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Self-report Measures of Psychopathic and Schizotypal Personality Characteristics: A Confirmatory Factor Analysis of Characteristics of Antisocial Behavior and Hypothetical Psychosis-Proneness in a College Sample

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SELF-REPORT MEASURES OF PSYCHOPATHIC AND SCHIZOTYPAL PERSONALITY CHARACTERISTICS: A CONFIRMATORY FACTOR ANALYSIS OF CHARACTERISTICS OF ANTISOCIAL BEHAVIOR AND HYPOTHETICAL PSYCHOSIS-PRONENESS IN A COLLEGE SAMPLE

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This study separated the constructs of hypothetical psychopathy and hypothetical psychosis-proneness by performing Confirmatory Factor Analyses on different proposed factor structures of both psychopathic and schizotypic subclinical symptoms using data from a college sample. The study validated and provided evidence for existing structures of each construct. Research showed that the constructs overlap in their factor structures, as do their measures, although psychopathy and schizotypy are most likely distinct constructs.

As conceptualized by Dr. Robert Hare, originator of the Psychopathy Checklist Revised (PCL-R; 2003), psychopathy reflects two interrelated but distinct factors of symptoms. The first symptom factor (Factor 1) reflects the shallow and remorseless emotional life of the psychopath. The next symptom factor (Factor 2) reflects a lifestyle of impulsive and antisocial behaviors. Further research into the factor structure of psychopathy has produced three, four, and even five-factor models of the construct (Cook & Michie, 2001; Lynam, 2002; Miller, Lynam, Widiger, & Leukefeld, 2001; Skeem, Mulvey, & Grisso, 2003; Widiger & Lynam, 1998;).

Similarly, schizotypal characteristics appear to represent several distinct factors. Confirmatory Factor Analysis by Raine & Benishay (1995) determined that the nine subscales of the Schizotypal Personality Questionnaire fit best with a three-factor model of schizotypy. Others, including Mason (1995), have compared different theories of schizotypy using Confirmatory Factor Analysis and tested two, three, and four-factor models.

The results indicated that although neither of the psychopathy models achieved acceptable fit indices, the two-factor model fit the data better than the three-factor model. In addition, the three-factor model of schizotypy fit the data better than the four-factor model, though neither of these models achieved acceptable fit statistics. The final model indicated structural overlap in the psychopathic factor of Antisocial Lifestyle and the schizotypic factor of Impulsive Nonconformity. However, there did not seem to be overlap in the psychopathic factor of Affective/Interpersonal Deficits and the schizotypic factor of Introvertive Anhedonia, indicating that the emotional lives of the psychopath and the schizotype may be distinct from each other.

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INTRODUCTION

Research shows that hypothetical psychopathy and hypothetical psychosis-proneness overlap in their factor structures, as do their measures, although they are most likely distinct personality constructs. For example, many self-report measures of schizotypy have been criticized on the grounds that in addition to psychosis-proneness, the measures also capture antisocial and impulsivity characteristics (Bishop, 1977; Block, 1977). This study seeks to separate the constructs of hypothetical psychopathy and hypothetical psychosis-proneness by performing Confirmatory Factor Analyses testing different factor structures of both psychopathy and schizotypy, using data from a college sample.

This study uses a personality-based approach to differentiate subclinical psychopathic and schizotypal factors based on the assumption that personality disorders can be conceptualized as distinct configurations of extreme scores on normative personality traits (Widiger, 1993; Widiger & Costa, 1994). In addition, both psychopathy and schizotypal personality disorder are viewed as lying on a continuous range from normal through sub-clinical to extreme behavior. Support for this position has been found for both psychopathy (Lynam, 2002; Miller, Lynam, Widiger, & Leukefeld, 2001) and for schizotypy (Eysenck, 1960; Meehl, 1962).

REVIEW OF LITERATURE

The Construct of Psychopathy

Although psychopaths are estimated to constitute only 1% of the general population, they are estimated to commit more than 50% of all serious crimes (Hare, 1993). Those people who are termed psychopaths exhibit markedly different patterns of behavior than other criminal offenders. For example, people who score high on psychopathy measures typically begin committing crimes at an earlier age, commit a wider variety of crimes, perpetrate a higher degree of violence, reoffend faster, violate parole sooner, and commit more institutional violence than nonpsychopathic offenders (Cornell et al., 1996; Hare & McPherson, 1984; Porter et al., 2000; Serin, 1991). Psychopathic individuals perpetrate about twice as many violent acts as other criminals, and their recidivism rate for violent crime is about three times higher than other violent offenders (Hare, 1993). Psychopathy, along with measures of deviant sexual arousal, has been shown to predict recidivism of sexual offenders in nearly 75% of cases (Rice, Harris, & Quinsey, 1990; Serin et al., 1994). Psychopathic sex offenders in general have been shown to have more extensive criminal histories, a less specific victimology, and a more opportunistic criminal behavior pattern.

Psychopathy as a construct has undergone many reconceptualizations over the years, starting with the Greeks and continuing up until the present moment. The most widely used definition of psychopathy is derived from Dr. Robert Hare and his associates (1985), who have reworked Hans Cleckley's description of the psychopathic personality (1941) into a measurable construct. Two correlated factors have emerged from Hare's extensive research on his own conceptualization of psychopathy. The first factor reflects

tendencies toward selfishness, egocentricity, superficial charm, and a lack of remorse or empathy. The second factor reflects the overt lifestyle choices that psychopaths seem to consistently make, which include delinquency, low frustration tolerance, frequent substance abuse, a parasitic lifestyle, impulsivity, and frequent illegal or criminal behaviors (Hare, 1985).

Psychopaths clearly have a dramatic impact on society and understanding their pathology is of prime importance to the criminal justice system. The psychological profession has historically been interested in this group (Arrigo & Shipley, 2001), but is still in its infancy regarding empirical research on the construct. The most important research issue concerning the personality construct of psychopathy is its association with antisocial personality disorder (ASPD) as defined by the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Revised (DSM-IV-TR; American Psychiatric Association, 2000). The current conceptualization of ASPD relies on a behaviorally-based set of criteria that was intended to take the place of or be inclusive of terms such as psychopathy, sociopathy, and dissocial personality disorder (Shipley & Arrigo, 2001). However, subsequent empirical research has indicated that even though psychopathy and ASPD have similarities in their presentation, significant differences between the two concepts lead researchers to conclude that the ASPD criteria do not sufficiently represent psychopathic symptoms (Hare, 1996; Hart & Hare, 1997; Shipley & Arrigo, 2001).

Specifically, the DSM-IV-TR's exclusion of affective symptoms and personality traits leads to an over-diagnosis of psychopathy in criminal populations and an under-diagnosis of psychopathy in noncriminal populations (Hart & Hare, 1997). Prevalence data reveal a significant distinction between the two disorders. Using the DSM-IV-TR

criteria for ASPD, about 50% to 80% of criminal offenders can be diagnosed with ASPD. In contrast, only 15% to 30% of the same population can be classified as psychopathic using the Hare Psychopathy Checklist - Revised (PCL-R; Hare, 1991) which assesses the most commonly used and most empirically validated criteria of psychopathy. Thus, a diagnosis of ASPD may only reflect criminal behaviors rather than the combination of personality traits and behaviors that constitute psychopathy (Shipley & Arrigo, 2001). The DSM-IV-TR may further confuse clinicians seeking to diagnose ASPD by including descriptions of antisocial people in the text. Many of the terms used to describe individuals with ASPD are reflective of psychopathy criteria, but play no role in the diagnosis of ASPD itself (Shipley & Arrigo, 2001).

Definition and Measurement of Psychopathy

The definition of psychopathy, then, is an important topic when researchers investigate offenders in the criminal justice system. As conceptualized by Dr. Robert Hare, originator of the PCL-R, psychopathy reflects two interrelated but distinct factors of symptoms (1991). The first symptom factor (Factor 1) reflects the shallow and remorseless emotional life of the psychopath. Even though the psychopath may seem charming and very intelligent about a number of topics at first, explorations into their emotions and opinions will eventually reveal a person who "knows the words to the song but not the music" (Hare, 1993). In other words, psychopaths know what to say, but not what to feel in relation to a certain context. In addition, psychopaths are able to commit morally reprehensible actions without the burden of a guilty conscience. Indeed, most psychopaths do not view their behavior as the problem; rather, the fact that they were

caught bothers them the most. They tend to view themselves as victims rather than perpetrators.

The next symptom factor (Factor 2) reflects a lifestyle of impulsive and antisocial behaviors. This factor on the PCL-R corresponds more closely with the DSM-IV-TR's criteria for ASPD (Shipley & Arrigo, 2001). Psychopaths typically lead a life full of impulsive, reckless decisions that often get them into trouble with the law. They are constantly looking for thrills and stimulation, with little regard to the rights or feelings of others. Thus, psychopaths often have a history of juvenile delinquency and adult antisocial behaviors (Hare, 1993).

The PCL-R

Dissatisfied with self-report measures that could easily be manipulated by the offenders he was interviewing, Robert Hare spent ten years developing the Psychopathy Checklist-Revised (1991). The result was a semi-structured interview schedule that rated examinees on 20 items typical of the psychopathic personality. Each item is rated on a 3 - point scale: 0 = item does not apply; 1 = item applies to a certain extent; 2 = item applies. The criteria have interrater reliabilities in the .90 range (Hare, 1991). The scoring range is 0 to 40, with a score of 30 or above generally designated as psychopathic. Although Hare supports a discrete view of the disorder, other researchers have suggested the PCL-R would be better used as a dimensional measure of psychopathic tendencies (Shipley & Arrigo, 2001). As mentioned earlier the PCL-R has been shown to have significant predictive validity in regard to general and violent criminal recidivism (Hare, 1993).

To use the PCL-R more efficiently, Hare developed a shorter version of the PCL-R called the Psychopathy Checklist: Screening Version (PCL-SV). The PCL:SV is used

to assess psychopathy among persons with mental disorders (Hart, Hare & Forth, 1994), but has also recently been used to study nonclinical populations as well (Levenson et al.,1995). Each of the 12 items in the PCL:SV is rated on a 3-point scale, with 0 = does not apply. Part 1 (items 1-6) measures the interpersonal and affective symptoms of psychopathy (Factor 1), and part 2 (items 7-12) measure the antisocial behaviors (Factor 2). The cutoff score for the diagnosis of psychopathy in the PCL:SV is 18 or higher. Those who score 12 or under are designated as nonpsychopathic, and scores between 13 and 17 indicate possible psychopathic tendencies.

The psychometric properties of the PCL:SV were examined in 11 samples in four settings: Among correctional offenders, forensic psychiatric patients, civil psychiatric patients, and university students (Hart, Cox, & Hare, 1995). The mean interrater reliabilities were .84 for the total score, .77 for part 1, and .82 for part 2. The weighted mean interrater reliability of the 12 items ranged from .50 to .79. The mean interrater agreement for PCL:SV diagnosis of psychopathy was .48 (*kappa*).

Because the PCL:SV is still an interview-based assessment, it is still expensive and time-consuming to administer. Studying the concept of psychopathy in non-forensic, non-clinical populations required the development of quicker, less expensive self-report measures (Forth, Brown, Hart, & Hare, 1996; Lilienfeld & Andrews, 1996). Hare developed the Self-Report Psychopathy scale (SRP-II, 1989) in order to address this methodological issue, and others developed measures based on their own conceptualizations of psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld & Andrews, 1996). However, only the SRP-II has the advantage of a theoretical and historical association with the PCL-R. Subsequent research has indicated that the self-

report measures that have been developed are less subject to manipulation by the subject than previously believed (Lilenfeld & Andrews, 1996). In particular, the SRP-II total score correlates positively with measures of disagreeableness (Paulhus & Williams, 2002), self-reported delinquent behavior (Williams et al., 2001), promiscuous sexual attitudes (Harms, Williams, & Paulhus, 2001). The SRP-II has also predicted such behaviors as cheating on exams and attempts to defraud a laboratory-controlled lottery (Paulhus, Williams, & Nathanson, 2002). The development and psychometric properties of the PCL-R, PCL-SV, and SRP-II are crucial to understanding the construct of psychopathy at this point since it is considered to be the "gold standard" of diagnosis (Harpur, Hare, & Hakstian, 1989; Hart & Hare, 1989; Kosson, Smith & Newman, 1990).

Both the psychiatric community and the criminal justice system often regard psychopathic offenders to be untreatable (Coid, 1998; Gunn, 1998; Shipley & Arrigo, 2001). Psychopaths generally have lower motivation when entering treatment programs offered in correctional facilities that typically focus on how better to "get along" in the outside world (Ogloff, Wong, & Greenwood, 1990). This is probably because their lack of remorse for their actions limits the amount of personal distress their personality disorder causes them. In addition, some researchers hypothesize these correctional treatment programs that emphasize social and coping skills to reduce violent recidivism in other types of offenders may actually increase violent recidivism in psychopaths (Harris, Rice, & Cormier, 1994). Some researchers have hypothesized that participation in treatment by psychopaths is usually a superficial attempt at impression management (Porter et al., 2000). Beyond the dismal implications this view of treatments holds for society, the psychopath tends to be viewed as a hopeless case by the criminal justice

system. Psychopathic individuals are generally regarded to be higher parole risks (Rice, 1997) and are viewed as more "bad" or morally reprehensible than other offenders (Toch, 1998). This judgment may lead to serious violations of an incarcerated individual's civil liberties, especially when civil commitment proceedings are initiated by the courts (Shipley & Arrigo, 2001). In addition, because psychopaths are generally regarded to be untreatable, a diagnosis of psychopathy can also bring a denial of access to mental health care and a career in the correctional rather than mental health system.

Not all psychopaths are criminals, nor are all psychopathic criminals violent. In fact, the majority of psychopaths never come to the attention of the criminal justice system. Instead they focus their attention on manipulation of both people and systems to further their own goals and satisfy their own needs, often operating on the edges of legality (Cleckley, 1982). Hare (1993) reports that he has interviewed offenders who have received the maximum score on the PCL-R but have never committed a violent offense. The possibility of nonviolent persons scoring very high on the PCL-R should considerably interest the criminal justice system. The PCL-R is increasingly used to determine the appropriateness of mental health treatment, the most suitable placement of a criminal offender (i.e., maximum security vs. minimum security, or prison vs. secure mental health facility), the risk of recidivism if the offender is released, the appropriateness of bail, parole, leniency, or the death penalty, or the appropriateness of civil commitment (Shipley & Arrigo, 2001). Thus, an offender scoring very high on the PCL-R may be considered to be a serious recidivism risk for violent offenses even though this offender has little or no history of violent behavior. The danger of this misapplication of the PCL-R is most apparent in civil commitment proceedings. A number of states have

passed laws that require certain offenders to have a civil commitment hearing before their parole or release (Edens, 2001; Shipley & Arrigo, 2001). If an offender is civilly committed based on the score on one or more psychopathy personality measures such as the PCL-R, the individual could possibly serve a life sentence based on crimes yet to be committed (Teir & Coy, 1997). In these cases, it would seem incredibly important to be able to distinguish which psychopathic offenders have a high risk for violence and which do not. This specificity would help avoid the indefinite incarceration of nonviolent psychopaths.

Clearly the psychopath's impact on society is widespread and problematic, and the recidivism risk that these individuals pose necessitates further investigation. As much as possible, the criminal justice system should be able to assess specifically a psychopath's risk for recidivism and be able to distinguish between violent and nonviolent psychopaths, in order to protect both society and the psychopath's civil liberties. Currently, there is no reliable method for distinguishing which psychopaths have a tendency to be violent and which psychopaths have tendency to be nonviolent.

Subtypes of Psychopathic Symptoms

The most recent trend in psychopathy research has been to determine how many unique but correlated factors can capture the construct of "psychopathy." Hare, and much subsequent research, support that there are simply two factors to the psychopathy construct: Factor 1, which reflects the personality characteristics typical of a psychopath; and Factor 2, which reflects the antisocial lifestyle that most psychopaths tend to lead (Hare, 1985). There have been some promising investigations into the ability of the PCL-R to distinguish among sexual and nonsexual offenders in relation to the two factors used

in scoring the PCL-R (Porter et al., 2000). Investigating the profiles of different types of sexual offenders, (i.e., molester, rapist, mixed), as well as the profiles of nonsexual offenders, Porter and his colleagues found significant differences that could be accurately measured using the PCL-R. For instance, the mixed group (those who had both raped and molested) scored significantly higher on both PCL-R factors than any other group. Rapists showed the same pattern to a lesser, but still significant, degree. There was also an interaction between factor scores and offender type (sexual vs. nonsexual). Sexual offenders scored higher on Factor 1 criteria and nonsexual offenders scored higher on Factor 2 criteria. In addition, some studies have indicated that Factor 1 scores on the PCL-R are better predictors of violent recidivism than Factor 2 scores or the combined factor scores (e.g., Serin, 1996). These initial studies have indicated that there may be utility in analyzing the factor scores individually, and that perhaps a unique profile of these factor scores may be differentially predictive of subtypes of psychopaths.

Further research into the factor structure of psychopathy has produced three, four, and even five-factor models of the construct (Cook & Michie, 2001; Skeem, Mulvey, & Grisso, 2003). Cook & Michie's Three-Factor Model (see Figure 1) divides the original PCL-R Factor 1 (emotional detachment) component into separate interpersonal (Arrogant and Deceitful Interpersonal Style), and affective (Deficient Emotional Experience). Another important modification was that they deleted almost half of the items from PCL-R Factor 2 (antisocial lifestyle) based on their own findings that the items were poor predictors of psychopathy. Cooke and Michie's Three-Factor Model was designed to put emphasis on the personality pathology rather than the nonspecific behaviors of a "socially deviant lifestyle" (2001). In multiple studies on different populations, including

Caucasians and African Americans, and forensic and nonforensic samples, the fit of Cook & Michie's model was found to fit the data significantly better than competing models (Cooke, Kosson, & Michie, 2001, Cooke & Michie, 1997; Cooke & Michie, 2001; Cooke, Michie, Hart, & Hare, 1999). Further validation studies have found that the de-emphasis on the socially deviant lifestyle reduces the Three-Factor model's ability to predict forensic psychiatric patient violence, but does model the construct of psychopathy in a more theoretically coherent manner (Skeem, Mulvey, & Grisso, 2003).

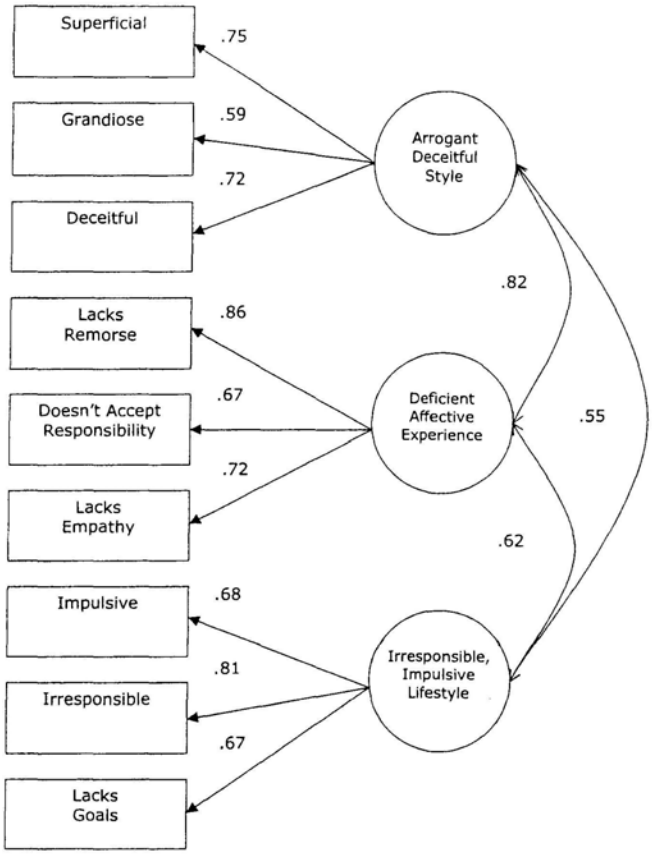

Figure 1: A simplified three-factor model of the Psychopathy Checklist: Screening Version. Cooke & Michie (2001); As published in Skeem, Mulvey & Grisso (2003).

The Construct of Schizotypy

Schizotypal Personality Disorder (SPD) as defined by the DSM-IV-TR (American Psychiatric Association, 2001), includes a pervasive pattern of social and interpersonal

deficits marked by a discomfort and reduced ability to form close relationships. In addition, cognitive or perceptual distortions, or eccentric behavior may be present. SPD is estimated to occur in approximately 3% of the general population. The DSM-IV-TR recognizes a higher incidence of SPD in families with Schizophrenia and other psychotic disorders.

However, the research literature reflects a significant debate over the classification of SPD. Some researchers believe that the symptoms of SPD are more consistent with the characteristics of an Axis I disorder than with an Axis II disorder (Kendler, 1985). Some aspects of SPD criteria are consistent with personality features, while others seem to be attenuated forms of psychotic symptoms. Furthermore, as with most personality disorders, there has been debate around the issue of dimensional (Eysenck, 1960) versus categorical classification of the disorder. Eysenck believed that clinical schizophrenia is actually the end point on a continuum of normal personality characteristics on a dimension he terms "psychoticism." He believed it possible that the psychoticism scale can represent both psychopathy and schizotypal characteristics because they fall on different parts of the psychoticism spectrum. Research on schizophrenia has historically investigated the “fuzzy” areas of the disorder, or rather those persons who exhibit schizophrenic-like symptoms but do not meet criteria for the disorder (Claridge, 1997). This had led to the development of a multitude of terms for describing this construct, including latent schizophrenia, schizoid, and schizotaxia (Blueler, 1911; Meehl, 1962; Rado, 1953). Meehl (1962) believed that schizophrenia was caused by an inherited neurological defect that he termed schizotaxia, which interacted with the environment to produce a personality configuration called the

schizotype. Although he thought that only about 10% of schizotypes went on to develop clinical schizophrenia, he developed a comprehensive list of schizotypic signs that could be used for clinical assessment and research (1962).

Current research on the wide spectrum of schizophrenic disorders is mostly conducted under the broad term of schizotypy (see Raine et al., 1995). This modern schizotypy research is based on the hypothesis that low-level schizotypic symptoms reflect an underlying predisposition to schizophrenia, which has had considerable empirical support (Ingraham, 1995). Two problems that still plague researchers are the definition of the schizophrenia spectrum itself (Levinson & Mowry, 1991), and the precise factors of schizotypy that relate to it. Torgersen, (1994) has found that just a few of personality-based factors are related to schizophrenia. However, Coid, (1992), found that schizotypal traits overlap considerably, as do the schizotypal, schizoid, and paranoid (or in other words, Cluster A) personality disorders listed in the DSM-IV.

Measurement of Schizotypy

There have been various attempts to measure the construct of schizotypy. Raine & Benishay (1995) developed the Schizotypal Personality Questionnaire, which was modeled on DSM-III-R (American Psychiatric Association, 1980) criteria for schizotypal personality disorder. Confirmatory Factor Analysis by the authors determined that the nine subscales of the Schizotypal Personality Questionnaire fit best with a three-factor model of schizotypy. Others, including Mason (1995), have compared different theories of schizotypy using Confirmatory Factor Analysis and tested two, three, and four-factor models. The two-factor result seemed to reflect the difference between positive and negative schizotypal symptoms, the three-factor model suggested another factor the

researchers called "cognitive disorganization/social anxiety," and the four factor model confirmed what Claridge et al. found: A model consisting of Introvertive Anhedonia, Impulsive Nonconformity, Cognitive Disorganization, and Unusual Experiences (1996). However, the trait of Introvertive Anhedonia was found to be the most separate factor of the four (consistent with previous confirmatory factor analyses (Bentall et al., 1989; Mason, 1995), only correlating with Cognitive Disorganization (1996). More recently, confirmatory factor analyses of the two, three, and four-factor models have been conducted on the SPQ (Wuthrich & Bates, 2006). These researchers found that by making three adjustments to Raine's (1991) three-factor model, they were able to construct a good-fitting three-factor model of schizotypy that included multiple measures of the schizotypal personality, including the Chapman scales discussed below.

The Chapmans and their colleagues have constructed their scales of hypothetical psychosis-proneness, which tap sub-clinical symptoms of schizotypy. This construction of measures was based on the notion that most "normal" people experience mild forms of psychotic experiences. The Chapmans sought to operationalize Meehl's (1962) schizotypic characteristics in order to identify people who may be at higher risk for developing clinical schizophrenia. The Chapmans used Jackson's (1970) method of rational scale development to construct their scales (Edell, 1995). In addition, they attempted to maximize scale homogeneity by increasing internal consistency reliability and minimizing response style in order to measure more long term personality traits rather than current mental state functioning (Edell, 1995). The Chapmans based their scale construction on the premise that the construct of schizotypy is multidimensional and multidetermined. This means that varying degrees of environmental and genetic factors

should be expected across the scales (Edell, 1995). Their scales, which include The Perceptual Aberration (PAb; Chapman et al., 1978) and The Magical Ideation Scale (MgI; Eckblad & Chapman, 1983) attempt to measure superstitions and other magical beliefs, as well as perceptual distortion and schizoid tendencies, but in ways that tap more common phenomena among the general population.

Hans Eysenck developed a fully dimensional model of psychoticism based on personality traits. Eysenck's measure of psychoticism, the P-Scale, was originally part of his PEN questionnaire which measured individual differences based on the three constructs of psychoticism, extraversion, and neuroticism (Eysenck & Eysenck, 1975). Eysenck describes a person who would score high on the P-scale as "cold, impersonal, hostile, lacking in sympathy, unfriendly, untrustful, odd, unemotional, unhelpful, antisocial, lacking in human feelings, inhumane, generally bloody-minded, lacking in insight, strange, with paranoid ideas that other people were against him" (1975). Eysenck considered schizophrenia the endpoint of the P-Scale, which is supposed to be a dimension of the normal personality. The P-Scale has been revised over the years because of a number of criticisms, including poor internal consistency and very low endorsement rates (Mason, Claridge, & Williams, 1997). Revising the scale fixed these problems, but these remedies shifted the content of the scales to measure more antisocial, impulsive, and socially nonconforming traits. Scale modification resulted in psychotics not scoring especially high on the scale (Bishop, 1977; Block, 1977; Davis, 1974; Zuckerman, 1991).

Raine (1987) administered the P-Scale to prisoners who were rated on each symptom of the DSM-III schizotypal personality disorder and he found no significant relationship between these ratings and P-Scale scores. Eysenck argued that although

antisocial personalities score high on the P-Scale, schizophrenics score the highest of all. He wrote in defense of the P-Scale that schizophrenics tend to dissemble on the scale, and he uses their high scores on the Lie Scale of the Minnesota Multiphasic Personality Inventory (MMPI) as evidence for this idea. He continued to argue that the P-Scale is a valid measure of their psychoticism (1992). He also continued to revise the P-Scale to address the psychometric criticisms, and its latest version is contained within the EPQ-R (Eysenck, Eysenck, & Barrett, 1985), for use in the current research.

Interaction and Overlap Between Psychopathy and Schizotypy

Interesting issues surround schizotypal personality disorder and its connection to violence. It has been found that those diagnosed with psychotic illness pose higher risk of harming others (Swanson et al., 1990) and acquiring a criminal conviction for violence (Wessley et al., 1993). However, the research into what specific symptoms of psychosis can be a predictor of violence is conflicting. Some researchers report a link between violence and individuals experiencing psychosis with persecutory delusions associated with passivity (Link & Stueve, 1994), while others have found no link between any type of delusions and overall risk of violence (Appelbaum, Robbins, & Monahan, 2000). In fact, Appelbaum et al., (2000), found that it was PCL scores, rather than symptoms of psychosis, that related to future violent behavior.

Others have found that there are not strong associations between specific symptoms of psychosis and violence (Bjorkly, 2002a, 2002b, Hersh & Borum, 1998). In a review of studies exploring the role of psychotic symptoms in triggering aggressive behavior, Bjorkly found no evidence to support the idea that hallucinations in and of themselves are associated with violence, although command hallucinations ordering

violence against others increases the risk (2002b). In addition, persecutory delusions, especially associated with emotional distress may increase the risk of aggressive behavior. Finally, he concluded that evidence for the combined effect of hallucinations and delusions on triggering aggressive behavior is inconclusive (2002a).

However, when psychopathy is added to the psychosis mix, there seems to be a significant increase in the probability of violence (Nolan et al., 1999; Tengstrom et al., 2000). These researchers postulate that violent patients with schizophrenia who also score high on psychopathy measures may have the personality disorder preceding the onset of psychotic symptoms, or that this population constitutes a new subtype of schizophrenia incorporating early conduct disorder symptoms and violent behavior patterns (Nolan et al., 1999). Interestingly, Dinn et al., found that psychopathy may actually distinguish subgroups of patients with schizotypal personality disorder (2002). They found that schizotypal subjects with many positive symptoms scored significantly higher on Eysenck's impulsivity and empathy subscales of the P-scale (Eysenck et al., 1985) than subjects with few positive symptoms. They also found that subjects with a many positive symptoms endorsed a higher number of antisocial personality characteristics on the Personality Diagnostic Questionnaire (PDQ-4; Hyler, 1994). A study using the International Classification of Diseases (ICD-10; World Health Organization, 1993) criteria for personality disorders confirmed that comorbid personality disorder is independently associated with an increased risk of violent behavior in psychosis (Dinn et al., 2002). Considering these findings, it would be important to be able to distinguish between psychosis-prone people who are psychopathic from those who are not. To

accomplish that distinction, self-report measures must be able to separate the core characteristics of psychoticism from the core characteristics of psychosis.

Measures of the traditional personality concept of psychoticism have been subject to criticism because of their specificity and criterion validity. These measures have overlapped with definitions of the above two constructs (Bishop, 1977; Block, 1977). In addition, there seem to be a number of biological and psychological connections between criminal behavior and the schizotypal spectrum of personality disorders that blur the boundaries between the disorders. Researchers have found that the majority or large minority of psychopaths show indicators of schizotaxia (Meehl, 1989). Siever et al., found that 19.2% of patients with schizotypal personality disorder are comorbid for antisocial personality disorder (1990), and that there are high rates of schizotypal personality disorder in juvenile delinquent populations (Serin, 1991). Clinical research strongly supports that those who show antisocial personality characteristics are prone to psychosis. In addition, those who show psychotic symptoms have consistently higher premorbid antisocial personality characteristics than such people in the general population (Chapman, Chapman, & Miller, 1982).

Some researchers have found that a sample of murderers could be separated into two subtypes: one defined by high psychosis proneness and low level of psychopathy; and one by low psychosis proneness and high level of psychopathy. Each group corresponded to distinct neuropsychological differences in intellectual abilities, learning disabilities, and social intelligence (Nestor, 2002) [Figure 2]. In addition, researchers have found that both disorders involve frontal lobe dysfunction and other similar

biologically-based correlates (Dinn & Harris, 2000; Lapierre et al., 1995; Raine et al., 2000; 2003).

Thus, research to date has indicated that there may be factorial overlap between schizotypy and psychopathy in the areas of impulsivity and social nonconformity. In order to capture and characterize this overlap, the Chapman Scale of Impulsive Nonconformity (INS; Chapman et. al., 1984) will be administered to the sample population. In addition, it could be possible that schizotypy and psychopathy overlap in the areas of physical and social anhedonia, for which the Chapman Revised Physical and Social Anhedonia Scale (RSA; Eckblad et al., 1982) will be utilized. Impulsivity will also be tapped by the Minnesota Multiphasic Personality Inventory - Second Edition: Scales 4, 8, and 9 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).

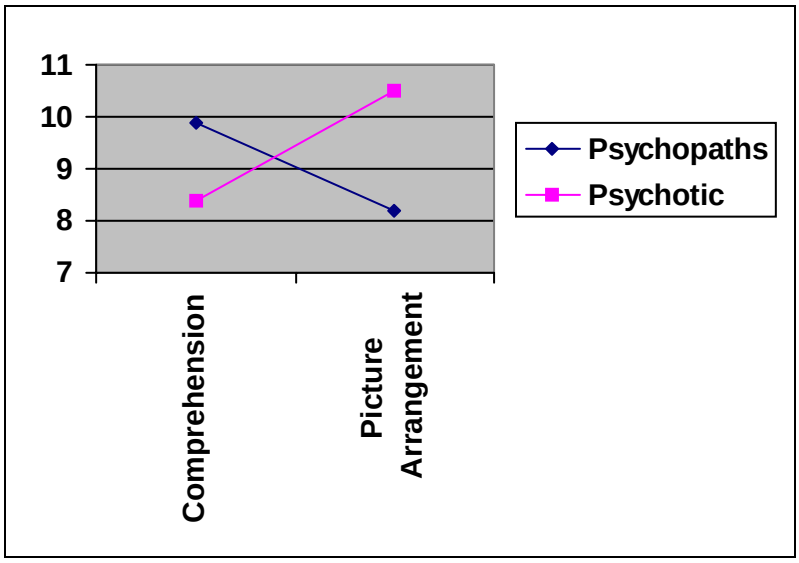

Figure 2: Nestor (2002)

Research to date has further indicated that the measurement of schizotypy captures aspects of the psychopathic personality. Eysenck believes that the construct of psychoticism can explain both schizotypy and psychopathy as being two different points

on a continuum. However, the current measurements that are used to identify schizotypy and psychopathy may overlapping in areas not centrally related to theoretical definitions of the “core features” of the two constructs. Factor analysis will help to determine whether or not this is the case and perhaps help to "clean up" these measurements so that their construct validity improves.

It could also be the case that the constructs of schizotypy and psychopathy overlap in their symptomology and the measurements are simply picking up this overlap in what amount to two constructs that are not really, empirically distinct. In order to know for sure, the factor structure of each construct must be investigated. This study will seek to separate the constructs of subclinical psychopathic and subclinical schizotypal characteristics by performing confirmatory factor analyses on different factor structures of both psychopathy and schizotypy using data from a college sample. The study will validate and provide evidence for existing structures of each construct, as well as seek to identify which of the factors overlap and may be confounding self-report measures of each construct.

Hypotheses

Hypothesis 1: Psychopathy Represents a Three-Factor Structure

The first hypothesis investigates the structure of psychopathy separate from schizotypy. The model tested in Hypothesis 1 postulates that psychopathy is a three-factor structure composed of Arrogant/Deceitful Style, Deficient Affective Experience, and Irresponsible, Impulsive Lifestyle (Cooke & Michie, 2001). See Figure 3.

Hypothesis 1a: Psychopathy Represents a Two-Factor Structure

The model tested in Hypothesis 1a postulates that psychopathy is a two-

factor structure composed of Affective/Interpersonal Deficits and an Antisocial Lifestyle (Hare, 1991). See Figure 4.

Hypothesis 2: Schizotypy Represents a Four-Factor Structure

The second hypothesis investigates schizotypy separately from psychopathy. The model tested in Hypothesis 2 postulates that schizotypy is a four-factor structure composed of Introvertive Anhedonia, Impulsive Nonconformity, Cognitive Disorganization, and Unusual Experiences (Claridge et. al., 1996). See Figure 5.

Hypothesis 2a: Schizotypy Represents a Three-Factor Structure

The model tested in Hypothesis 2a postulates that schizotypy is a three-factor structure composed of Cognitive/Perceptual Symptoms, Interpersonal Symptoms, and Disorganization as factors (Mason, 1995). See Figure 6.

Hypothesis 3: Psychopathy and Schizotypy will have Structural Overlap

The model tested in Hypothesis 3 postulates that psychopathy factors will overlap with schizotypal factors. Specifically, it is predicted that the schizotypic factors of Introvertive Anhedonia and Impulsive Nonconformity will overlap with the psychopathic factors of Affective/Interpersonal Deficits and Antisocial Lifestyle. The remaining factors are hypothesized to be distinct. Since it is hypothesized that Eysenck's P Scale taps into both schizotypy and psychopathy, the P Scale should show overlapping loadings on the latent variables associated with the two constructs.

The model constructed for Hypothesis 3 (See Figure 7) was based upon the findings in the previous two hypotheses. Specifically, since the two-factor model of psychopathy had better fit indices than the three-factor model, the latent variables in the two-factor model were used in the final model. In addition, an attempt was made to

construct and test a more comprehensive model with the additional schizotypy latent variables of Cognitive Disorganization and Unusual Perceptual Experiences, but this model could not be fir statistically using AMOS.

METHOD

Institutional Review Board Approval

Prior to collecting data, the principal investigator obtained approval from the Institutional Review Board (IRB) of The University of Montana. The purpose of the IRB is to ensure the scientific and ethical integrity of all research that is conducted under the purview of the University. Along with the application, a copy of the informed consent sheet was submitted to the board for approval.

Participants

Undergraduate psychology students at the University of Montana were administered the specified assessments in a pack of questionnaires during group testing sessions. Participation was voluntary and subjects received credit toward the completion of introductory psychology classes. Participants were asked to read and sign an informed consent that explained the purpose of the study along with any possible risks, along with the contact information of the principle investigator and faculty research supervisor. A copy of the informed consent was given to all participants. Subjects were at least 18 years of age. The sample of 266 participants consisted of 178 females and 88 males. The mean age of the sample was 20.7 years, with a range of 18-58 years. Eighty-six percent of the sample described themselves as Caucasian, 4% identified themselves as American Indian/Native American, 4% identified themselves as Asian/Asian American, and 3% identified themselves as Hispanic/Latino. The questionnaires were presented as a survey of attitudes and experiences. The questionnaires were divided into two halves: One half measuring subclinical psychopathic characteristics and one half measuring hypothetical psychosis-proneness. To combat the influence of possible fatigue and other order effects,

the measures were partially counterbalanced so that half of the sample completed the psychopathy measures first and half of the sample completed the psychosis-proneness measures first.

A research assistant first briefly explained the process of the administration to the participants, and then distributed the informed consent sheets. After collecting the signed informed consent from each participant, the research assistant allowed the subjects to complete the packet. Participants were instructed to complete the packet in order.

Sample Size

Computer simulation of Confirmatory Factor Analyses have revealed that problems such as a Heywood case (Heywood, 1931) are more likely to occur for models with only two indicators per factor and sample sizes of fewer than 100-150 cases (Kline, 1998). To avoid these problems, statisticians recommend at least three indicators per factor, and for researchers to determine sample sizes according to the ratio of subjects to model parameters. The recommended ratio is 10 subjects per parameter, although 20 subjects per parameter would be even more ideal (Kline, 1998). Because the preliminary factor structure representing the overlap between psychopathy and schizotypy had 27 parameters (See Figure 7), a sample size of 270 was set as a goal. The study had 325 total participants, although 59 were eliminated from subsequent analyses because of missing data in their questionnaires. There were no systematic differences between those participants eliminated and those retained in terms of gender, age, or ethnicity. The number of female participants was nearly twice that of male participants; however, this accurately reflects the gender difference in enrollment of undergraduate psychology classes.

Measures

In addition to the scales described below, participants filled out a 17-item Infrequency Scale modeled after Jackson (1970). The Infrequency Scale is a measure of invalid test taking response patterns and consists of items such as "On some mornings I didn't get up immediately when I awakened," or others that the general population tends to answer in the same direction. Subjects who answer 3 or more Infrequency Scale items in the nontypical direction are generally dropped from the study. This method has been used by Chapman, Chapman, & Miller as a successful screening measure (1982). However, no participant answered more than 2 of the Infrequency Scale items, so all participants were retained despite this screening measure.

The Measurement of Psychopathy

Self Report Psychopathy Scale *(SRP-III; Paulhus, Hemphill, & Hare, in press).* The original SRP was constructed by Hare, Harpur, and Hemphill (1989) and the scale consisted of 35 items. The SRP-II was an expansion of the SRP and consists of a 60-item self-report questionnaire that asks subjects to respond to items on a five-point scale (1=disagree strongly, 5=agree strongly). Hare reports a correlation of .54 between the SRP-II and the PCL-R in forensic populations (Hare, 1991). The *alpha* reliability for the total 60-item SRP-II has been reported to be .84 (Williams & Paulhus, 2004). The SRP-II has been shown to be predictive of a number of antisocial behaviors as well as correlating with other related personality attributes of psychopathy (Williams & Paulhus, 2004). Recently, Paulhus, Hemphill, and Hare (in press) created the SRP-III, which is a 44-item self-report questionnaire with the same scoring format as the SRP-II. The SRP-III was constructed with the intention of reflecting the original two-factor structure of

psychopathy in addition to two new "facets" that Hare believes are subsumed under the original two factors (Williams, Paulhus, & Hare, in press). The SRP-III has not been published or widely distributed among researchers, and thus does not have norms, reliability or validity statistics available.

The Comprehensive Misconduct Inventory *(CMI-58; Williams & Paulhus, 2004).* The CMI will be used as a measure of convergent validity for the SRP-III. Williams and Paulhus (2004) have developed a modified version that is shorter and more amenable to research with large non-clinical populations. The modified version consists of 58 self-report items referring to antisocial behaviors ranging from minor misbehaviors to felony crimes. Subjects will be asked to estimate how many times in the past five years they have committed each of the acts. Williams and Paulhus also included nine additional items that asked subjects to report various types of drug use. Previous factor analyses of the CMI-58 have indicated that the measure can be broken down into five main categories of delinquency: Minor Crime (e.g. shoplifting, plagiarism), Serious Crime (e.g. auto theft, violent or sexual assault), Bullying (e.g. physical bullying, ridiculing), Anti-Authority behavior (e.g. verbally assaulting parents, teachers, or other authorities, illegal parking) and Drug Abuse (e.g. public intoxication, abuse of substances) (Williams et al., 2001). The CMI-58 can be used to calculate an overall delinquency score by weighting the five factors equally. Research has indicated that CMI-58 scores are linked to psychopathy-related traits (Alexio & Norris, 2000; Frick, Cornell, Barry, Bodin, & Dane, 2003; Lynam, 1998).

Minnesota Multiphasic Personality Inventory - Second Edition: Scales 4, 8, and 9 *(MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).* The MMPI-2 is

currently the most widely used and researched objective personality inventory (Greene, 2000). Scale 4: Psychopathic Deviate (*Pd*) will be used to assess characteristics of psychopathy. Scale 8: Schizophrenia (*Sc*) will be used to assess schizophrenia-spectrum characteristics relevant to schizotypy. Scale 9: Hypomania (*Ma)* will be used to assess characteristics of behavioral or cognitive over-activity, including grandiosity, egocentricity, and irritability. Due to clerical errors, one item (#54) was left out of Scale 4.

Measurement of Schizotypy

Minnesota Multiphasic Personality Inventory - Second Edition: Scale 8 and 9 *(MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).* Scale 8 (Schizophrenia) consists of 78 items that assess a wide variety of content areas such as bizarre thought processes and peculiar perceptions, social alienation, poor relationships, difficulties in concentration and impulse control, and lack of meaningful interests. Scale 9 (Hypomania) consists of 46 items that assess content areas such as overactivity, grandiosity, egocentricity, and irritability (Greene, 2000). Because of clerical errors, one item (#38) was left out of Scale 8.

Schizotypal Personality Questionnaire - B *(SPQ-B; Raine & Benishay, 1995).* The SPQ-B is a 22-item, forced choice questionnaire. Scores range from 0 to 22. The SPQ-B is a brief, self-report screening instrument used to evaluate respondents for the presence of schizotypal personality features. A total score and three subscale scores can be obtained. The three subscales include measures of cognitive or perceptual distortions, interpersonal difficulties, and disorganization. The items in the SPQ-B correspond to DSM-IV diagnostic criteria for schizotypal personality disorder.

Eysenck's P-scale. The P-scale consists of 27 items that were created by Eysenck (1985). The scale was originally meant to measure the construct of general psychoticism, but over the years it has undergone a number of revisions that have readjusted the content of the scales (Eysenck & Eysenck, 1975; Eysenck et al., 1985). The first form of Eysenck's Personality Questionnaire (EPQ; Eysenck, 1975) was found to have poor internal consistency and low endorsement rates. Eysenck revised the EPQ to take care of these reliability issues, but subsequent analyses have found that the revision also shifted the content measured from general psychoticism to more antisocial traits (Mason, Claridge, & Williams, 1997). Zuckerman (1991) even hypothesized that the revision had turned the P-scale into more of a measure of psychopathy than of psychoticism. Chapman, Chapman, and Miller (1982) hypothesize that the Eysenk P-Scale identifies a kind of antisocial personality often foreshadowing the later development of psychosis. Although the construct of schizotypy has significant overlap with the DSM-IV-TR personality disorders (Widiger et al., 1993), the P-scale should be factor analyzed to see which items load on psychopathic characteristics, which load on psychotic characteristics, and which seem to overlap. Eysenck and Eysenck (1976) reported coefficient *alpha* reliability values ranging from .68 to .74. However, Chapman, Chapman, and Miller (1982) reported values of .52 for male college students and .58 for female college students. According to Chapman, Chapman, and Kwapil (1994), the research evidence overall strongly supports the idea that criminals, psychopaths, alcoholics, and drug addicts score substantially higher on the P-Scale than psychotics. Due to clerical errors, one item (#100) was left out of the P-Scale.

Chapman et al. scales of Hypothetical Psychosis-Proneness *(1985).* The Chapmans and their colleagues have constructed their scales based on the notion that most "normal" people experience mild forms of psychotic experiences. Many items on the Chapman scales are reused for each trait to increase reliability (Mason, Claridge, & Williams, 1997). However, since the Chapman items are often milder versions of symptom-identifying items, many of them rarely get endorsed in "normal populations." This has not stopped researchers from using these scales to try to identify a population at risk for SPD or other forms of psychoticism (Lenzenweger & Korfine, 1995).

Despite these measurement issues, evidence for the predictive validity of the scales has been quite impressive. Chapman et al. found that after a 10-year follow-up of a large cohort, PaB, MgI, and RSA scales, in various combinations, were good predictors of other major psychoses, as well as schizotypal symptoms and psychotic-like experiences, although they were not predictive of schizophrenia itself. In addition, the PAb and MgI scales given together have been shown to identify a deviant cohort of individuals among college students, who, when measured at a 25-month follow-up, were more likely than controls to have sought professional help for problems including depression, anxiety, interpersonal difficulties, and adjustment problems. They also found that this cohort continued to show higher rates of psychotic and schizotypal symptoms, and were more likely to use street drugs. At the time of this follow-up, 10% of the Pab/MgI group had symptoms severe enough to be rated psychotic, while 0% of the control group could be rated similarly (Chapman & Chapman, 1980).

The Perceptual Aberration *(PAb; Chapman et al., 1978).* The PAb is a 35-item questionnaire, of which 28 items measure transient bodily aberrations and 7 items

measure other perceptual distortions. Some items include: “Occasionally it has seemed as if my body had taken on the appearance of another person’s body” (true), “My hands and feet have never seemed far away” (false), and “My hearing is sometimes so sensitive that ordinary sounds become uncomfortable” (true). Coefficient *alpha* was found to be .88 for male college students and .90 for female college students.

The Revised Social Anhedonia Scale *(RSA; Eckblad, Chapman, Chapman, & Mishlove, 1982).* The RSA, a 61-item questionnaire, is based on the original Physical Anhedonia Scale (Chapman et. al, 1978) that measures schizoid indifference and decreased ability to feel pleasure in social contexts. Some items include: “A car ride is much more enjoyable if someone is with me” (false), and “I attach very little importance to having close friends” (true). The coefficient *alpha* was .83 for male college students and .78 for female college students.

The Magical Ideation Scale *(MgI; Eckblad & Chapman, 1983).* The MgI is a 30-item questionnaire measures superstitions and other magical beliefs, including belief in forms of causality that are not culturally accepted to be valid. Some items include: “Good luck charms don’t work” (false), “Some people can make me aware of them just by thinking about me” (true). Coefficient *alpha* was found to be .82 for college males and .85 for college females. The correlation of the MgI to the PAb is about .70.

The Impulsive Nonconformity Scale *(INS; Chapman et. al., 1984).* The INS is a 51-item questionnaire that measures antisocial personality characteristics such as a lack of conscience, a lack of self-control, and a tendency to act impulsively. Some items include: “I usually control my feelings well” (false), “When I start out in the evening I seldom know what I’ll end up doing” (true), and “I break rules just for the hell of it”

(true). The coefficient *alpha* was found to be .84 for male college students and .83 for female college students.

Analyses

Descriptive statistics, as well as internal consistency reliability (coefficient *alpha*) were computed for all measures. A correlation matrix was computed and used as the basis for subsequent analyses. Participants with missing data on any relevant measure were dropped from the study at this point.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analyses were conducted using the AMOS computer modeling program to test each hypothesis. A CFA is a statistical method of formal model testing requiring that models be developed on *a priori* grounds. Using this statistical analysis requires a better understanding of the relationships that are likely to emerge. First, one specifies the number and type of factors and then using the data set asks the AMOS algorithm to calculate the probability of relationships between those factors. Goodness-of-fit indices, usually chi-square statistics and the normed-fit index (NFI; Bentler & Bonett, 1980), which can vary from 0, which reflects a complete absence of fit, to 1, which reflects a perfect fit, show the degree to which the predicted and actual results diverge (Mason, Claridge, & Williams, 1997). The χ^2 test is sometimes considered to be overly strict because the test is highly sensitive to sample size and non-normality (Byrne, 1998). Thus, other widely accepted fit indices including the root mean square error of approximation (RMSEA; Steiger & Lind, 1980), the goodness-of-fit index (GFI; Bentler & Bonett, 1980), and the Adjusted Goodness-of-Fit index (AGFI), which adjusts for the number of parameters estimated by the model, will be considered when judging overall

model fit. A CFA allows one to explore different structures of a theoretical construct, as well as compare models developed from competing theories of that construct.

In order to determine if and how the constructs of psychosis-proneness and psychopathy overlap, two models of psychopathy and two models of schizotypy were compared using CFA's. The model that was best supported by the data was used to form the conceptual basis for the model from hypothesis 3, which suggests that the two constructs overlap.

RESULTS

Group Differences

Possible gender differences were examined using *t*-tests, and no significant differences were found between males and females for any measure administered.

Internal Consistency

Internal consistency statistics were computed for all scales used in the study. While the internal consistency were low, especially the P-Scale, the majority of *alpha* reliabilities for the scales were acceptable. Please refer to Table 1 for a complete summary of the *alpha* reliabilities for each subscale. All *alphas* are computed only for cases with no missing items, except for the MMPI-2 Schizophrenia Scale, the MMPI-2 Hypomania Scale, and the Chapman Impulsive Nonconformity scale, where item mean substitution was used with missing item data. Item mean substitution is utilized because all subjects left blank at least one item for these scales.

Confirmatory Factor Analyses

Hypothesis 1: Psychopathy is a Three-Factor Structure

The χ^2 test did not suggest a good fitting model, χ^2 [24] = 303.40, $p < .001$. The other fit indices also suggested a poor fitting model, GFI = .782, AGFI = .592, NFI = .695, RMSEA = .210. The parameter estimates for the factor loadings are shown in Figure 8. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The correlations among the factors were extremely high, approaching 1 in the case of Arrogant Deceitful Style and Irresponsible Impulsive Lifestyle. Based on prior research, these correlations are significantly higher than expected and most likely reflect a poor fitting model.

Because the models tested in this study were constructed based on theoretical conceptualizations of the constructs of psychopathy and schizotypy, theoretical considerations were taken into account over statistical specification searches when it came to refining the models. After reviewing the item content on the CMI-58 Anti-Authority Misbehavior Scale, it was replaced with the CMI-58 Bullying/Harassing Scale. Items on the Anti-Authority Misbehavior Scale included the number of times per month the subject "parked in illegal parking spot" or "downloaded illegal music." Alternatively, items on the Bullying/Harassing subscale included the number of times per month the person would "say cruel things to others" and "ridicule someone who is helpless." The latter items seem to be more related to the factor of "Arrogant/Deceitful Style" than the former items since they focus more directly on personality-related interpersonal behaviors. Indeed, replacing this scale resulted in improved fit statistics for the model (χ^2 [17] = 239.0, $p < .001$, GFI = .840, AFGI = .700, NFI = .720, RMSEA = .184).

In addition, a literature review revealed that Scale 4 of the MMPI-2, although named the Psychopathic Deviate Scale (Pd), has an undetermined relationship to current conceptualizations of psychopathy (Lilienfeld, 1999). Specifically, the Pd scale seems to capture features of depression and anxiety (Graham, 2000), that are incompatible with the essential characteristics of a psychopath (Williams, Paulhus, & Hare, in press). Given the questionable validity of the scale, it was removed from the model and the fit indices slightly improved (χ^2 [17] = 210.6, $p < .001$, GFI = .841, AGFI = .663, NFI .729, RMSEA = .207).

Finally, because Cooke and Michie dropped the antisocial behavior items from their confirmatory factor analyses in which a three-factor model was shown to have the

best fit (2001), the Antisocial Behavior subscale of the SRP-III was deleted from the model. This deletion resulted in improved fit statistics (χ^2 [17] = 140.5, $p < .001$, GFI = .881, NFI = .762, RMSEA = .211).

The parameter estimates for the factor loadings for the specification model are shown in Figure 9. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The correlations among the factors continued to be higher than expected, and again, probably reflect a poor fitting model.

Note that this model cannot confirm nor disconfirm Cooke & Michie's (2001) model because the model being tested includes different latent variables than Cooke & Michie's model.

Hypothesis 1a: Psychopathy is a Two-Factor Structure

The fit for this model was poor (χ^2 [19] = 149.8, $p < .001$, GFI = .880, AGFI = .772, NFI = .794, RMSEA = .121), but fit significantly better than the three-factor model. The parameter estimates for the factor loadings are shown in Figure 10. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The values were generally high, ranging from .47 to .79 with an average of .64. The correlation among the factors was .79, which was higher than expected based on previous research (Williams & Paulhus, 2001).

Using the same theoretical justifications for the specification search in Hypothesis 1, the CMI-58 Anti-Authority scale was replaced with the CMI-58 Bullying/Harassing subscale, the MMPI-2 Scale 4 was deleted, as was the Antisocial Behavior subscale of the SRP-III. These steps led to improved fit statistics for the model (χ^2 [8] = 53.44, $p < .001$, GFI = .942, AGFI = .847, NFI = .887, RMSEA = .146).

The parameter estimates for the factor loadings on the specification model are shown in Figure 11. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The values were generally high, ranging from .48 to .84 with an average of .66. The correlation among the factors was .79, which was higher than expected based on previous research (Williams & Paulhus, 2001).

Hypothesis 2: Schizotypy is a Four-Factor Structure

The four-factor model of schizotypy did not fit the data very well, (χ^2 [73] = 413.9, $p < .001$, GFI = .827, AGFI = .751, NFI = .785, RMSEA = .133). The parameter estimates for the factor loadings are shown in Figure 12. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The correlations among the factors were again, much higher than expected and approached one in some instances. In addition, the correlation between Introvertive Anhedonia and Cognitive Disorganization was negative, contrary to prior research findings. These results are most likely due to the poor fit of the model.

Hypothesis 2a: Schizotypy is a Three-Factor Structure

The χ^2 test suggested a model approaching good fit, χ^2 [24] = 88.9, $p < .001$. The other goodness-of-fit indices also indicated that the model is approaching acceptable fit statistics (GFI = .931, AGFI = .872, NFI = .908, RMSEA = .101). The parameter estimates for the factor loadings are shown in Figure 13. Each of the parameter estimates were statistically significant (i.e., $t > \pm 1.96$). The correlations among the factors were closer to those found in prior research (Claridge et. al., 1996). These results are most likely due to the fact that the subscales of a single measure, the SPQ-B, were used as the

indicator variables, which increases the probability that the indicator variables are correlated highly enough to produce acceptable fit statistics.

Hypothesis 3: Psychopathy and Schizotypy will have Structural Overlap

The χ^2 test suggested a poor fitting model (χ^2 [63] = 472.3, $p < .001$, GFI = .802, AGFI = .715, NFI = .657, RMSEA = .157). The parameter estimates for the factor loadings are shown in Figure 14. Each of the parameter estimates was statistically significant (i.e., $t > \pm 1.96$). The correlation between the psychopathic factor of Affective/Interpersonal Deficits and the schizotypic factor of Introvertive Anhedonia are correlated .31, which indicates that the factors are similar but certainly do not describe the same construct.

The correlation between the psychopathic factor of Antisocial Lifestyle and the schizotypic factor of Impulsive Nonconformity was .68, indicating that the two factors have moderate overlap in their factor structure.

As noted, attempts were made to fit a more inclusive model, but these models could not be fit successfully.

DISCUSSION

Psychopathy is an important construct for psychologists to understand not only for assessment and therapeutic purposes, but also because of the vast impact it seems to have on society. For example, as discussed above, people who score high on psychopathy measures typically begin committing crimes at an earlier age, commit a wider variety of crimes, perpetrate a higher degree of violence, reoffend more quickly, violate parole sooner, and commit more institutional violence than nonpsychopathic offenders (Cornell et al., 1996; Hare & McPherson, 1984; Porter et al., 2000; Serin, 1991).

Similarly, schizotypy is an important construct because of its unique relationship with schizophrenia-spectrum disorders. It would be very clinically useful if psychologists could identify those who are at a higher risk of developing schizophrenia, and the study of psychosis-proneness has found evidence that those low-level schizotypic symptoms reflect an underlying predisposition to schizophrenia (Ingraham, 1995).

Psychopathy and schizotypy together are important and seem to overlap somewhat in their constructs. Self-report measures of these psychopathy and schizotypy should be analyzed to see which factors of each construct they are measuring. To identify those persons who are at highest risk for dangerous behavior and those at highest risk for developing psychotic symptoms, precise knowledge of self-report measures' construct validity must be confirmed.

This study takes one step towards clarifying the constructs of psychopathy and schizotypy by using CFA to examine the factor structure of a number of widely used measuring instruments. The results indicate that in this sample psychopathy is best modeled by the two- factor model suggested by Hare (1991).

Limitations of the Psychopathy Models

Concluding that this study supports the two-factor structure of psychopathy is problematic for a few reasons. First of all, none of the psychopathy models achieved acceptable fit statistics, even after theoretical specification searches were carried out. Second, the SRP-III has just been reconstructed and the reliability and validity statistics have yet to show that the SRP-III is accurately measuring the construct of psychopathy (Williams, personal communication). This may have reduced the overall fit of both psychopathy models. Third, because the P-Scale has been shown to capture facets of both psychopathy and schizotypy, including it in the models may have reduced specificity and thus the overall fit of the models. Fourth, because the SRP-III was used instead of the SRP-II, the number of subscales available to use as indicators was reduced, leaving two factors in the three-factor model with just two indicator variables. Kline (1998) noted that errors are more likely to occur in CFA's that include only two indicator variables for one factor. Fifth, the factors involved in the psychopathy models were highly correlated with each other, indicating that the measures used to identify each factor may not have been able to distinguish accurately between the factors such as Antisocial Lifestyle and Callous Affect. Finally, this study did not test a four-factor model of psychopathy, which recent studies have shown to be a more coherent, comprehensive, and predictive model of psychopathy (Williams, Paulhus, & Hare, in press). Hare has recently taken more interest in expanding Cooke and Michie's (2001) three-factor model by re-including the antisocial behavior items that they removed from their analysis. Thus, he believes that a four-factor model will build off the empirical success of the three-factor model while still

being theoretically tied to the current conceptualization of psychopathy, of which antisocial behavior is an important component (Williams, Paulhus, & Hare, in press).

Schizotypy Models

For its part, schizotypy appears best modeled by a three-factor structure in this particular sample. However, this finding is contrary to the majority of factor analytic research on schizotypy, which suggests that the four-factor model more accurately describes the construct (Claridge, et. al., 1996). More recent research seems to indicate that slightly modifying the three-factor structure of schizotypy produces a model fit superior to the four-factor model (Wuthrich & Bates, 2006). One reason that the three-factor model showed better fit statistics could be because only one measure's subscales were used as indicator variables. This particular measure, the SPQ-B, has had its factor structure investigated and confirmed a number of times (Claridge et. al., 1996, Raine & Benishay, 1995). In addition, the SPQ-B does not address symptoms of Introvertive Anhedonia in its item content, which could have reduced the overall fit of the four-factor model. Since the construct of Introvertive Anhedonia is more theoretically similar to the psychopathic construct of Affective/Interpersonal deficits than the three-factor schizotypic construct of Interpersonal Symptoms based on the SPQ-B item content, Introvertive Anhedonia was used as one of the schizotypic factors in the final model. Likewise, the schizotypic factor of Impulsive Nonconformity is more theoretically similar to the psychopathic factor of Antisocial Lifestyle than the three-factor schizotypic construct of Disorganization, and so Impulsive Nonconformity was used in the final model.

Limitations of the Schizotypy Models

The factors of Disorganization and Cognitive/Perceptual symptoms in the three-factor model were highly correlated with a correlation coefficient of .81, which was higher than expected from previous research (Claridge et. al., 1996). The four-factor model produced a number of very high correlations between factors, and also one negative correlation between the factors of Introvertive Anhedonia and Cognitive Disorganization. These findings are contrary to previous research (Claridge et. al., 1996) and contribute to the poor fit of the models.

The Integrated Model

The final model tested was a model with two psychopathy and two schizotypy latent variables. It fit the data poorly, but some conclusions can still be drawn from the results. Examination of fit indices indicated that the psychopathic factor of Affective/Interpersonal Deficits and the schizotypic factor of Introvertive Anhedonia are somewhat related but mainly distinct factors. This result makes sense because indicator variables related to Introvertive Anhedonia measure symptoms of social anxiety, which is inconsistent with current conceptualizations of psychopathy (Williams, Paulhus, & Hare, in press). In addition, it is quite possible that psychopaths do not experience social and physical anhedonia and instead experience pleasure from their impulsive and manipulative lifestyle. In other words, having a callous affect appears to not be the same as having constricted affect. Indeed, some descriptions of the psychopath emphasize the pleasure they get from their antisocial and manipulative social activities (Hare, 1991). However, the psychopathic factor of Antisocial Lifestyle was highly correlated with the schizotypic factor of Impulsive Nonconformity, suggesting that the constructs of

psychopathy and schizotypy may overlap in this area. This result makes sense because the indicator variables for the two factors attempt to measure similar symptoms, such as impulsivity and rejection of social norms. The previous research findings that the P-Scale of Eysenck's PEN Questionnaire captures more antisocial personality characteristics than psychosis-proneness personality characteristics could arise from the similar nature of the psychopath's and schizotype's impulsive tendencies. This overlap might also explain why those who have comorbid symptoms of schizotypy and psychopathy have an increased risk of (Dinn et al., 2002).

Eysenck's P-scale, long controversial, seems best a measure of the schizotypal construct of Impulsive Nonconformity and the psychopathic factor of Antisocial Lifestyle. Rather than being able to measure psychosis-proneness or the cognitive (thought disorder) and affective (flat affect) aspects of schizotypy, it seems that the P-Scale would be better utilized as a general measure of impulsivity and antisocial tendencies.

This research suggests a number of modifications in how we think about psychopathy and schizotypy. The recognition that these two disorders have some overlapping symptoms in terms of impulsivity and rejection of social norms should be of interest to diagnosticians and clinicians. This overlap does not seem to be an artifact of measurement but instead an accurate depiction of some shared symptomology between the two disorders. However, the two disorders are distinct in the majority of their core features, which seems to contradict Eysenck's (1992) claim that the two disorders lie along the same dimensional spectrum.

Future Research Directions

Measurement of these constructs could probably be improved by continued research into the reliability and validity of the SRP-III and continued revision of the P-Scale in order to accurately assess psychosis-proneness. De-emphasizing impulsivity and antisocial behavior on the P-Scale may improve its ability to assess psychosis-proneness. Research on the SRP-III needs to be expanded to incarcerated, clinical, and civil psychiatric samples to confirm its construct validity.

These findings could have implications for diagnosis and treatment of these important populations, and for the design of both mental health and correctional programs. In the case of psychopathy, a clear and empirically supported factor-structure will help to ensure that correct diagnosis of a disorder that comes along with many stigmas, civil liberties implications, and fewer treatment options. In the case of schizotypy, a clear and empirically supported factor-structure will assist those attempting to assess psychosis-proneness by helping to reduce confounds in frequently used self-report measures.

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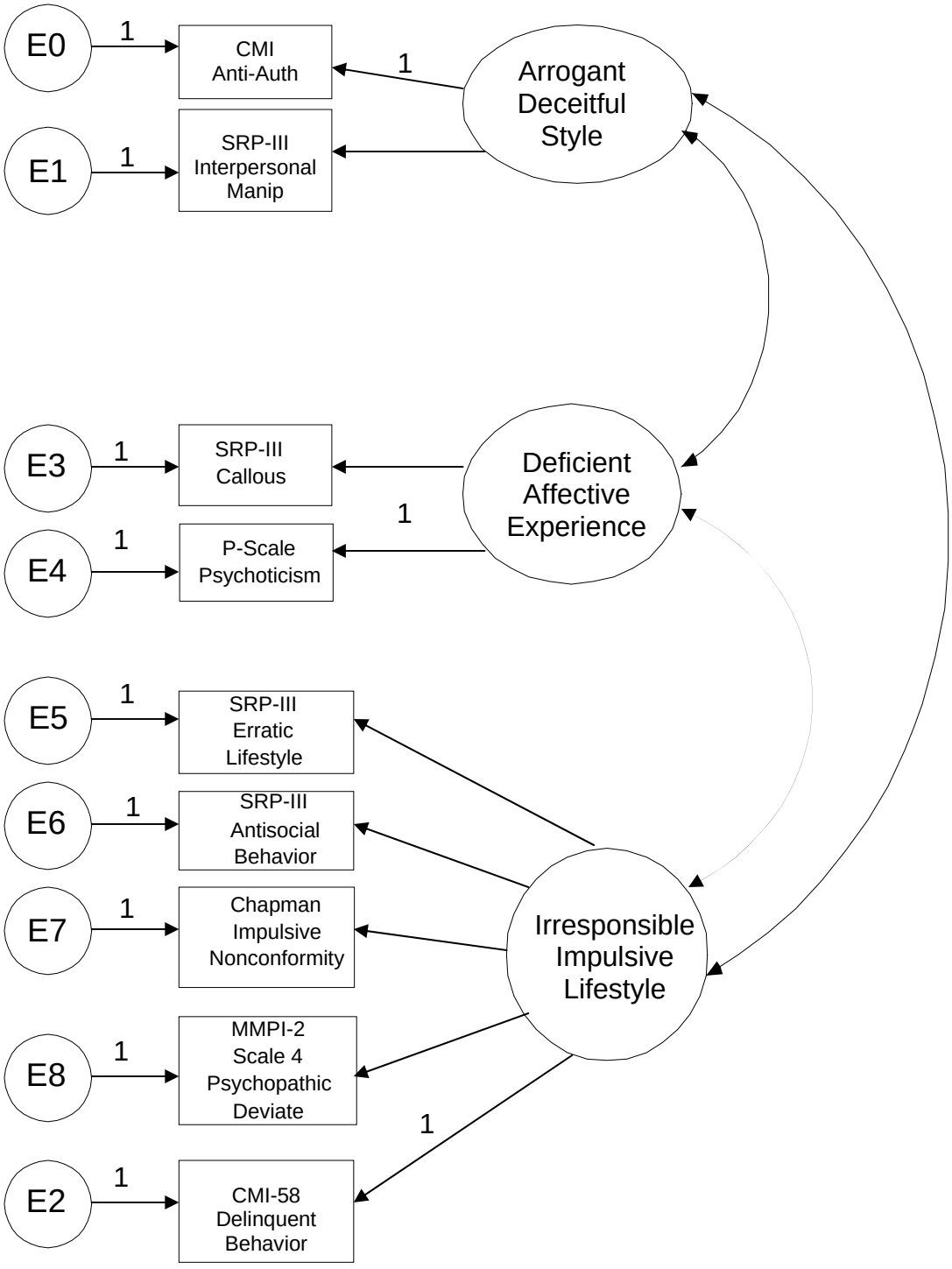
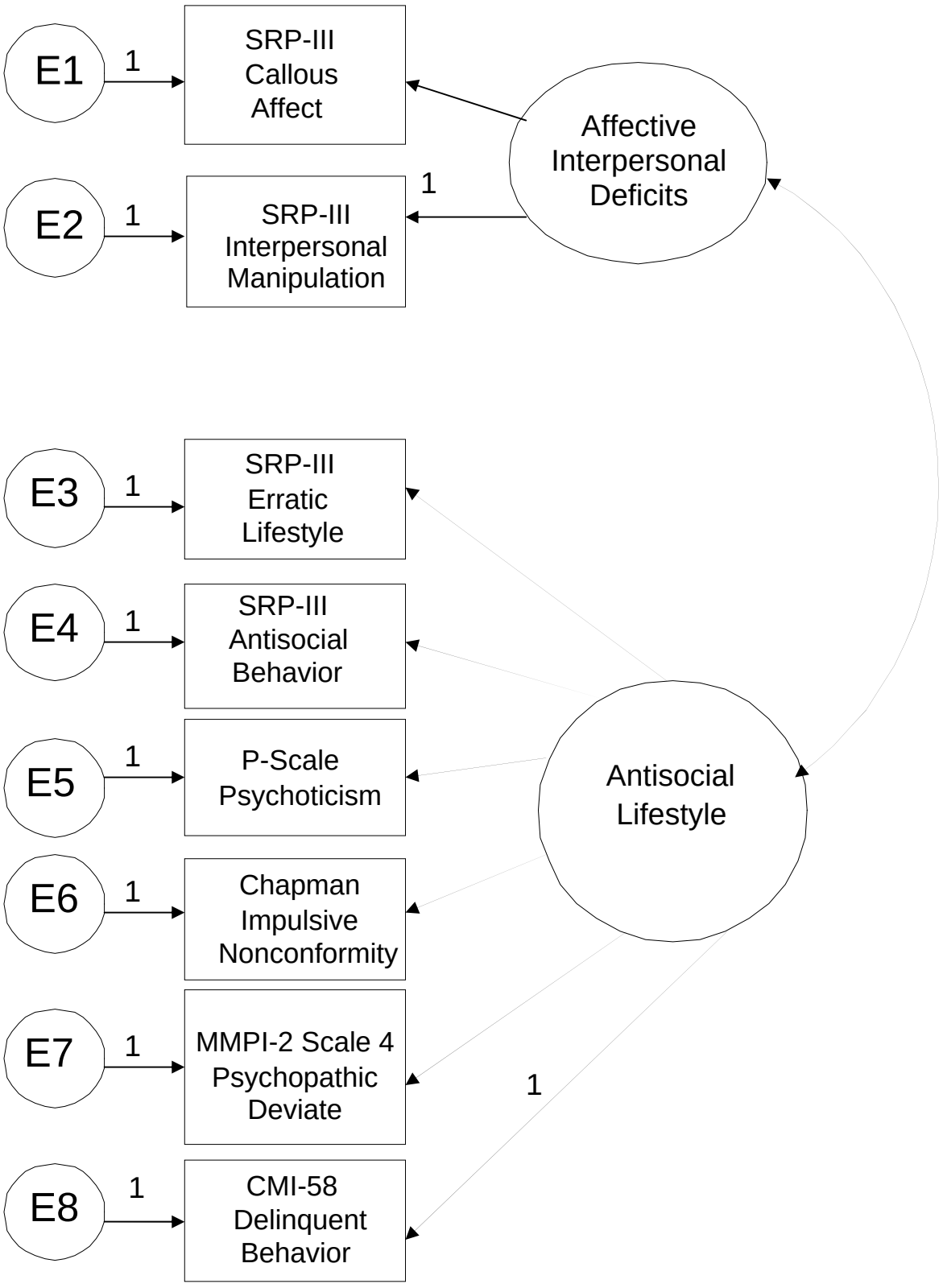
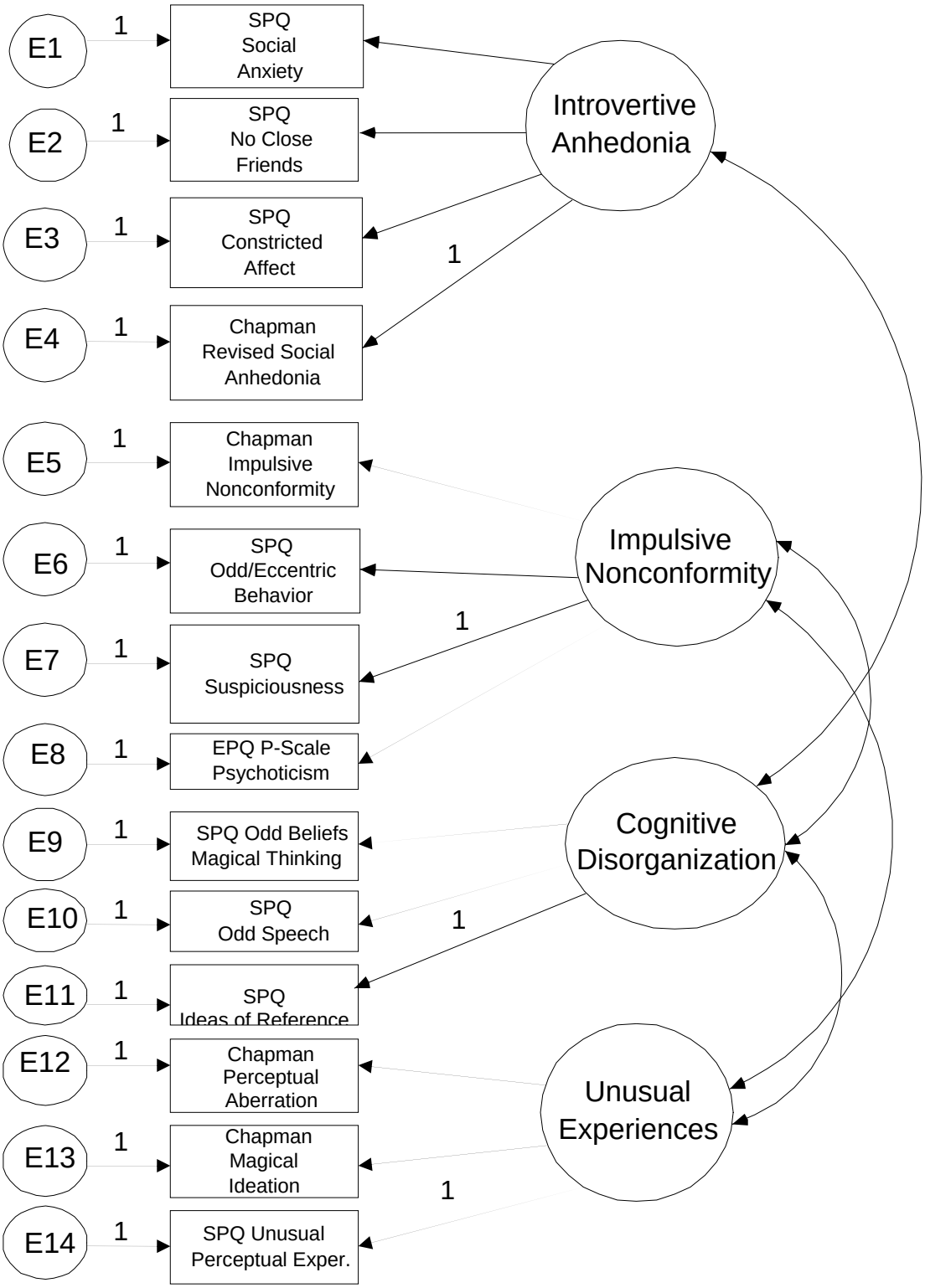
APPENDIX A
Figure 3: Hypothesis 1



APPENDIX B
Figure 4: Hypothesis 1a

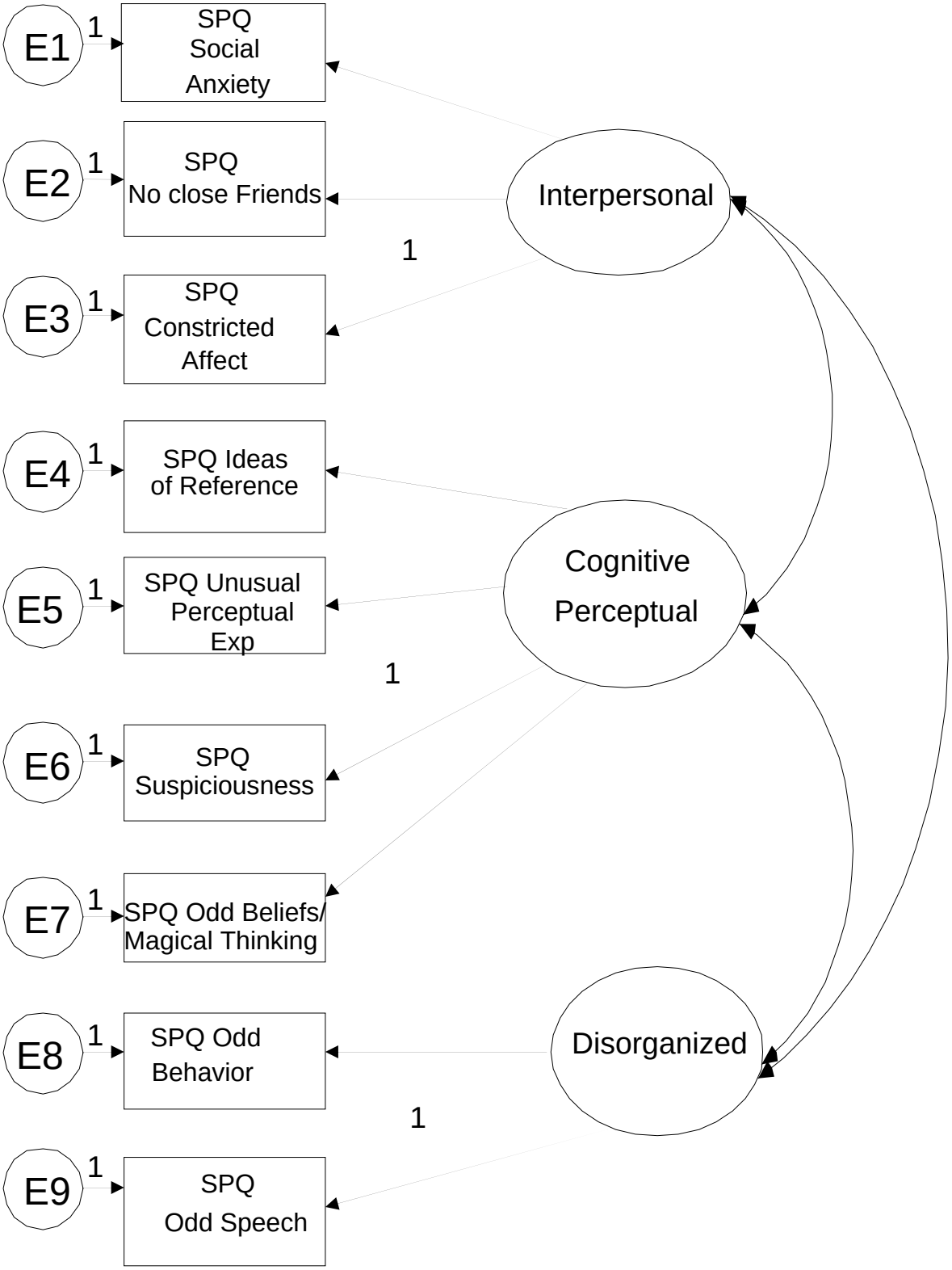


APPENDIX C
Figure 5: Hypothesis 2



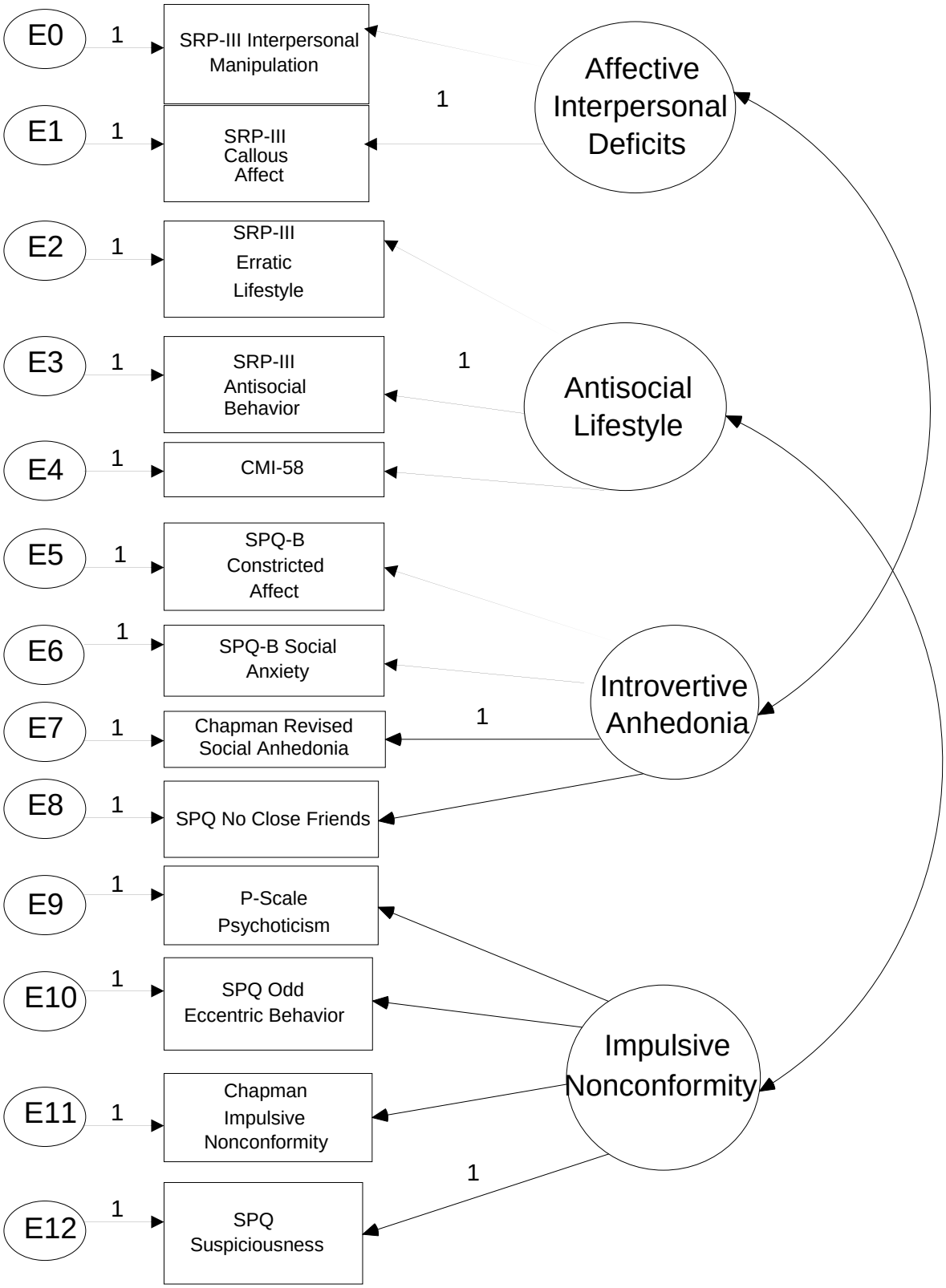
APPENDIX D

Figure 6: Hypothesis 2a



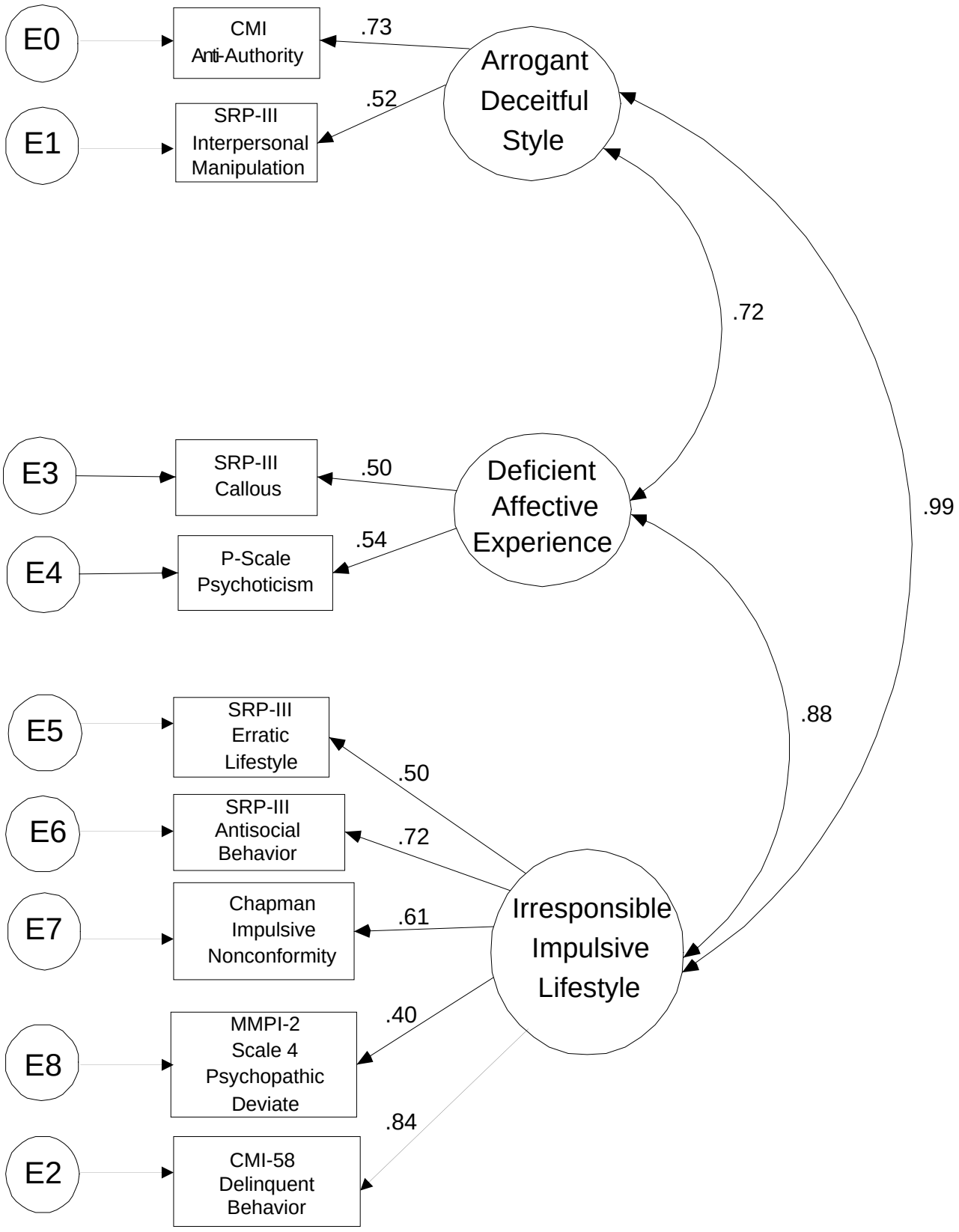
APPENDIX E

Figure 7: Hypothesis 3



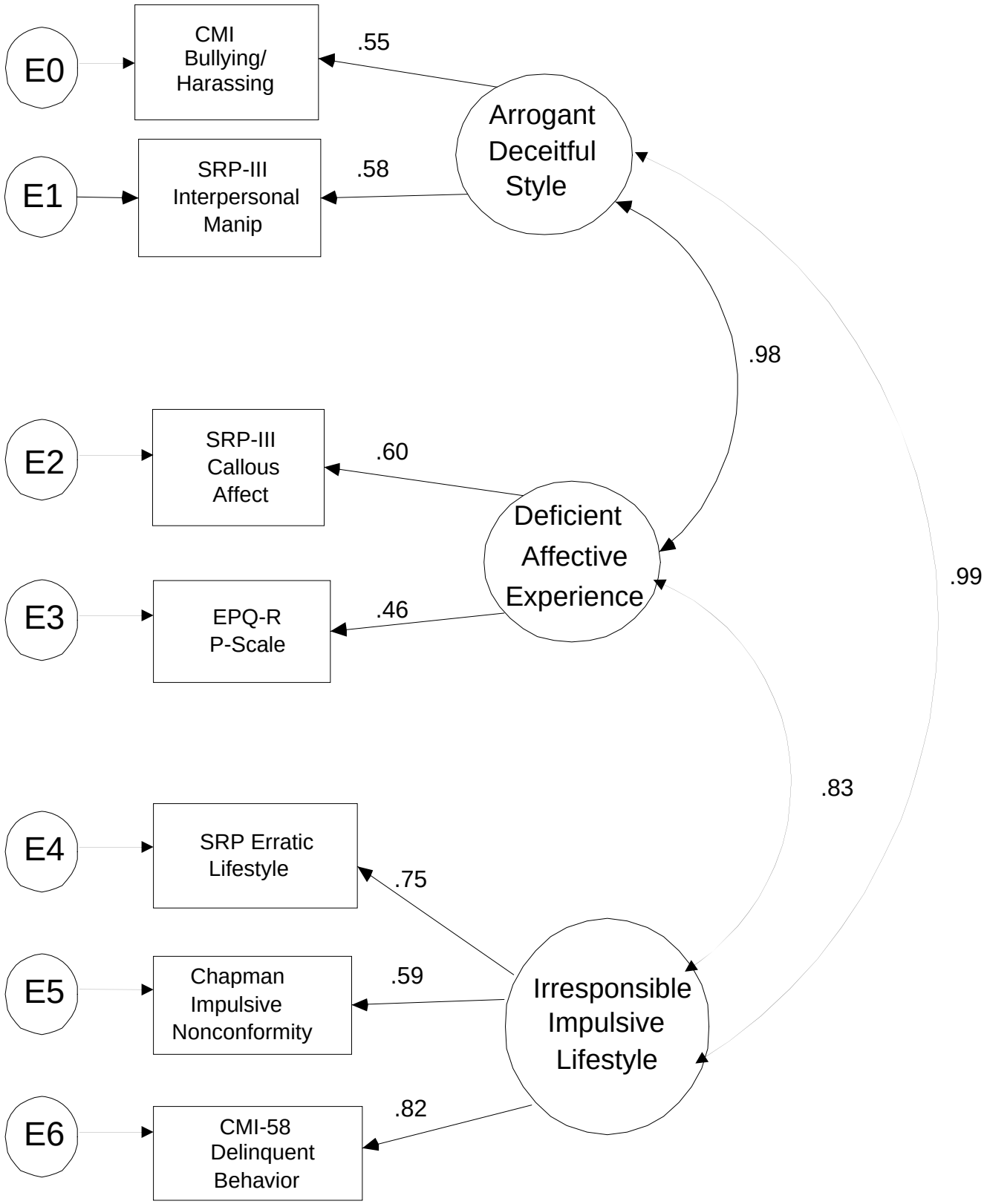
APPENDIX F

Figure 8: Hypothesis 1 Factor Loadings



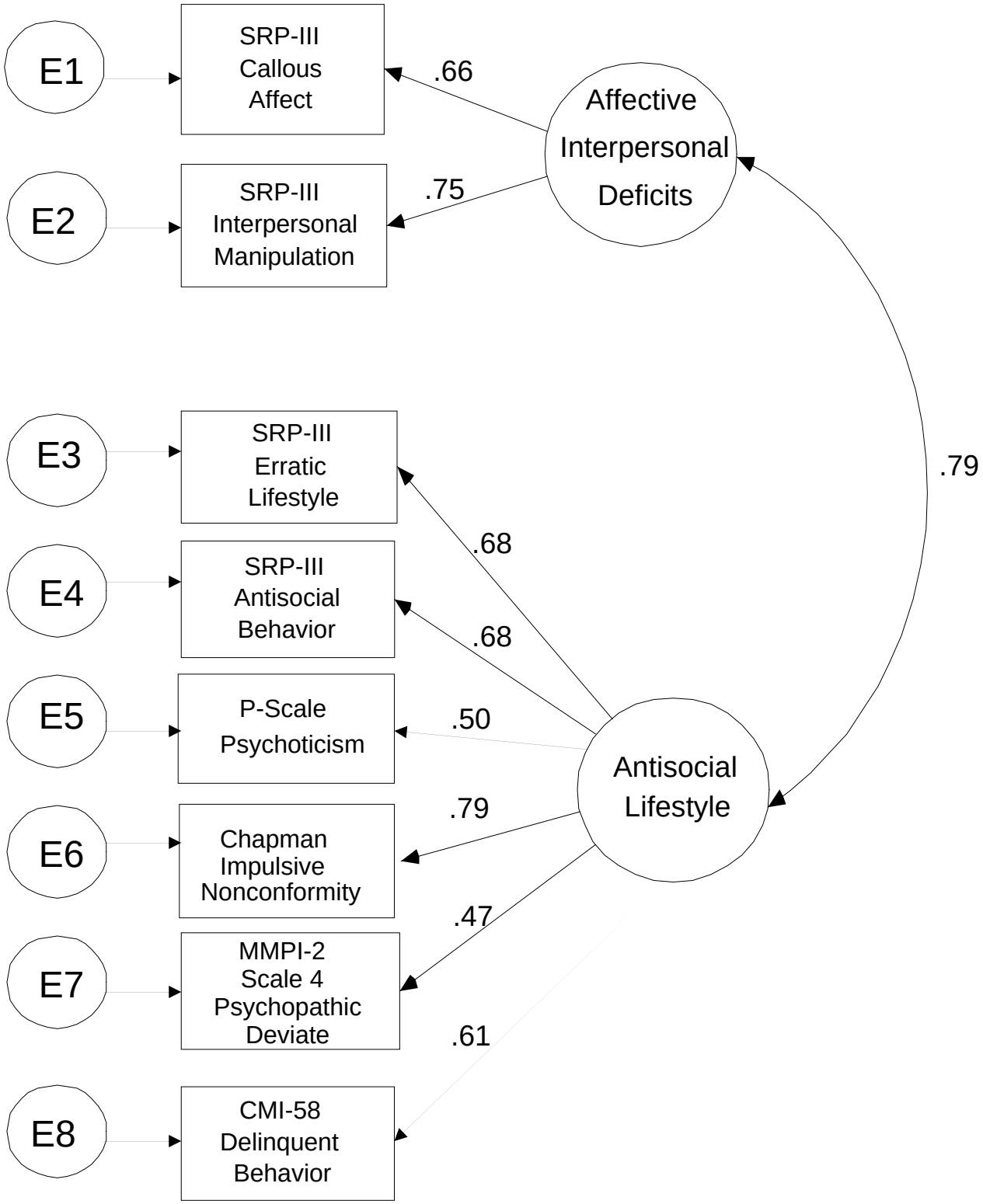
APPENDIX G

Figure 9: Hypothesis 1 Specification Search Factor Loadings



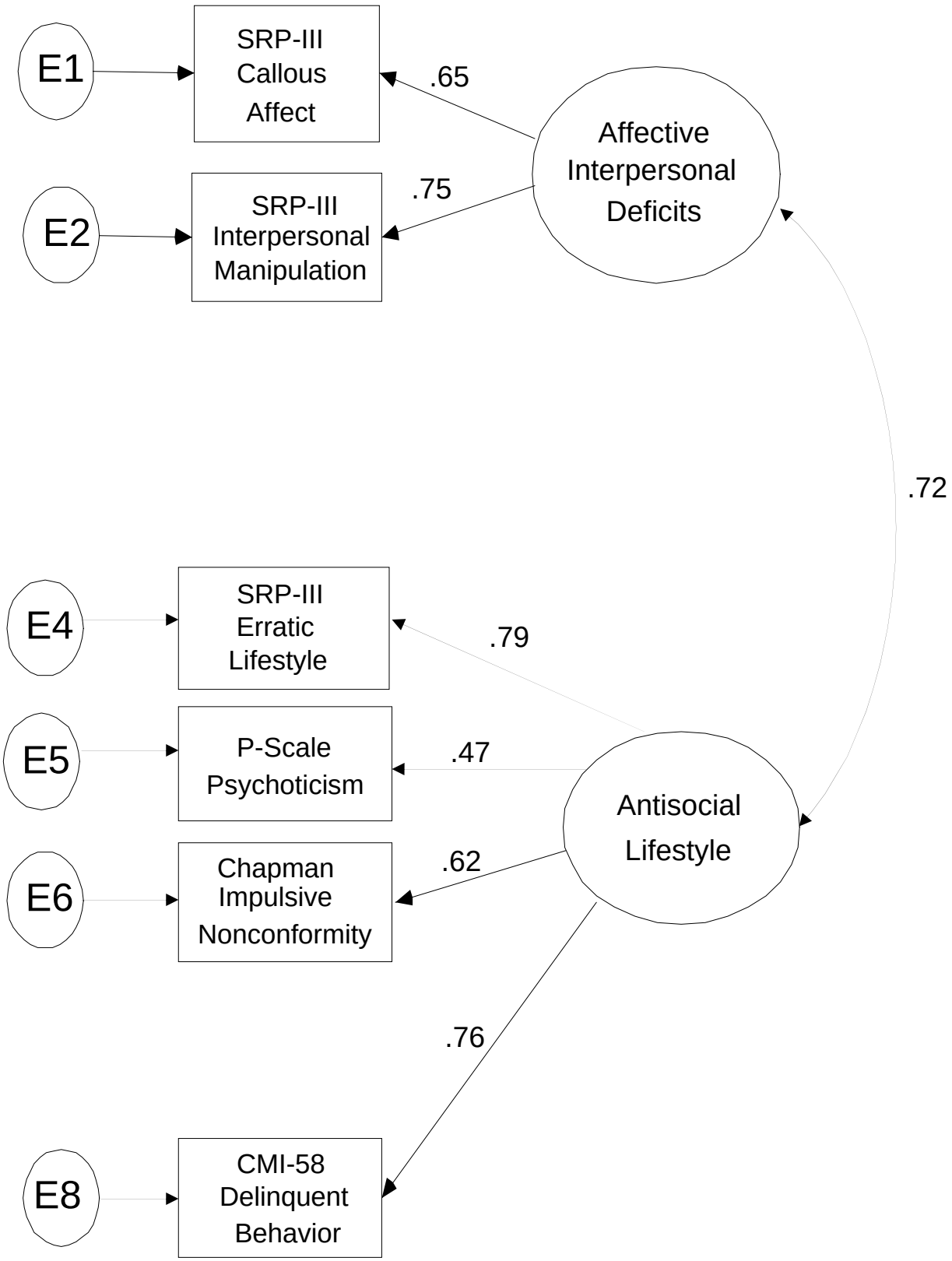
APPENDIX H

Figure 10: Hypothesis 1a Factor Loadings



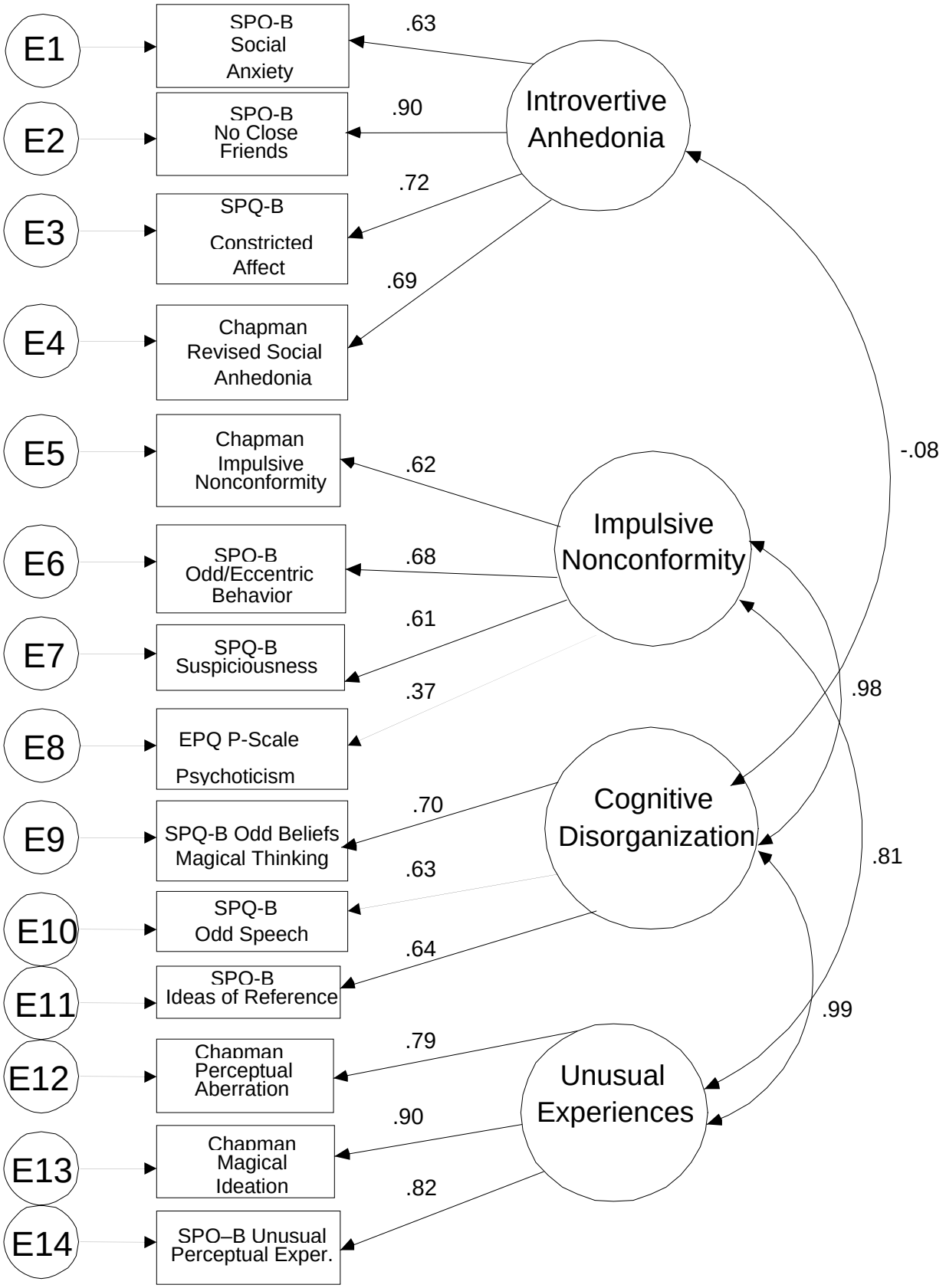
APPENDIX I

Figure 11: Hypothesis 1a Specification Search Factor Loadings



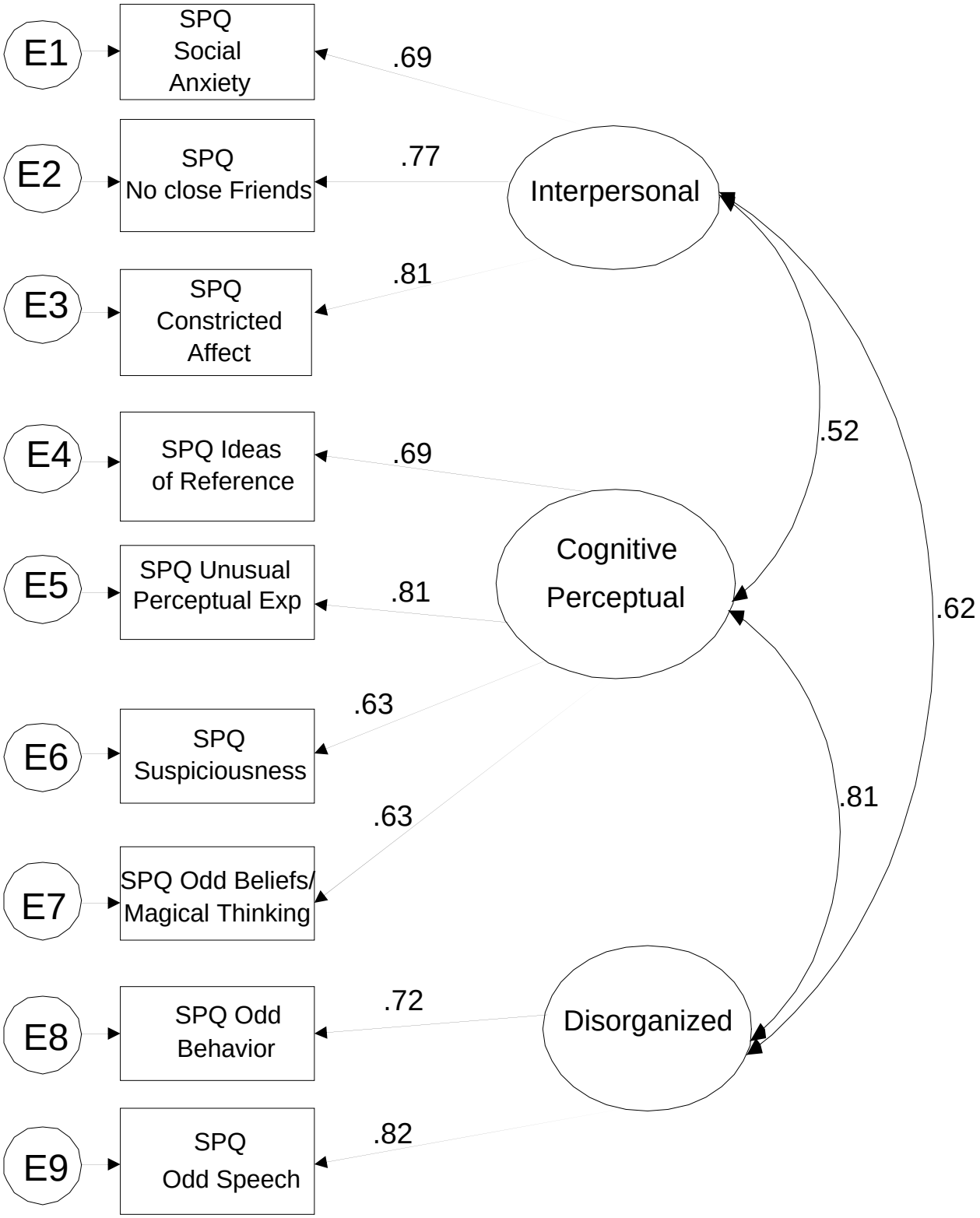
APPENDIX J

Figure 12: Hypothesis 2 Factor Loadings



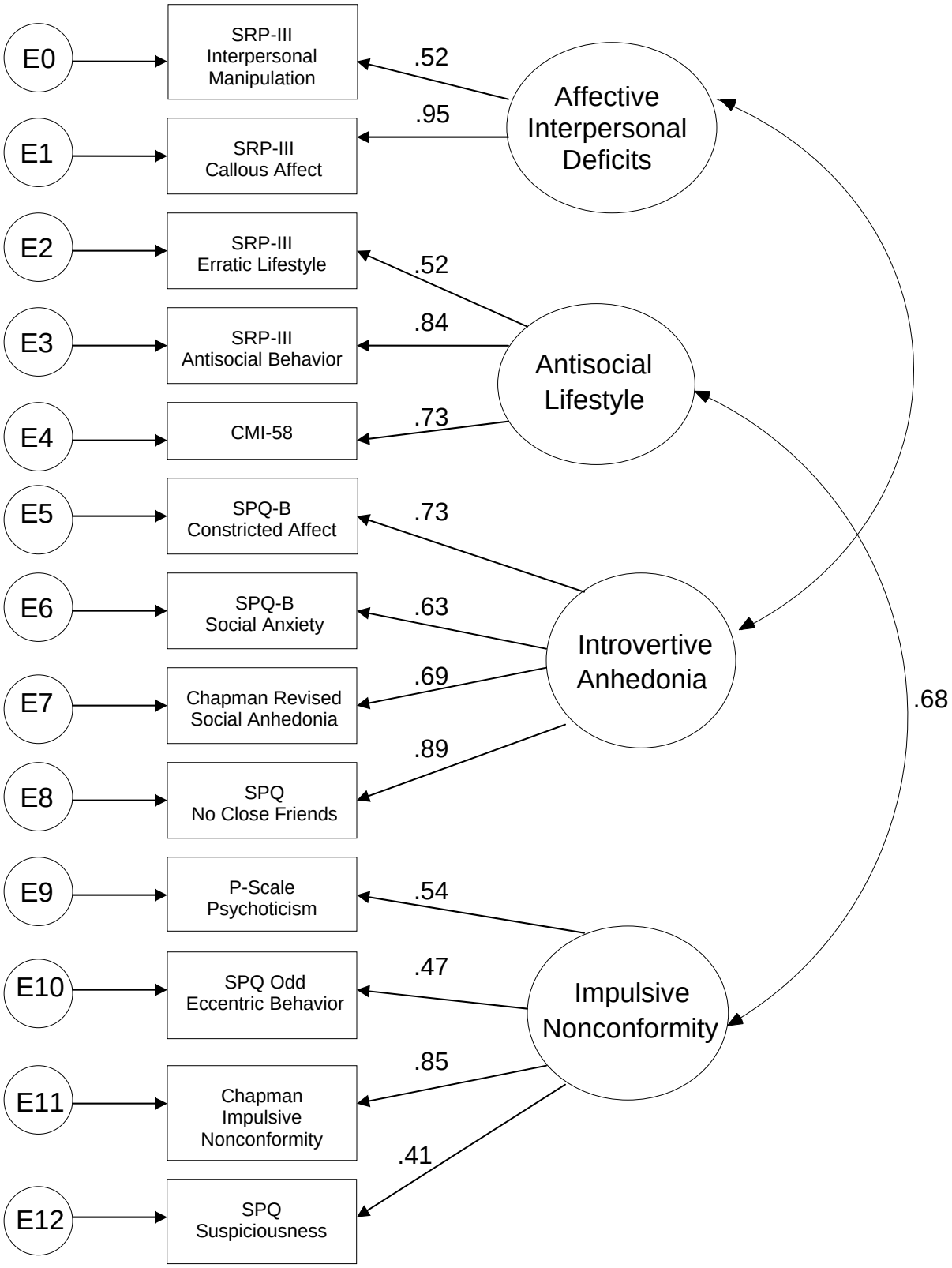
APPENDIX K

Figure 13: Hypothesis 2a Factor Loadings



APPENDIX L

Figure 8: Hypothesis 3 Factor Loadings



APPENDIX M
Demographic Information

1. Are you?
   - □ Female
   - □ Male
   - □ Transgender

2. Are you? (Check all that apply) (Optional)
   - □ American Indian/Native American
   - □ Asian/Asian American
   - □ Black/African American
   - □ Hispanic/Latina/o
   - □ Pacific Islander
   - □ White/European American
   - □ Other (_____)

3. What is your age?
   _____ years old

4. Where were you born?
   _____City
   _____State
   _____Country

5. Highest grade in school completed? (In other words, if you completed two years of college,
   you would write 14 below)

   _____Highest Grade Completed

6. What is your parent/s/caretaker's yearly income?

   $_____

APPENDIX N
Internal Consistency Statistics

Scale Name	# of items	*n* of Valid Cases	Cronbach's *Alpha*
SRP-III Total Score	44	320	.879
Callous Affect Subscale -SRP-III	10	322	.650
Erratic Lifestyle Subscale - SRP-III	10	322	.756
Antisocial Lifestyle Subscale - SRP-IIII	14	321	.821
Interpersonal Manipulation Subscale - SRP-III	10	321	.674
SPQ-B Total Score	74	311	.933
No Close Friends Subscale - SPQ-B	9	321	.761
Constricted Affect Subscale - SPQ-B	8	320	.708
Suspiciousness Subscale - SPQ-B	8	320	.679
Odd Behavior Subscale - SPQ-B	7	322	.813
Odd Speech Subscale - SPQ-B	9	323	.746
Social Anxiety Subscale - SPQ-B	8	321	.783
Ideas of Reference Subscale - SPQ-B	9	324	.764
Odd Beliefs/Magical Thinking Subscale – SPQ-B	7	322	.724
Unusual Perceptual Experiences Subscale – SPQ-B	9	319	.756
MMPI-2 Scale 4 Psychopathic Deviate	49	247	.555
MMPI-2 Scale 8 Schizophrenia	77	325	.879
MMPI-2 Scale 9 Hypomania	46	325	.558
Eysenck Personality Questionnaire Psychoticism Subscale	32	297	.259
Chapman Social and Physical Anhedonia Scale	40	307	.834
Chapman Perceptual Aberration Scale	35	312	.905
Chapman Impulsive NonConformity Scale	49	325	.816
Chapman Magical Ideation Scale	30	308	.863
CMI-58 Overall Misbehavior Score	58	299	.870
CMI-58 Soft Drug Abuse Scale	8	311	.600
CMI-58 Hard Drug Abuse Scale	6	324	.645
CMI-58 Minor Criminality Scale	10	320	.741
CMI-58 Serious Criminality Scale	10	322	.696
CMI-58 Driving Misbehavior Scale	7	318	.629
CMI-58 Bullying/Harassing Scale	8	318	.494
CMI-58 Anti-Authority Scale	8	316	.469