IA/CD (adjusted mean difference = .70,  $SE = .10$ ) profiles. In addition, participants in the Healthy Schizotypy profile scored significantly higher on the Personal Growth scale than participants in the High IA (adjusted mean difference = .82,  $SE = .14$ ) and High IA/CD (adjusted mean difference = .65,  $SE = .13$ ) profiles. Interestingly, one difference that was noted with results from this scale was that participants in the High Schizotypy group also scored higher than those in the High IA group on Personal Growth (adjusted mean difference = .72,  $SE = .23$ ). Results are depicted in Figure 4.

*Latent profiles and Environmental Mastery.* An ANCOVA was conducted to assess differences among profiles on the Environmental Mastery scale, while controlling for alcohol and marijuana use. The interactions between covariates and the factor (latent profile) were non-significant, indicating that the homogeneity-of-slopes assumption was met. Results from the ANCOVA indicated that latent profiles differed on Personal Growth scores,  $F(5, 411) = 30.79, p < .01$ , and the partial  $\eta^2$  of .27 indicates a strong relationship between latent profile and Environmental Mastery, controlling for alcohol and marijuana use.

Follow-up tests with Bonferroni corrections revealed a slightly different pattern of results. Participants in the Low Average profile scored significantly higher on the Environmental Mastery scale than all other groups. Differences in adjusted means were .74 (High IA,  $SE = .12$ ), 1.52 (Hi Schizotypy,  $SE = .26$ ), 1.27 (High IA/CD,  $SE = .12$ ),

.30 (Average,  $SE = .08$ ) and .72 (Healthy Schizotypy,  $SE = .14$ ). Participants in the Average group scored significantly higher on all other groups, except the Low Average group. Differences in adjusted means were .44 (High IA,  $SE = .12$ ), 1.22 (High Schizotypy,  $SE = .26$ ), .97 (High IA/CD,  $SE = .12$ ) and .42 (Healthy Schizotypy,  $SE = .13$ ). Those in the High IA group scored significantly higher than the High IA/CD group (adjusted mean difference = .52,  $SE = .15$ ). Finally, the Healthy Schizotypy profile had significantly higher Environmental Mastery scores than those in the High IA/CD profile only (adjusted mean difference = .54,  $SE = .16$ ). Results are depicted in Figure 5.

***Latent profiles and Autonomy, with Ethnicity as a Covariate.*** In the test for the homogeneity-of-slopes assumption, the interaction term between the dummy-coded ethnicity variable and the factor (latent profile) was significant, indicating that the assumption was not met and ANCOVA was not an appropriate test in this case. Instead, tests of simple main effects (ANOVAs) were conducted to assess differences between groups on the dependent variables at particular levels of the covariate.

Results indicated that latent profiles differed significantly on the Autonomy scale among Caucasian participants,  $F(5, 190) = 3.37, p < .01$ , African American participants,  $F(5, 18) = 3.14, p < .05$ , and among participants in the Other group,  $F(5, 67) = 4.92, p < .01$ . There were no significant differences among latent profiles on the Autonomy scale among Hispanic or Asian American participants. Bonferroni post-hoc tests indicated that among Caucasian participants, those in the Low Average profile scored significantly higher on Autonomy than those in the High IA/CD (mean difference = .64,  $SE = .19$ ) profile, a finding that was consistent with results from other Psychological Well-Being scales. Bonferroni post-hoc tests could not be conducted on the African American or

Other ethnicity group because at least one group had fewer than two cases. For example, among African Americans, only one participant fell within the Healthy Schizotypy group.

***Latent profiles and Autonomy, without Ethnicity as a Covariate.*** As there were no other relevant covariates to control for, a one-way analysis of variance was conducted to assess differences among profiles on the Autonomy scale. The ANOVA was significant,  $F(5, 414) = 8.04, p < .01$ . The strength of relationship between latent profiles and Autonomy scores was medium to large, partial  $\eta^2 = .09$ .

Bonferroni post-hoc tests were conducted to evaluate differences among the means. Participants in the Low Average profile scored significantly higher on the Autonomy scale than those in the High IA (mean difference = .46,  $SE = .13$ ) and High IA/CD (mean difference = .72,  $SE = .13$ ) groups. Finally, those in the Average and Healthy Schizotypy group demonstrated higher means on the Autonomy scale when compared to those in the High IA/CD group. Differences in adjusted means were .58 (Average,  $SE = .12$ ) and .58 (Healthy Schizotypy,  $SE = .17$ ). Results are depicted in Figure 6.

***Latent profiles and Self-Acceptance, with Ethnicity as a Covariate.*** In the test for the homogeneity-of-slopes assumption, the interaction term between the dummy-coded ethnicity variable and the factor (latent profile) was significant, indicating that the assumption was not met and ANCOVA was not an appropriate test in this case. Instead, tests of simple main effects (ANOVAs) were conducted to assess differences between groups on the dependent variables at particular levels of the covariate.

Results indicated that latent profiles differed significantly on the Self-Acceptance scale among Caucasian participants,  $F(5, 190) = 10.18, p < .01$ , Hispanic participants,  $F$

(5, 94) = 9.44,  $p < .05$ , Asian American participants,  $F(4, 46) = 4.14$ ,  $p < .01$ , and among participants in the Other group,  $F(5, 67) = 6.30$ ,  $p < .01$ ). There were no significant differences among latent profiles on the Self-Acceptance scale among African American participants. Bonferroni post-hoc tests could not be conducted on the Other ethnicity group because at least one group had fewer than two cases.

Bonferroni post-hoc tests indicated that among Caucasian participants, those in the Low Average profile scored significantly higher on Self-Acceptance than those in the High IA (mean difference = 1.19,  $SE = .23$ ) and High IA/CD (mean difference = 1.16,  $SE = .21$ ) profiles. Participants in the Average profile also scored significantly higher on the Self-Acceptance scale than those in the High IA (mean difference = .88,  $SE = .22$ ) and High IA/CD (mean difference = .85,  $SE = .21$ ) profiles.

Among Hispanic participants, Bonferroni post-hoc tests revealed that the High IA profile scored significantly higher on the Self-Acceptance scale than those in the High IA/CD profile (mean difference = 1.32,  $SE = .41$ ). The Low Average group scored significantly higher than the High Schizotypy (mean difference = 1.88,  $SE = .50$ ) and the High IA/CD profiles (mean difference = 1.66,  $SE = .33$ ). The Average group scored significantly higher than the High Schizotypy (mean difference = 1.90,  $SE = .49$ ) and the High IA/CD (mean difference = 1.68,  $SE = .32$ ) profiles.

Among Asian American participants, Bonferroni post-hoc tests revealed that the Low Average group scored significantly higher than the Average group (mean difference = .91,  $SE = .29$ ). No other differences between latent profiles were noted.

***Latent profiles and Self-Acceptance, without Ethnicity as a Covariate.*** As there were no other relevant covariates to control for, a one-way analysis of variance was



conducted to assess differences among profiles on the Self-Acceptance scale. The ANOVA was significant,  $F(5, 414) = 27.10, p < .01$ . The strength of relationship between latent profiles and Autonomy scores was large, partial  $\eta^2 = .25$ .

Bonferroni post-hoc tests were conducted to evaluate differences among the means. Participants in the Low Average profile scored significantly higher on the Self-Acceptance scale than those in the High IA (mean difference = .99,  $SE = .14$ ), High Schizotypy (mean difference = 1.65,  $SE = .31$ ), High IA/CD (mean difference = 1.30,  $SE = .14$ ) and the Healthy Schizotypy (mean difference = .55,  $SE = .16$ ) groups. Those in the Average group also scored significantly higher on Self-Acceptance than the High IA (mean difference = .73,  $SE = .14$ ), High Schizotypy (mean difference = 1.39,  $SE = .31$ ) and the High IA/CD (mean difference = 1.04,  $SE = .14$ ) groups. Finally, those in the Healthy Schizotypy group demonstrated higher means on the Self-Acceptance scale when compared to those in the High Schizotypy (mean difference = 1.10,  $SE = .33$ ) and the High IA/CD (mean difference = .75,  $SE = .19$ ) groups. Results are depicted in Figure 7.

***Latent profiles and Purpose in Life, with Ethnicity as a Covariate.*** In the test for the homogeneity-of-slopes assumption, the interaction term between the dummy-coded ethnicity variable and the factor (latent profile) was significant, indicating that the assumption was not met and ANCOVA with ethnicity as a covariate was not an appropriate test in this case. However, gender, alcohol and marijuana use were also known covariates for this dependent variable. Therefore, ANCOVAs were conducted separately for each ethnic group. Gender and substance use variables did not significantly interact with the factor, indicating that the homogeneity-of-slopes assumption was met for these covariates.

Among Caucasian participants, results from the ANCOVA indicated that latent profiles differed on Purpose in Life scores,  $F(5, 181) = 10.57, p < .01$ , and the partial  $\eta^2$  of .23 indicates a strong relationship between latent profile and Purpose in Life, controlling for gender, alcohol and marijuana use. Follow-up tests with Bonferroni corrections revealed that participants in the Low Average profile scored significantly higher on the Purpose in Life scale than those in the High IA (adjusted mean difference = 1.04,  $SE = .20$ ), High Schizotypy (adjusted mean difference = 1.22,  $SE = .39$ ) and High IA/CD groups (adjusted mean difference = .86,  $SE = .19$ ). Participants in the Average group scored significantly higher than those in the High IA (adjusted mean difference = .97,  $SE = .20$ ) and High IA/CD groups (adjusted mean difference = .79,  $SE = .18$ ). Finally, those in the Healthy Schizotypy group also scored significantly higher than those in the High IA (adjusted mean difference = .98,  $SE = .28$ ) and High IA/CD groups (adjusted mean difference = .80,  $SE = .26$ ).

Among Hispanic participants, results from the ANCOVA indicated that latent profiles differed on Purpose in Life scores,  $F(5, 86) = 2.95, p < .05$ , and the partial  $\eta^2$  of .15 indicates a strong relationship between latent profile and Purpose in Life, controlling for gender, alcohol and marijuana use. Follow-up tests with Bonferroni corrections revealed that participants in the Low Average profile scored significantly higher on the Purpose in Life scale than those in the High IA/CD group (adjusted mean difference = .91,  $SE = .28$ ). Participants in the Average group scored significantly higher than those in the High IA/CD groups (adjusted mean difference = .80,  $SE = .26$ ).

Among African American participants, results from the ANCOVA indicated that latent profiles did not differ significantly on Purpose in Life scores,  $F(5, 10) = .73, p >$

.05. Among Asian American participants, results from the ANCOVA indicated that latent profiles differed on Purpose in Life scores,  $F(4, 39) = 5.73, p < .01$ , and the partial  $\eta^2$  of .37 indicates a strong relationship between latent profile and Purpose in Life, controlling for gender, alcohol and marijuana use. Follow-up tests with Bonferroni corrections revealed that participants in the Low Average profile scored significantly higher on the Purpose in Life scale than those in the High IA/CD group (adjusted mean difference = 1.07,  $SE = .35$ ) and in the Average group (adjusted mean difference = 1.14,  $SE = .26$ ).

Among participants in the Other ethnicity group, results from the ANCOVA indicated that latent profiles differed on Purpose in Life scores,  $F(5, 59) = 6.43, p < .01$ , and the partial  $\eta^2$  of .35 indicates a strong relationship between latent profile and Purpose in Life, controlling for gender, alcohol and marijuana use. Follow-up tests with Bonferroni corrections revealed that participants in the Low Average profile scored significantly higher on the Purpose in Life scale than those in the High IA (adjusted mean difference = 1.05,  $SE = .29$ ) and in the High IA/CD groups (adjusted mean difference = 1.35,  $SE = .27$ ). Participants in the Average group also scored significantly higher than those in the High IA/CD group (adjusted mean difference = .86,  $SE = .27$ ).

***Latent profiles and Purpose in Life, without Ethnicity as a Covariate.*** An ANCOVA was conducted to assess differences among profiles on the Purpose in Life scale, while controlling for gender, alcohol and marijuana use. Results from the ANCOVA indicated that latent profiles differed on Purpose in Life scores,  $F(5, 410) = 21.49, p < .01$ , and the partial  $\eta^2$  of .21 indicates a strong relationship between latent profile and Purpose in Life, controlling for gender, alcohol and marijuana use.

Bonferroni post-hoc tests were conducted to evaluate differences among the means. Participants in the Low Average profile scored significantly higher on the Purpose in Life scale than those in the High IA (adjusted mean difference = .86,  $SE = .13$ ), High Schizotypy (adjusted mean difference = 1.09,  $SE = .27$ ), High IA/CD (adjusted mean difference = .99,  $SE = .12$ ) groups. Those in the Average group also scored significantly higher on Purpose in Life than the High IA (adjusted mean difference = .65,  $SE = .12$ ), High Schizotypy (adjusted mean difference = .87,  $SE = .26$ ) and the High IA/CD (adjusted mean difference = .78,  $SE = .12$ ) groups. Finally, those in the Healthy Schizotypy group demonstrated higher means on the Purpose in Life scale when compared to those in the High IA/CD (adjusted mean difference = .65,  $SE = .14$ ) group. Results are depicted in Figure 8.

### ***3. Potential mediators of the relationship between latent profiles and mental health***

To test whether creativity and religion mediate the proposed relationship between latent profiles and mental health, Shrout and Bolger's (2008) procedure for mediation analyses was followed. From analyses conducted to test Hypothesis 1, there was sufficient data to show that there are differences among latent profiles on all dependent variables measuring mental health. Therefore, step one of the mediation analyses was supported. To test step two, a one-way ANOVA was conducted to determine whether there were differences among latent profiles on the proposed mediators: intrinsic religion and average creativity.

***Intrinsic religion.*** Results from the ANOVA indicated that there were no between-group differences on intrinsic religion scores,  $F(5, 414) = 1.13, p > .05$ . This

violated step two of mediation. Thus, intrinsic religion was not a viable mediator between Healthy Schizotypy and the other latent profiles and mediation models were not tested in the SPSS Indirect Macro.

On an exploratory basis, relationships between intrinsic religion and dependent variables, while controlling for relevant covariates, were tested. Intrinsic religion was associated with greater QoL ( $B = .10, p < .05$ ), Personal Growth ( $B = .11, p < .05$ ), Self-Acceptance ( $r = .12, p < .05$ ) and Purpose in Life ( $B = .13, p < .01$ ).

**Creativity.** A one-way ANOVA was conducted to assess differences among profiles on creativity. Results indicated that there were no significant differences among profiles on creativity scores,  $F(5, 385) = 2.14, p > .05$ . Creativity was thus not a viable mediator and mediation models were not tested in the SPSS Indirect Macro.

Several exploratory analyses were conducted to further clarify the relationships between latent profiles, creativity and mental health. First, relationships between creativity and dependent variables, while controlling for relevant covariates, were tested. Of all the dependent variables, creativity was only associated with lower scores on the Environmental Mastery scale ( $B = -.11, p < .05$ ).

Next, analyses were conducted with cognitive fluency and divergent thinking separately, rather than using the composite average creativity score. Two one-way ANOVAs were conducted to assess differences among profiles on cognitive fluency and divergent thinking. Results indicated that there were significant differences among profiles on both cognitive fluency,  $F(5, 390) = 3.50, p < .01$ , and divergent thinking scores,  $F(5, 390) = 4.06, p < .01$ . Post-hoc analyses with Bonferroni corrections revealed that individuals in the Average profile scored significantly higher than those in the High

IA profile on both cognitive fluency ( $M$  difference = 3.35,  $SE$  = .89) and divergent thinking ( $M$  difference = 7.88,  $SE$  = 2.30). In addition, those in the Average profile also scored significantly higher than those in the Low Average group on divergent thinking ( $M$  difference = 4.59,  $SE$  = 1.50).

Because differences among latent profiles were noted on the two creativity indicators, relationships between these indicators and dependent variables (controlling for relevant covariates) were also examined on an exploratory basis. Divergent thinking was not significantly associated with QoL or any of the PWB scales. Cognitive fluency was also not associated with QoL or six of the seven PWB scales, but there was a significant inverse association between cognitive fluency and Self-Acceptance ( $B$  = -.11,  $p$  < .05).

## CHAPTER FOUR: DISCUSSION

This study utilized latent profile analysis to identify patterns of schizotypy that exist in the normal population. It was the first study to use this approach and to directly examine the healthy schizotypy model by empirically testing associations between latent schizotypy profiles and mental health. This study also tested whether two proposed mediators, intrinsic religion and creativity, might account for high levels of psychological and subjective well-being among individuals in the Healthy Schizotypy profile, when compared to individuals in other latent profiles of schizotypy.

### *Latent profile analysis*

The latent profile analysis of the O-LIFE revealed that a six-class solution was the best fit for the data. The six profiles that emerged were: Low Average, Average, Healthy, High IA, High IA/CD and High Schizotypy. While a number of cluster analyses have been conducted on the O-LIFE, previous researchers have agreed that Loughland and Williams' (1997) four-cluster solution provides the most accurate solution to date. This solution includes a Low Schizotypy group, a High UE group (which may be considered as a Healthy Schizotypy group), a High CD group and a High IA/CD group. Three of the six latent profiles (Low Average, Healthy and High IA/CD) overlapped considerably with clusters derived from Loughland and Williams' (1997) cluster analysis. One major difference is that the latent profile analysis in the present study found a group that scored high on IA alone, while the cluster analysis found a High CD group instead. In addition, the latent profile analysis derived an Average group and a High Schizotypy group that

scored above average on all four O-LIFE scales. As this group was only made up of seven individuals, results concerning the High Schizotypy profile should be interpreted with considerable caution.

In addition, previous cluster analyses of the O-LIFE have all excluded the Impulsive Nonconformity (IN) scale. Including this scale in the latent profile analysis did not reveal many interesting results. No profile was characterized by below or above average scores on the IN scale, with the exception of the High Schizotypy group, which scored highly on all four O-LIFE scales. Nonetheless, this finding indicates that IN is a viable schizotypy indicator as those who scored highly on the three more well-established O-LIFE scales also scored highly on IN. Previous researchers have argued that IN does not represent a central schizotypy indicator (Loughland & Williams, 1997). However, the authors of the O-LIFE argue for its inclusion based on the fact that there is considerable overlap on the core features of affective and psychotic disorders (Mason & Claridge, 2006). Based on the emergence of a High Schizotypy profile in the present study, it is recommended that the IN scale be included in future research utilizing the O-LIFE.

One finding that is consistent across cluster and latent profiles analyses is the existence of the Healthy Schizotypy group, which is characterized by above average scores on the Unusual Experiences scale and average (or below average) scores on the remainder of the O-LIFE scales. As this profile was central to the hypotheses proposed in the present study, this stability is encouraging and suggests that the Healthy Schizotypy profile exists across samples and merits further research to help us understand how and why this group is presenting as mentally healthy.



### ***Latent profiles and mental health***

A major goal of the present study was to expand the healthy schizotypy model by applying the principles of the complete state model of mental health, which states that mental health should be defined by the absence of psychopathology in addition to the presence of flourishing (psychological and subjective well-being; Keyes, 2005). While considerable theoretical attention has been paid to the healthy schizotypy construct, the few empirical studies that exist have only indirectly tested associations between membership in this group and indicators of mental health. Results from the present study showed a rather consistent pattern in which the Healthy Schizotypy group tended to display levels of subjective and psychological well-being that were commensurate to the Low Average and Average groups. At the same time, all three of these profiles tended to score significantly higher than the High IA, High IA/CD group and, in some cases, the High Schizotypy group. There were only two analyses in which the Healthy Schizotypy group scored lower than any other group; the Healthy Schizotypy profile had lower scores on Environmental Mastery than the Low Average and Average groups and also had lower Self-Acceptance scores than the Low Average group. In both of these analyses, the Healthy Schizotypy group simultaneously scored higher than the High IA/CD group and, in the case of Self-Acceptance, the Healthy Schizotypy group also scored higher than the High Schizotypy group.

These results suggest that there might be certain types of well-being that are lower among those in the Healthy Schizotypy group, when compared to those with Low Average or Average schizotypy scores. Nonetheless, the Healthy Schizotypy group still scored higher than those with negative schizotypy symptoms on both of these scales.

Environmental Mastery is characterized by a sense of competence in managing one's environment and surroundings, which includes a sense of control over the external world. Due to the atypical and odd nature of positive schizotypal symptoms, it is possible that those participants who report unusual experiences do not feel like they have control over these experiences, and thus demonstrate lower Environmental Mastery scores than those who do not report unusual experiences. The Healthy Schizotypy group also had significantly lower scores on Self-Acceptance than those in the Low Average group. Because the Healthy Schizotypy group demonstrated similar scores on Self-Acceptance when compared to those in the Average group, this finding might indicate that the Low Average group has relatively high positive attitudes toward their good and bad qualities, rather than pointing to deficits in Self-Acceptance among those in the Healthy Schizotypy or Average groups.

On all seven dependent measures of subjective and psychological well-being, the Low Average group demonstrated the highest scores, while the High IA/CD most consistently demonstrated the lowest scores. There were no cases in which the Low Average group scored lower than other profiles on any dependent measure. Likewise, there were no cases in which the High IA/CD group scored higher than any other group on any dependent measure. The High Schizotypy group was more inconsistent, in that individuals in this profile generally scored lower than those in the Low Average, Average (Purpose in Life, Environmental Mastery) and the Healthy Schizotypy group (QoL, Positive Relations, Self-Acceptance). However, individuals in this group demonstrated higher scores on Personal Growth than those in the High IA group. As mentioned above, results involving the High Schizotypy group should be interpreted with caution, as it was

made up of only seven individuals. Overall, however, results are in line with the hypothesis that those who present with positive schizotypy indicators, in the absence of negative indicators (Healthy Schizotypy) are mentally healthy. At the same time, those who present with negative and disorganized schizotypy indicators (High IA and High IA/CD) tended to display the lowest scores on measures of subjective and psychological well-being (Goulding 2004, 2005). This finding also bolsters previous research that indicates the negative and disorganized features of schizotypy are better discriminators between adaptive and pathological presentations than the positive symptoms (Kendler et al., 1995; Maier et al., 2002; McCreery & Claridge, 2002).

Results from the present study are in line with the healthy schizotypy model and provide empirical support for the notion that the concept of schizotypy can be uncoupled from the disease concept of schizophrenia (McCreery & Claridge, 2002). In other words, abnormal experiences do seem to occur outside of psychopathology and are not always associated with distress or adjustment difficulties (McCreery, 1993). In fact, a beneficial, or healthy, form of schizotypy exists among the normal population (Claridge, 2002).

#### ***Potential mediators of the relationship between latent profiles and mental health***

A final goal of the present study was to examine two potential mediators (intrinsic religion and creativity) that may help explain why the Healthy Schizotypy group is mentally healthy despite the presence of unusual perceptual experiences and magical thinking. It was theorized that intrinsic religion, which is one of the more common global meaning systems, may allow individuals to interpret their unusual experiences in light of

religious beliefs. In turn, this rather normative form of interpretation may lessen the potentially threatening nature of unusual experiences and thus explain why these individuals maintain mental health (Maltby & Day, 2002).

Contrary to expectations, neither variable was a viable mediator in the present study, as there were no differences among latent profiles on intrinsic religion or average creativity. On an exploratory basis, associations between potential mediators and outcome variables were tested. Results indicated that intrinsic religion was generally associated with increased subjective and psychological well-being. This finding is in line with prior research, in which intrinsic religion has been related to greater mental health (George, et al., 2000; Ventis, 1995). Other research suggests that the relationship between intrinsic religion and QoL may be mediated by one's ability to make meaning out of stressful life events (Park, 2005; Tuchman & Weisman de Mamani, 2011). That is, intrinsic religion may provide a global system for understanding one's view of the world and oneself, which in turn, allows individuals to make sense out of their unusual or challenging experiences. The ability to learn and grow from these experiences is related to increased subjective well-being. Future research may extend this line of research by examining how individuals with different schizotypy profiles make meaning from their odd or otherwise stressful life experiences.

In addition, it was theorized that creativity, which has been demonstrated to correlate with positive schizotypy (Burch et al., 2006; Schuldberg et al., 1988), may reflect a flexible cognitive system that allows individuals with unusual experiences to entertain different, perhaps more meaningful, interpretations of these experiences and thus not experience them as stressful or threatening. Creativity, however, was not

positively associated with any dependent variable and, in fact, was related to lower scores on Environmental Mastery. This finding was not in line with hypotheses and may indicate that, while creativity is related to positive mood, problem-solving and flexible coping (Runco, 2004), it is not directly related to measures of mental health. Another possibility is that the creativity measure used in the present study did not accurately capture this construct, as the measure used only assessed one aspect of creativity. Future research should include more extensive measures of creativity in order to determine whether there is, in fact, a relationship between creativity and psychological and subjective well-being.

Results from exploratory analyses revealed that there were significant differences between latent profiles on cognitive fluency and divergent thinking scores. In particular, individuals in the Average profile scored significantly higher than those in the High IA profile on both cognitive fluency and divergent thinking. Those in the Average profile also scored significantly higher than those in the Low Average group on divergent thinking. These results suggest that individuals with average scores on all schizotypy indicators produced more responses and their responses were more creative than those with high scores on Introvertive Anhedonia. This finding provides further support for the association between deficits in cognitive fluency and negative schizophrenia symptoms (Allen, Liddle & Frith, 1993; Howanitz, Cicalese & Harvey, 2000).

No association was found between Healthy Schizotypy and creativity. Results from the present study therefore contradicted Schuldberg's (2000-2001) conclusion that greater levels of positive schizotypal symptoms tend to be associated with greater creativity. Methodological differences might account for the lack of consistent findings in

this area of research. Prior studies, including Schuldberg's (2000-2001) have relied on positively skewed symptom-like scales. By contrast, the present study utilized the O-LIFE, which was created to reflect the dimensional model of schizotypy and thus captures individuals across the schizotypy continuum. In addition, the present study employed the latent profile approach to identify individuals that scored highly on positive schizotypy indicators in the absence of negative or disorganized symptoms. Future research should continue to examine whether the previously observed relationship between positive schizotypy and creativity holds when these more conceptually accurate statistical methods are used.

### ***Additional Study Results***

While previous research has found that individuals with high SWB and PWB tend to be older than adults with low SWB and PWB (Keyes et al., 2002), age was not significantly associated with PWB or SWB in the present study. This finding is not surprising, however, when considering that the age range was limited due to sampling from an undergraduate population. In fact, 85.5% of the participants were between the ages of 18 to 20.

There were significant gender differences on SWB and PWB. Females scored higher than males on QoL, Positive Relations, Personal Growth, and Purpose in Life. Prior research has shown that women score consistently and significantly higher than men on Positive Relations (Ryff, 1989; Ryff & Keyes, 1995) and QoL (Frisch et al., 1992). Results from the present study suggest that women might also score higher than men on many other dimensions of psychological well-being. Interestingly, there is also a substantial body of research pointing to stable and persistent gender differences in

depression, whereby women are approximately twice more likely than men to experience depression (Culbertson, 1997). This dissociation between depression and mental health among women may be interpreted in light of the complete state model of mental health, in which mental health and mental illness are related, but distinct latent factors (Keyes, 2005) and women may be more likely to experience both flourishing and languishing.

Alcohol and marijuana use were significantly and inversely related to several dependent variables. In particular, individuals who endorsed greater alcohol and marijuana use demonstrated lower scores on Purpose in Life and Environmental Mastery. Greater marijuana use was also related to lower QoL. A number of studies have indicated that greater alcohol use is related to lower SWB and PWB. For example, heavier drinking has been associated with poorer psychological well-being among older adults (Graham & Schmidt, 1997), lower mental health scores have been found among persons seeking help for drug and alcohol treatment when compared to individuals with other chronic diseases (Stein, Mulvey, Plough, & Samet, 1998), and very poor QoL has been documented among alcohol-dependent individuals (Foster, Powell, Marshall, & Peters, 1999). Among college students, research on the link between alcohol use and mental health has demonstrated positive, negative and null findings (for review, see Molnar et al., 2009). Some researchers have explained these mixed findings by showing that alcohol use does predict greater subjective well-being, but only after controlling for adverse alcohol-related consequences, which are associated with greater alcohol use and poorer psychological functioning (Molnar et al., 2009). One mechanism through which student drinking may influence well-being is through socializing and increased social cohesion (Molnar et al., 2009). It is interesting to note that, in the present study, alcohol use was

not related to lower scores on the Positive Relations with Others scale of the PWB scales. The two inverse relationships between alcohol use and PWB in the current study suggest that students who drink more often may feel that they have less direction or purpose in life and less control over their external circumstances.

Significant differences among ethnic groups were noted on several of the PWB scales. Hispanic participants scored significantly higher than participants in the “Other” ethnicity category on Purpose in Life and Self-Acceptance. Caucasian participants also scored significantly higher than participants in the “Other” category on the Self-Acceptance scale. Because the “Other” category consisted of individuals in many different ethnic groups, including those who identify as bicultural, it is difficult to interpret results regarding this category. Hispanic participants scored significantly higher than Caucasian participants on the Autonomy scale. While a large body of research indicates that Hispanic individuals tend to have a strong identification and attachment with family members, there is also evidence to suggest that the strength of their familism decreases with greater acculturation (Sabogal, Marin, Otero-Sabogal, Marin & Perez-Stable, 1987). While acculturation was not directly assessed in the present study, all participants were students at a major university in the United States. Therefore, the discrepancy in Autonomy scores may exist because our Hispanic sample is biased towards those individuals from Hispanic cultures who are more likely to attend university away from home and thus may identify as more autonomous.

### ***Limitations and Directions for Future Research***

The current study provides strong empirical support for the existence of the Healthy Schizotypy and confirmed that individuals with this schizotypy profile are, in



fact, mentally healthy. There were several limitations, however, that limit the generalizability of results. First, this study was cross-sectional in nature, which did not allow for the examination of longitudinal or causal relationships among study variables. In addition, while the sample size was relatively large, some of the latent profiles were made up of a small number of individuals. This was especially true in the High Schizotypy group, which only included seven participants. Nonetheless, it was not surprising that there were far more participants in the Low Average and Average profiles than in any of the profiles dominated by high scores on the O-LIFE, as our sample was drawn from an undergraduate population. Future research should recruit larger samples drawn from the community, which would allow for more rigorous statistical models to address the questions posed in the current study.

While prior research has shown that social desirability is not a major confound in the literature on well-being and that self-reports of well-being tend to be stable and reliable measures (Ryff, 1989), future research would benefit from behavioral or experimental studies that offer a different approach to the hypotheses presented in this study. For example, future research would benefit from an experimental examination of how individuals in the Healthy Schizotypy group make sense of unusual or ambiguous stimuli or experiences. The two potential mechanistic explanations proposed in the current study did not account for the observed relationship between latent profile membership and mental health. Future research should continue to examine this important question in order to better understand the healthy schizotype and to inform interventions that might target those at risk for the development of psychosis.

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Table 1

*Demographic Data*

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	Male ( <i>N</i> = 264)	Female ( <i>N</i> = 156)	Total ( <i>N</i> = 420)
Mean age	19.14	19.20	19.18
Ethnicity			
Caucasian	85	106	191
Hispanic	31	64	95
Asian-American	15	32	47
African-American	6	13	19
Other	19	49	68

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Table 2a

*Psychometric Properties of the Major Study Variables*

	<i>M</i>	<i>SD</i>	Skew	Kurtosis	$\alpha$
<b>O-LIFE</b>					
UE	0.29	0.20	0.77	0.26	.87
CD	0.40	0.23	0.33	-0.57	.86
IA	0.18	0.15	1.16	1.21	.80
IN	0.35	0.16	0.44	-0.04	.70
Intrinsic Religion	2.53	1.06	0.41	-0.73	.90
<b>PWB Scales</b>					
Self-Acceptance	4.52	0.91	-0.64	-0.37	.91
Positive Relations	4.69	0.85	-0.72	0.20	.90
Autonomy	4.25	0.75	0.03	-0.45	.85
Env. Mastery	4.32	0.79	-0.34	-0.05	.88
Purpose in Life	4.73	0.77	-0.69	0.34	.87
Personal Growth	4.87	0.65	-0.76	0.94	.84
Quality of Life	6.08	1.62	-0.45	0.16	.78

Table 2b

*Psychometric Properties of the Substance Use Variables*

	<i>M</i>	<i>SD</i>	Skew	Kurtosis
<b>Past 30 Days</b>				
Alcohol	2.56	1.45	0.43	-1.06
Marijuana	1.71	1.51	2.27	4.18
Cocaine	1.02	0.20	11.29	143.29
Amphetamines	1.04	0.40	11.97	155.51
Sedatives	1.01	0.15	20.45	418.00
Hallucinogens	1.01	0.10	20.45	418.00
Opiates	1.00	0.05	20.45	418.00
Inhalants	1.00	0.05	20.45	418.00
Designer Drugs	1.01	0.15	11.55	138.93
Steroids	1.00	0.00	-	-
Other	1.00	0.05	20.42	417.00
<b>Past Year</b>				
Alcohol	3.40	2.33	-0.31	-1.35
Marijuana	1.44	2.32	1.55	1.23
Cocaine	0.11	0.59	7.75	69.92
Amphetamines	0.07	0.57	10.40	115.90
Sedatives	0.05	0.38	8.06	70.67
Hallucinogens	0.06	0.33	7.56	69.86
Opiates	0.01	0.13	12.09	160.06
Inhalants	0.01	0.18	15.24	238.41
Designer Drugs	0.05	0.23	5.33	30.77
Steroids	0.00	0.05	20.49	420.00
Other	0.00	0.07	14.42	206.98

Table 3

*Correlations among the Main Study Variables*

	QoL	PR	Aut.	EM	PG	PiL	SA	Intrinsic Religion	Average Creativity
QoL	1	.60**	.36**	.58**	.52**	.58**	.65**	.13**	-.05
PR		1	.38**	.60**	.59**	.58**	.69**	.10*	-.03
Aut.			1	.49**	.42**	.44**	.55**	.04	.02
EM				1	.56**	.77**	.78**	.10*	-.11*
PG					1	.64**	.59**	.12*	-.03
PiL						1	.76**	.18**	-.09
SA							1	.12*	-.07
Religion								1	-.06
Creativity									1

*Note.* \* $p < .05$ , \*\* $p < .01$

Table 4a

*Correlations between Continuous Covariates and Dependent Variables*

	Age	Alcohol Use	Marijuana Use
Quality of Life	.07	-.07	-.13*
PWB Scales			
Self-Acceptance	.02	-.04	-.08
Positive Relations	.05	.03	-.06
Autonomy	.02	-.07	.02
Env. Mastery	.03	-.10*	-.13**
Purpose in Life	.07	-.15*	-.21**
Personal Growth	.02	-.05	-.10

*Note.* \* $p < .05$ , \*\* $p < .01$

Table 4b

*Independent Samples t-tests Comparing SWB and PWB in Males and Females*

	Male		Female		<i>t</i> (418)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Quality of Life	5.82	1.55	6.23	1.65	-2.55*
PWB Scales					
Self-Acceptance	4.44	0.87	4.57	0.93	-1.45
Positive Relations	4.48	0.85	4.82	0.83	-4.00**
Autonomy	4.26	0.73	4.24	0.76	0.28
Env. Mastery	4.27	0.77	4.34	0.80	-0.84
Purpose in Life	4.60	0.83	4.80	0.73	-2.70**
Personal Growth	4.69	0.69	4.98	0.60	-4.61**

*Note.* \* $p < .05$ , \*\* $p < .01$

Table 4c

*One-way ANOVAs Comparing PWB and SWB among Ethnic Groups*

	Caucasian	Hispanic	African Am.	Asian Am.	Other	
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i> (4, 419)
Quality of Life	6.05 (1.53)	6.26 (1.71)	5.96 (1.87)	5.75 (1.77)	6.18 (1.58)	0.88
PWB Scales						
Self-Acceptance	4.56 (0.88)	4.68 (0.83)	4.74 (1.08)	4.44 (0.91)	4.20 (0.99)	3.40**
Positive Relations	4.78 (0.83)	4.27 (0.83)	4.63 (0.66)	4.57 (0.93)	4.51 (0.91)	1.65
Autonomy	4.16 (0.72)	4.45 (0.73)	4.56 (0.93)	4.21 (0.69)	4.13 (0.79)	3.62**
Env. Mastery	4.31 (0.77)	4.41 (0.77)	4.45 (0.81)	4.33 (0.77)	4.15 (0.89)	1.24
Purpose in Life	4.72 (0.77)	4.90 (0.67)	4.96 (0.71)	4.67 (0.83)	4.50 (0.84)	3.19*
Personal Growth	4.87 (0.65)	4.96 (0.52)	4.92 0.60	4.94 0.63	4.71 (0.81)	1.63

*Note.* \* $p < .05$ , \*\* $p < .01$



Table 5

*Goodness-of-fit Statistics for the One Class to Seven Class Latent Profile Solutions*

	<u>Number of Classes</u>						
	1	2	3	4	5	6	7
Log-likelihood	474.08	593.41	619.69	658.23	682.84	700.01	707.84
AIC	-932.17	-1160.82	-1203.38	-1270.47	-1309.68	-1334.02	-1339.69
BIC	-899.85	-1108.29	-1130.65	-1177.54	-1196.55	-1200.69	-1186.16
Sample Size Adjusted BIC	-925.23	-1149.55	-1187.77	-1250.53	-1285.40	-1305.41	-1306.74
Entropy	N/A	0.73	0.67	0.74	0.78	0.83	0.77
Adjusted LMRT	N/A	231.00, $p < .001$	50.88, $p = 0.08$	53.59 $p = 0.23$	47.63 $p = 0.03$	33.24 $p = 0.03$	32.59 $p = 0.18$

Table 6

*Model-based means and standard errors for the six profiles*

	<i>M</i>	<i>Standard Error</i>
Latent Class 1: High IA		
UE	.218	.022
CD	.417	.046
IA	.454	.027
IN	.326	.030
Latent Class 2: Low Average		
UE	.116	.011
CD	.219	.022
IA	.114	.010
IN	.265	.012
Latent Class 3: Hi Schizotypy		
UE	.815	.070
CD	.734	.068
IA	.367	.065
IN	.738	.045
Latent Class 4: High IA/CD		
UE	.491	.023
CD	.680	.031
IA	.372	.024
IN	.498	.030
Latent Class 5: Average		
UE	.318	.016
CD	.418	.018
IA	.118	.008
IN	.352	.014
Latent Class 6: Healthy Schizotypy		
UE	.674	.028
CD	.547	.046
IA	.129	.015
IN	.400	.031

Figure 1

*Latent Profile Means on O-LIFE Subscales*

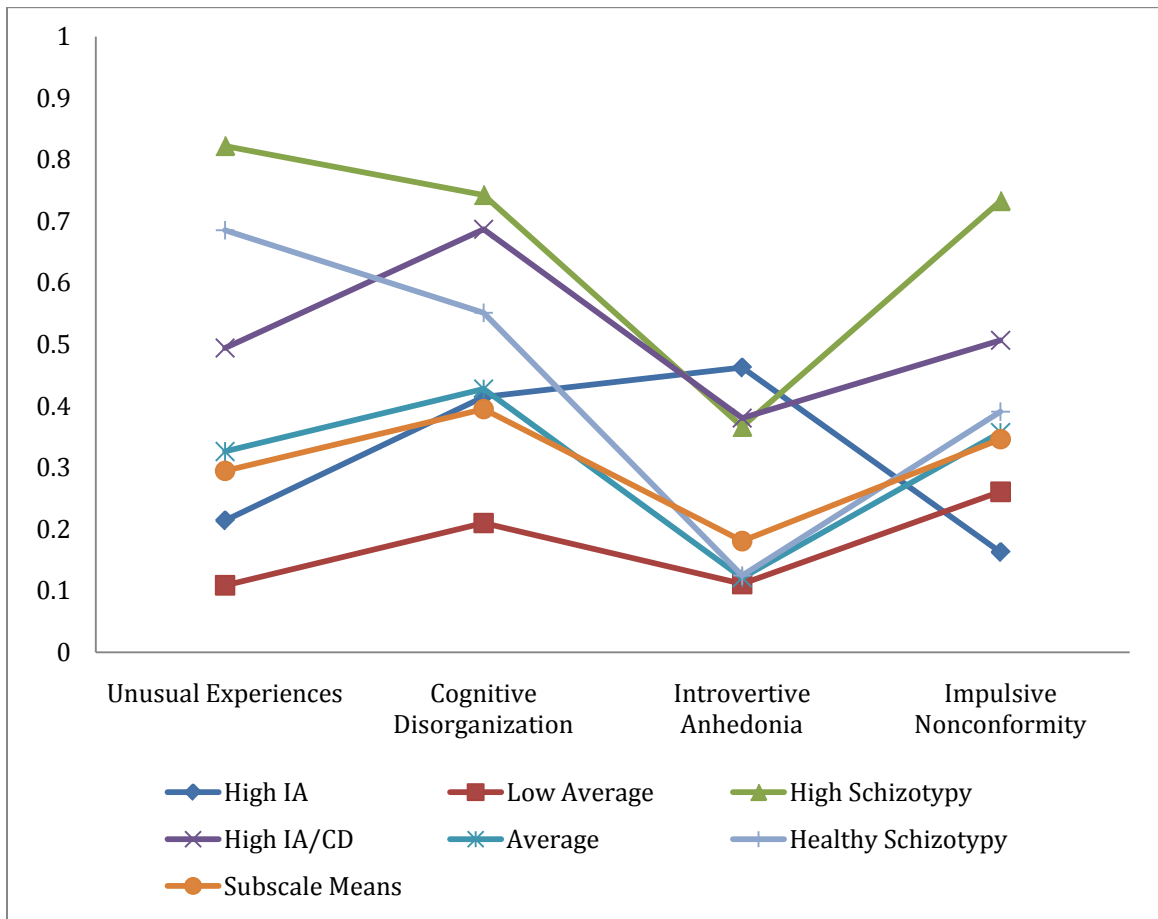


Figure 2

*Differences on QoL Scores among Latent Profiles, Controlling for Gender and Marijuana Use*

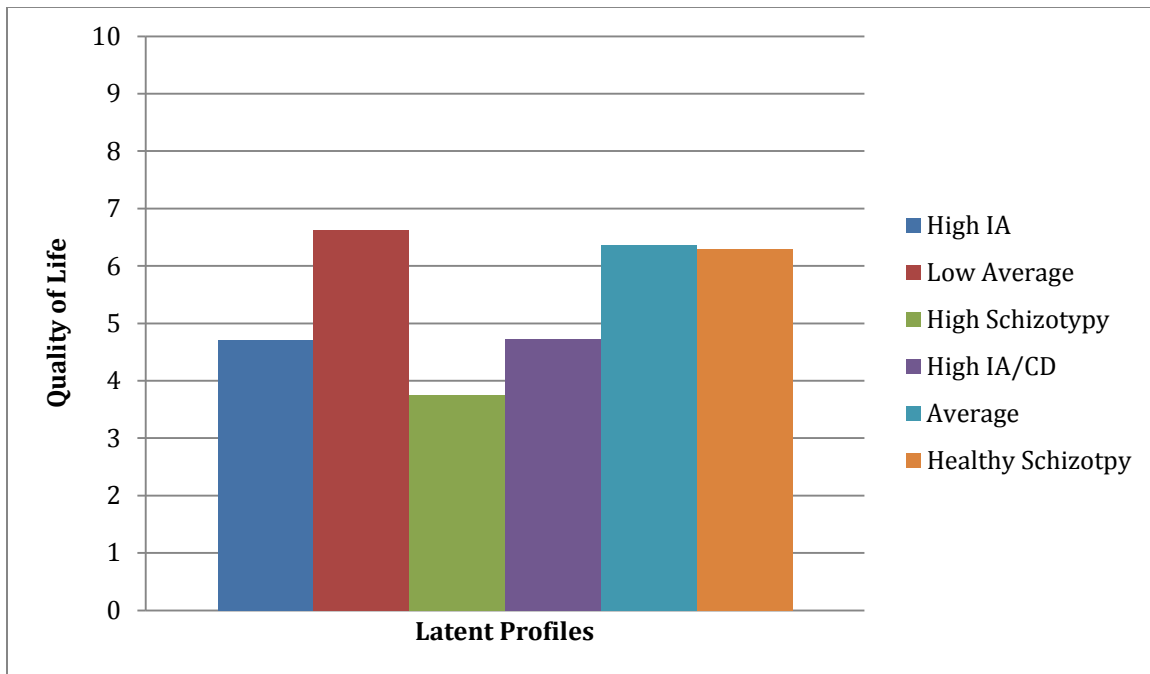


Figure 3

*Differences on Positive Relations Scores among Latent Profiles, Controlling for Gender*

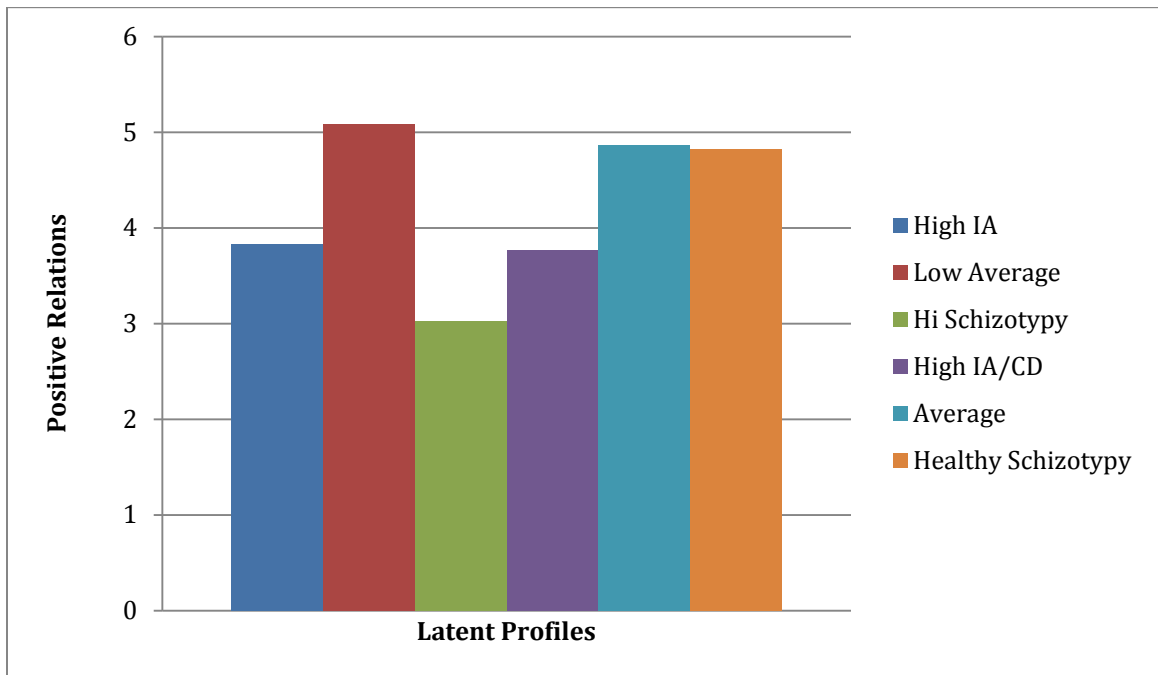


Figure 4

*Differences on Personal Growth Scores among Latent Profiles, Controlling for Gender*

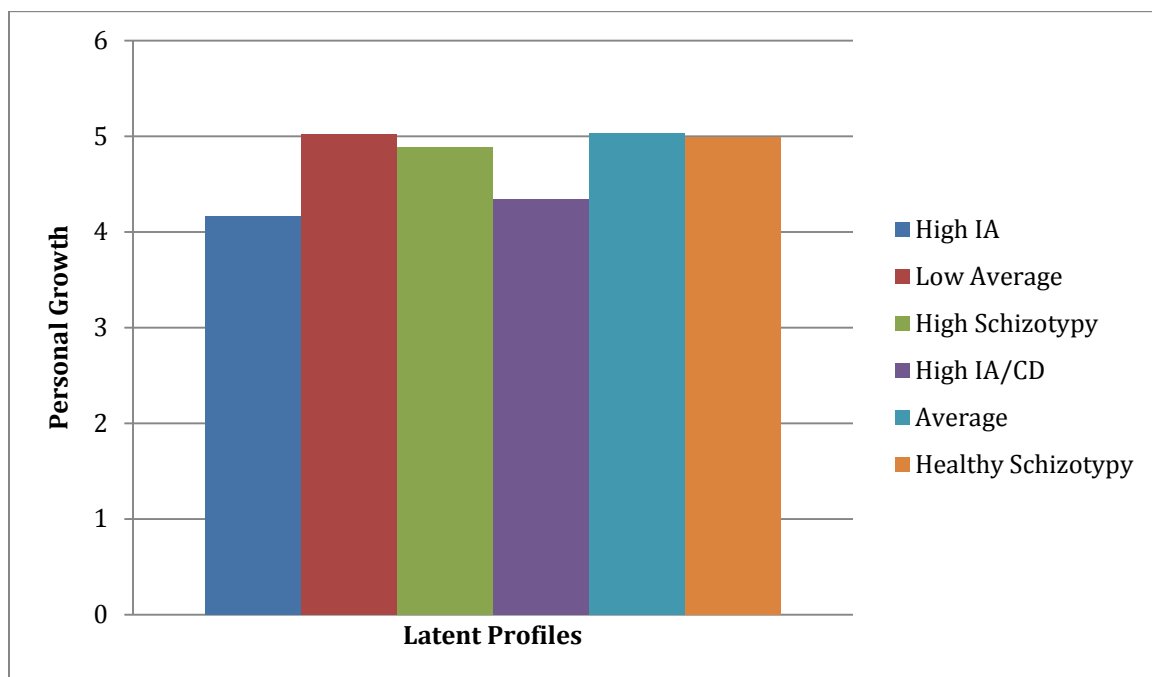


Figure 5

*Differences on Environmental Mastery Scores among Latent Profiles, Controlling for Alcohol and Marijuana Use*

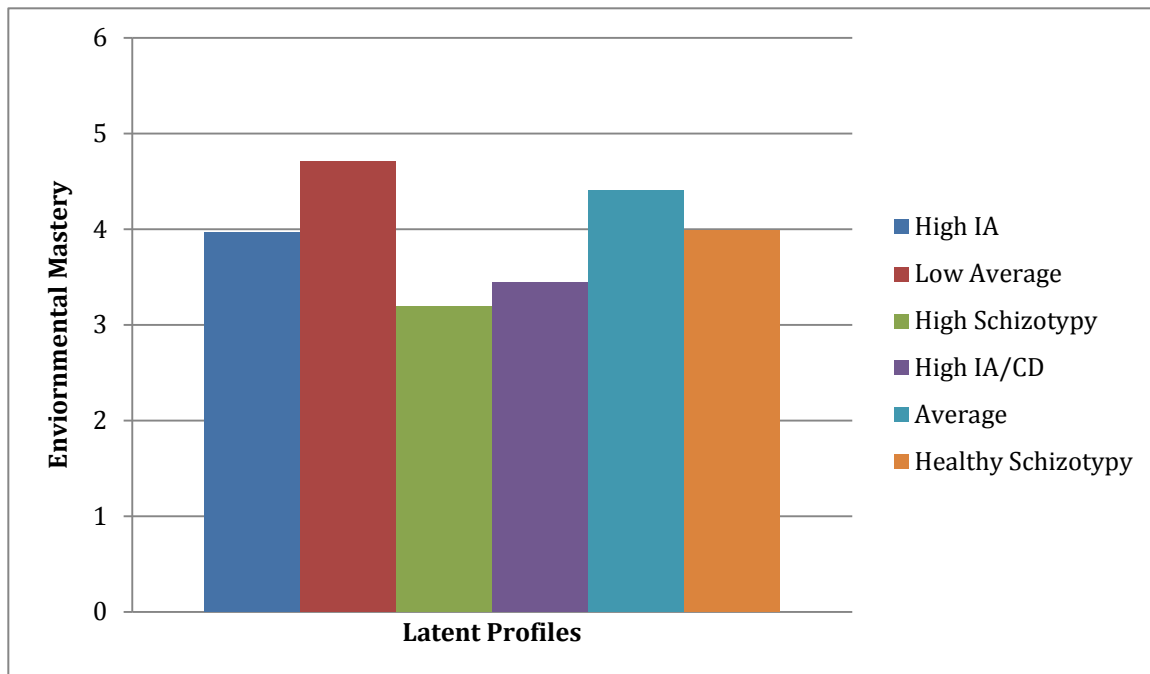


Figure 6

*Differences on Autonomy Scores among Latent Profiles*

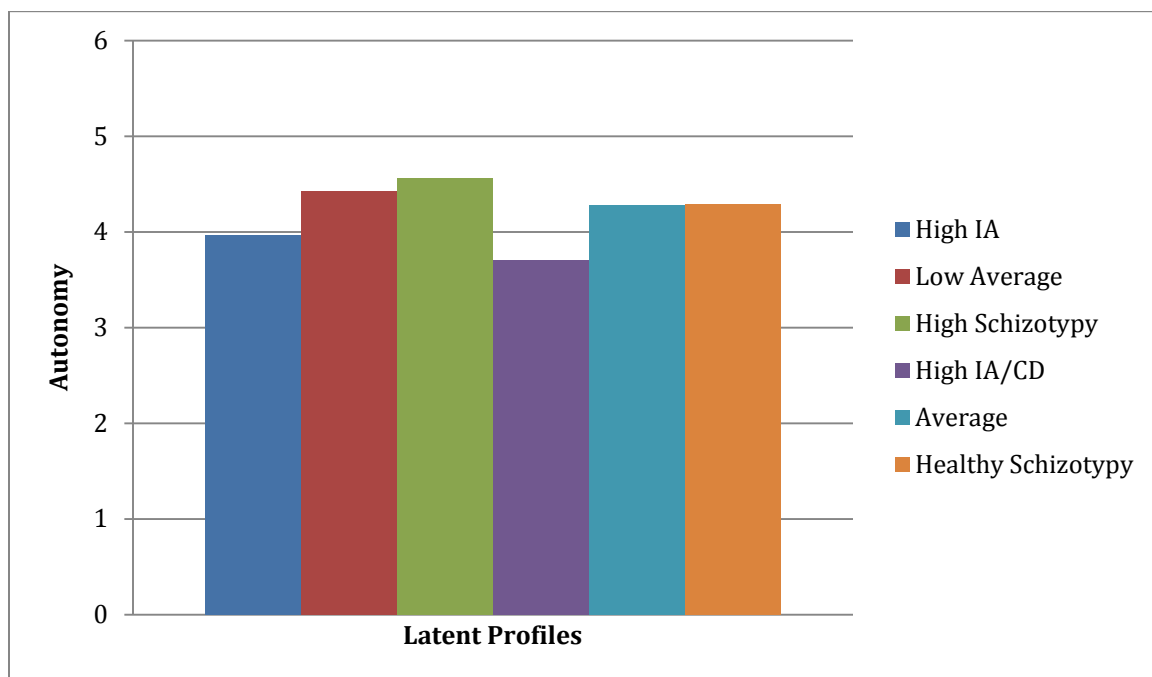




Figure 7

*Differences on Self-Acceptance Scores among Latent Profiles*

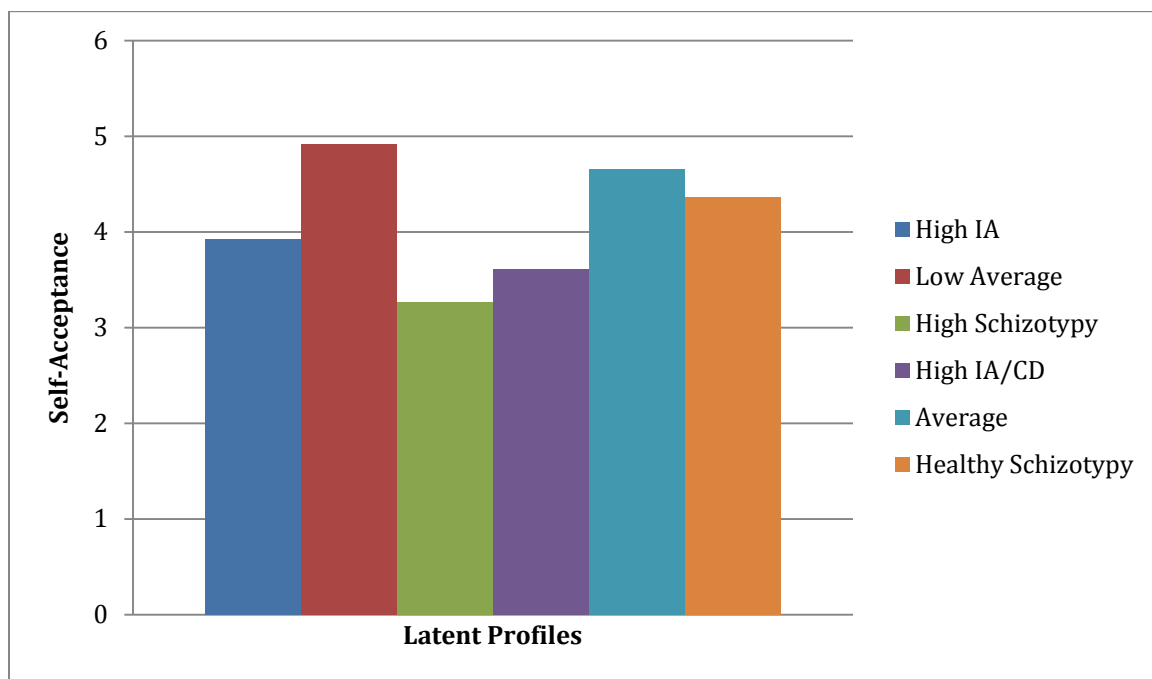
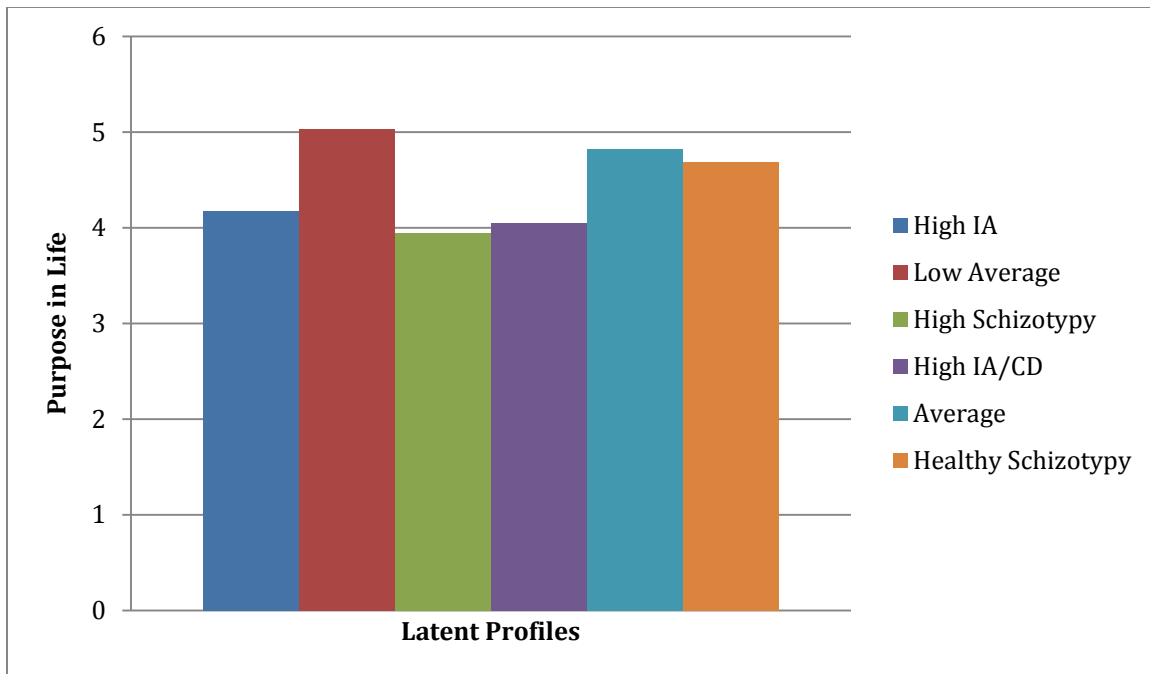


Figure 8

*Differences on Purpose in Life Scores among Latent Profiles, Controlling for Gender, Alcohol, and Marijuana Use*







**Schizotypy Measure: O-LIFE**

These questions relate to your thoughts, feelings, experiences and preferences. There are no right or wrong answers or trick questions so please be as honest as possible. For each question please choose either YES or NO and circle this on the form. Please do not spend too much time thinking about it – choose the answer closest to your own. \* Items from four scales were presented in random order.

**UNUSUAL EXPERIENCES**

1. Do you believe in telepathy?
2. Do you ever feel sure that something is about to happen, even though there does not seem to be any reason for you thinking that?
3. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?
4. Do you often have days when indoor lights seem so bright that they bother your eyes?
5. Does your sense of smell sometimes become unusually strong?
6. Have you felt as though your head or limbs were somehow not your own?
7. Have you sometimes sensed an evil presence around you, even though you could not see it?
8. Have you wondered whether the spirits of the dead can influence the living?
9. On occasions, have you seen a person's face in front of you when no one was in fact there?
10. When in the dark do you often see shapes and forms even though there's nothing there?
11. When you look in the mirror does your face sometimes seem quite different from usual?
12. Are your thoughts sometimes so strong that you can almost hear them?
13. Can some people make you aware of them just by thinking about you?
14. Do ideas and insights sometimes come to you so fast that you cannot express them all?

15. Do the people in your daydreams seem so true to life that you sometimes think they are real?
16. Do you sometimes feel that your accidents are caused by mysterious forces?
17. Do you think you could learn to read other's minds if you wanted to?
18. Does it often happen that nearly every thought immediately and automatically suggests an enormous number of ideas?
19. Does a passing thought ever seem so real it frightens you?
20. Does your voice ever seem distant or faraway?
21. Have you ever felt that you have special, almost magical powers?
22. Is your hearing sometimes so sensitive that ordinary sounds become uncomfortable?
23. Do you ever have a sense of vague danger or sudden dread for reasons that you do not understand?
24. Do you feel so good at controlling others that it sometimes scares you?
25. Have you ever thought you heard people talking only to discover that it was in fact some nondescript noise?
26. Have you felt that you might cause something to happen just by thinking too much about it?
27. Have you occasionally felt as though your body did not exist?
28. Have you sometimes had the feeling of gaining or losing energy when certain people look at you or touch you?
29. Are the sounds you hear in your daydreams really clear and distinct?
30. Do your thoughts sometimes seem as real as actual events in your life?

#### COGNITIVE DISORGANIZATION

1. Are you easily distracted when you read or talk to someone?
2. Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make sense?
3. Do you often experience an overwhelming sense of emptiness?

4. Do you often feel lonely?
5. Is it hard for you to make decisions?
6. Are you a person whose mood goes up and down easily?
7. Are you easily hurt when people find fault with you or the work you do?
8. Are you sometimes so nervous that you are blocked?
9. Do you dread going into a room by yourself where other people have already gathered and are talking?
10. Do you easily lose your courage when criticized or failing in something?
11. Do you find it difficult to keep interested in the same thing for a long time?
12. Do you frequently have difficulty in starting to do things?
13. Do you often feel that there is no purpose to life?
14. Do you often have difficulties in controlling your thoughts?
15. Do you often worry about things you should not have done or said?
16. Do you worry about awful things that might happen?
17. No matter how hard you try to concentrate do unrelated thoughts creep into your mind?
18. When in a crowded room, do you often have difficulty in following a conversation?
19. Are you easily confused if too much happens at the same time?
20. Are you easily distracted from work by daydreams?
21. Do you often feel fed up?
22. Do you worry too long after an embarrassing experience?
23. Would you call yourself a nervous person?
24. Do you often hesitate when you are going to say something in a group of people whom you more or less know?

## INTROVERTIVE ANHEDONIA

1. Can you usually let yourself go and enjoy yourself at a lively party?
2. Do people who try to get to know you better usually give up after a while?
3. Do you feel that making new friends isn't worth the energy it takes?
4. Do you find the bright lights of a city exciting to look at?
5. Do you like going out a lot?
6. Do you prefer watching television to going out with other people?
7. Do you usually have very little desire to buy new kinds of food?
8. Is it fun to sing with other people?
9. Are people usually better off if they stay aloof from emotional involvements with people?
10. Are there very few things that you have ever really enjoyed doing?
11. Are you much too independent to really get involved with other people?
12. Are you rather lively?
13. Can just being with friends make you feel really good?
14. Do you have many friends?
15. Do you like mixing with people?
16. Do you think having close friends is not as important as some people say?
17. Does it often feel good to massage your muscles when they are tired or sore?
18. Has dancing or the idea of it always seemed dull to you?
19. Have you often felt uncomfortable when your friends touch you?
20. Is trying new foods something you have always enjoyed?
21. On seeing a soft thick carpet have you sometimes had the impulse to take off your shoes and walk barefoot on it?



22. When things are bothering you do you like to talk to other people about it?
23. Do you feel very close to your friends?
24. Do you love having your back massaged?
25. Have you had very little fun from physical activities like walking, swimming, or sports?
26. Do you enjoy many different kinds of play and recreation?
27. Is it true that your relationships with other people never get very intense?

#### IMPULSIVE NONCONFORMITY

1. Do people who drive carefully annoy you?
2. Do you often feel like doing the opposite of what other people suggest, even though you know they are right?
3. Do you often feel the impulse to spend money which you know you can't afford?
4. Do you often have an urge to hit someone?
5. Do you sometimes talk about things you know nothing about?
6. Are you usually in an average sort of mood, not too high and not too low?
7. Do you at times have an urge to do something harmful or shocking?
8. Do you ever have the urge to break or smash things?
9. Do you often change between intense liking and disliking of the same person?
10. Do you stop to think things over before doing anything?
11. Do you think people spend too much time safeguarding their future with savings and insurance?
12. Have you ever blamed someone for doing something you know was really your fault?
13. Have you ever cheated at a game?
14. Have you ever felt the urge to injure yourself?

15. When in a group of people do you usually prefer to let someone else be the centre of attention?
16. When you catch a train do you often arrive at the last minute?
17. Would being in debt worry you?
18. Would you take drugs which may have strange or dangerous effects?
19. Do you consider yourself to be pretty much an average kind of person?
20. Have you ever taken advantage of someone?
21. Would you like other people to be afraid of you?
22. Do you often overindulge in alcohol or food?
23. Would it make you nervous to play the clown in front of other people?

**Religion Measure: Intrinsic subscale of the Religious Orientation Scale-Revised**

1. I enjoy reading about my religion

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

2. It doesn't much matter what I believe so long as I am good (Note: answer "5" if you are not religious)

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

3. It is important to me to spend time in private thought and prayer

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

4. I have often had a strong sense of God's presence.

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

5. I try hard to live all my life according to my religious beliefs.

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

6. Although I am religious, I don't let it affect my daily life. (Note: Answer "5" if you are not religious)

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

7. My whole approach to life is based on my religion.

1 = I strongly disagree      4 = I tend to agree  
2 = I tend to disagree      5 = I strongly agree  
3 = I'm not sure

8. Although I believe in my religion, many other things are more important in life. (Note: answer "5" if you are not religious)

1 = I strongly disagree

2 = I tend to disagree

3 = I'm not sure

4 = I tend to agree

5 = I strongly agree

**Psychological Well-Being Measure: PWB Scales**

The following set of questions deals with how you feel about yourself and your life. Please remember that there are no right or wrong answers. Circle the number that best describes your present agreement or disagreement with each statement. \*Items from all six scales were presented in random order.

**AUTONOMY**

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

## ENVIRONMENTAL MASTERY

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

## PERSONAL GROWTH

1. I am not interested in activities that will expand my horizons.
2. In general, I feel that I continue to learn more about myself as time goes by.
3. I am the kind of person who likes to give new things a try.
4. I don't want to try new ways of doing things--my life is fine the way it is.

5. I think it is important to have new experiences that challenge how you think about yourself and the world.
6. When I think about it, I haven't really improved much as a person over the years.
7. In my view, people of every age are able to continue growing and developing.
8. With time, I have gained a lot of insight about life that has made me a stronger, more capable person.
9. I have the sense that I have developed a lot as a person over time.
10. I do not enjoy being in new situations that require me to change my old familiar ways of doing things.
11. For me, life has been a continuous process of learning, changing, and growth.
12. I enjoy seeing how my views have changed and matured over the years.
13. I gave up trying to make big improvements or changes in my life a long time ago.
14. There is truth to the saying you can't teach an old dog new tricks.

#### POSITIVE RELATIONS WITH OTHERS

1. Most people see me as loving and affectionate.
2. Maintaining close relationships has been difficult and frustrating for me
3. I often feel lonely because I have few close friends with whom to share my concerns.
4. I enjoy personal and mutual conversations with family members or friends.
5. It is important to me to be a good listener when close friends talk to me about their problems.
6. I don't have many people who want to listen when I need to talk.
7. I feel like I get a lot out of my friendships.
8. It seems to me that most other people have more friends than I do.
9. People would describe me as a giving person, willing to share my time with others.

10. I have not experienced many warm and trusting relationships with others.
11. I often feel like I'm on the outside looking in when it comes to friendships.
12. I know that I can trust my friends, and they know they can trust me.
13. I find it difficult to really open up when I talk with others.
14. My friends and I sympathize with each other's problems.

#### PURPOSE IN LIFE

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



## SELF-ACCEPTANCE

1. When I look at the story of my life, I am pleased with how things have turned out.
2. In general, I feel confident and positive about myself.
3. I feel like many of the people I know have gotten more out of life than I have.
4. Given the opportunity, there are many things about myself that I would change.
5. I like most aspects of my personality.
6. I made some mistakes in the past, but I feel that all in all everything has worked out for the best.
7. In many ways, I feel disappointed about my achievements in life.
8. For the most part, I am proud of who I am and the life I lead.
9. I envy many people for the lives they lead.
10. My attitude about myself is probably not as positive as most people feel about themselves.
11. Many days I wake up feeling discouraged about how I have lived my life.
12. The past had its ups and downs, but in general, I wouldn't want to change it.
13. When I compare myself to friends and acquaintances, it makes me feel good about who I am.
14. Everyone has their weaknesses, but I seem to have more than my share.

### Subjective Well-Being Measure: Quality of Life Inventory

**DIRECTIONS:** This survey asks how satisfied you are with parts of your life such as your work and your health. It also asks how important these things are to your happiness. Special definitions are used for words like “money,” “work,” and “play.” Keep these definitions in mind as you answer the questions. Answer every question, even if it does not seem to apply to you. It is your feelings and opinions that are important, so there are no right or wrong answers. Just give the answers that best describe you.

The survey asks you to describe how important certain parts of your life (such as work and health) are and how satisfied you are with them.

Important means how much this part of your life adds to your overall happiness. You can say how important something is by picking one of three choices: “Not Important” (0), “Important” (1), or “Extremely Important” (2).

Satisfied means how well your needs, goals, and wishes are being met in this area of life. You can say how satisfied you are by picking one of three choices from “Very Dissatisfied” (0) to “Very Satisfied” (5).

For each question, circle the number that best describes you.

**HEALTH** is being physically fit, not sick, and without pain or disability.

1. How important is HEALTH to your happiness?

0	1	2
not important	important	extremely important

2. How satisfied are you with your HEALTH?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**SELF-ESTEEM** means liking and respecting yourself in light of your strengths and weaknesses, successes and failures, and ability to handle problems.

3. How important is SELF-ESTEEM to your happiness?

0	1	2
not important	important	extremely important

4. How satisfied are you with your SELF-ESTEEM?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**GOALS-AND-VALUES** are your beliefs about what matters most in life and how you should live, both now and in the future. This includes your goals in life, what you think is right or wrong, and the purpose or meaning of life as you see it

5. How important are GOALS-AND-VALUES to your happiness?

0	1	2
not important	important	extremely important

6. How satisfied are you with your GOALS-AND-VALUES?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**MONEY** is made up of three things. It is the money you earn, the things you own (like a car or furniture) and believing that you will have the money and things you need in the future.

7. How important is MONEY to your happiness?

0	1	2
not important	important	extremely important

8. How satisfied are you with your MONEY?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**WORK** means your career or how you spend most of your time. You may work at a job, at home taking care of your family, or at school as a student. WORK includes your duties on the job, the money you earn (if any), and the people you work with. (If you are unemployed, retired, or can't work, you can still answer these questions).

9. How important is WORK to your happiness?

0	1	2
not important	important	extremely important

10. How satisfied are you with your WORK?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**PLAY** is what you do in your free time to relax, have fun, or improve yourself. This could include watching movies, visiting friends, or pursuing a hobby like sports or gardening.

11. How important is PLAY to your happiness?

0	1	2
not important	important	extremely important

12. How satisfied are you with your PLAY?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**LEARNING** means gaining new skills or information about things that interest you. LEARNING can come from reading books or taking classes on subjects like history, car repair, or using a compute.

13. How important is LEARNING to your happiness?

0	1	2
not important	important	extremely important

14. How satisfied are you with your LEARNING?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	

**CREATIVITY** is using your imagination to come up with new and clever ways to solve everyday problems or to pursue a hobby like painting, photography, or needlework. This can include decorating your home, playing the guitar, or finding a new way to solve a problem at work.

15. How important is CREATIVITY to your happiness?

0	1	2
not important	important	extremely important

16. How satisfied are you with your CREATIVITY?

0	1	2	3	4	5
Very	Somewhat	A little	A little	Somewhat	Very
	DISSATISFIED			SATISFIED	



