Tridimensional Personality Questionnaire with an Adult Probation Population

A Thesis

Submitted to the Faculty

of

Drexel University

by

in partial fulfillment of the

requirements for the degree

of

Master of Science

December 2008
Dedications

To my mother and my grandmother for being role models of determination.
Acknowledgements

I am very grateful to the many people who have been involved in this project, and without whom, it would not have been possible.

I would like to thank my thesis committee for their guidance and support. Thank you, Dr. Naomi Goldstein, my advisor and mentor, for her encouragement. I am very grateful for the research training and experience you have provided. Thank you, Dr. David DeMatteo, for your insight and guidance on this project. Dr. Rajita Sinha, thank you for the opportunity to be involved in this project, your expertise, and your ongoing support.

I would also like to thank all of the research assistants who helped collect data from research participants and the graduate students who provided guidance and support in the data analysis. Specifically, it would not have been possible without the efforts of Heather Zelle who generously provided her insight and knowledge concerning the analyses for this project.
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There has been a substantial increase in the number of adults under the supervision of local, state, or federal probation in the United States. Although there has been concern about the increasing numbers, few research studies have systematically explored the personality characteristics of the adult probation population. The tendency of extant research to focus on disorders, rather than personality dimensions, limits our knowledge and treatment of the probation population. A more dimensional approach to studying personality characteristics is needed to inform efforts at preventing criminal justice involvement and treating those individuals already involved with the system. Many questionnaires have been developed from factor analysis alone to assess personality using a trait-based approach (e.g., NEO-PI). In contrast, the Tridimensional Personality Questionnaire (TPQ) was conceptually based on a psychobiological framework that utilized research linking personality and genetic factors. Seven hundred and seven adult probationers in the three largest cities in Connecticut completed several questionnaires, including a demographics questionnaire and the TPQ. The current study is designed to examine the factor-loading of the TPQ with a probation sample. Findings suggest that the previously identified factor structure of the TPQ is not appropriate for use with a probation population. The TPQ higher order scales did not appear to be reliable constructs of novelty seeking, harm avoidance, and reward dependence with a probation sample.
Chapter 1: Introduction

1.1 Offender Population Description

According to the Bureau of Justice Statistics (2007), more than 5 million adults were under the supervision of local, state, or federal probation in the United States, representing more than a 35% increase in the number of probationers from 1995 to 2007. Despite these increasing numbers, few research studies have systematically explored the personality characteristics of the adult probation population. However, research studies have provided some important findings on other characteristics of this population.

Compared with the general population, forensic populations have higher rates of substance abuse and dependence (Bureau of Justice Statistics [BJS], 2004). According to the National Household Survey on Drug Abuse (2004), 7.9% of the general population in the United States reported illicit drug use within the month prior to survey completion. During a similar time period, the BJS (2004) reported that 32% of the probation population had used illicit drugs during the previous month. Estimates of lifetime drug use prevalence rates of probationers have ranged from 66 to 88% (BJS, 2004; Lurigio, 2003). Although rates of substance use have been well established, mental illness rates require further investigation.

Mental illness rates in the probation population have not been well studied. Boone (1995) cited literature estimating rates of mental illness at between six and nine percent in this population; however, these estimates were largely anecdotal. There is evidence that these estimates, likely, under-represent the prevalence of mental illness in this high-risk population (Lurigio, 2003). In studying a sample of adult probationers in
Illinois, Luirigio (2003) found that 13.2% of the subjects met criteria for at least one major mental illness. Overall, there is limited research on prevalence rates in the United States probation population.

Additionally, there has been increased concern regarding the growing number of women involved in the criminal justice system. The number of women on probation has grown at a slightly faster rate than the number of men, with women comprising 21% of the probation population in 1995 and 24% in 2007 (BJS, 2007). Some evidence also suggests that, compared with men on probation, women on probation exhibit more severe psychiatric and substance abuse problems, despite their lower likelihood of arrest (BJS Special Report, 1999; BJS Selected Findings, 1999). The National Household Survey (2004) found that males across the life span were more than twice as likely as females in the same age range to be dependent on alcohol or drugs. However, when adolescent girls were compared to adolescent boys, ages 12 to 17, their rates of substance abuse and dependence were equal (National Household Survey, 2004). These findings suggest that substance abuse and dependence may be increasing in the young female age group.

Despite these efforts to examine characteristics of the probation population, few studies have examined personality characteristics among adult probationers. Initial research has shown a link between negative emotional states, a lack of impulse control, and criminal activity (Bergvall et al., 2003). With respect to personality characteristics, numerous studies (e.g. Hare, 1996; 2006; Blonigen et al, 2005) have focused narrowly on psychopathy and antisocial personality disorder. Although the study of psychopathy and antisocial personality disorder is important in understanding forensic populations, this categorical approach to personality assessment fails to provide information on the large
majority of individuals involved in the criminal justice system who do not have features of psychopathy or antisocial personality disorder, traits notably absent in the female forensic population (Paris, 2004; Teplin, 1994). The tendency of extant research to focus on disorders, rather than personality dimensions, limits our knowledge and treatment of the probation population. A more dimensional approach to studying personality characteristics is needed to inform efforts at preventing criminal justice involvement and treating those individuals already involved with the system. A brief examination of the history of dimensional and categorical approaches to understanding personality can illustrate both the difficulty and the value of studying personality characteristics.

1.2 History of Personality Theories

The three most widely researched and supported theories of personality are the Big Five (Costa & McCrae, 1995), Alternative Five (Zuckerman et al., 1991), and Big Three Factor Models (Digman, 1990; Eysenck et al., 1985; Sher et al., 2000). Although all three models include two of the same factors, Neuroticism and Extraversion (Zuckerman, 1993; Digman, 1990), there is notable disagreement on the remaining factors (Digman, 1990).

Costa and McCrae’s (1992) version of the Big Five personality structure has been widely researched and analyzed. The Big Five Factor Model was identified through an analysis of natural language description of personality traits. The five-factor analysis revealed that, in addition to Neuroticism and Extraversion-Introversion, Agreeableness, Conscientiousness, and Openness to Experience were higher order personality structures. The NEO Personality Inventory – Revised (NEO-PI-R; Costa & McCrae, 1992) was
designed to measure these traits. However, many researchers have argued that encoding personality traits from language analysis does not account for the biological basis of personality (Cloninger, 1986; Zuckerman et al., 1993).

The Alternative Five Factor model (Zuckerman et al., 1991; 1993) was developed by factor analyzing data collected from 33 personality scales, including the Eysenck Personality Questionnaire Revised. Results revealed that the three and five factor models were equally strong (Zuckerman, 1991). However, the five factor model was preferable due to its specificity. The five-factor model included Neuroticism-Anxiety, Sociability, Impulsive-Unsocialized Sensation Seeking, Aggressive-Hostility, and Activity. Again, the common factors of Neuroticism and Extraversion (Sociability) were included in this model. The additional factors of Impulsive-Unsocialized Sensation Seeking and Aggressive-Hostility parallel the Big 5 Factors of Agreeableness and Conscientiousness, respectively.

Eysenck & Eysenck (1968; Eysenck et al., 1985) proposed a three-factor theory of personality that included the major order traits of Extraversion, Neuroticism, and Psychoticism. Measures of these traits are included in the Eysenck Personality Questionnaire (EPQ). In his theory, Eysenck (1968) described Extraversion as involving the traits sociable, lively, active, and sensation seeking. Neuroticism included the traits anxious, depressed, irrational, and moody. Psychoticism included the following traits: impersonal, impulsive, antisocial, creative, and aggressive. Although Extraversion and Neuroticism, largely, have been accepted by personality theory experts (e.g., Zuckerman, 1993; Digman, 1990), the dimension of Psychoticism has been the subject of much debate. Many theorists have suggested that Psychoticism may not be a distinct
personality factor but, instead, may comprise several divergent personality traits (Costa & McCrae, 1992; Goldberg & Rosolack, 1994).

Eysenck (1977) predicted that prisoners would show higher scores on all three traits than would healthy controls. In his study of male prisoners, although 33% produced high scores on all three factors, 20% of controls also scored high on all three factors (Eysenck & Eysenck, 1977). This difference was statistically significant, but it failed to provide a clear differentiation between healthy controls and a criminal population. In addition, the Psychoticism scale has not been validated to distinguish between criminal and noncriminal populations, which further limits the utility of this instrument (Eysenck & Eysenck, 1977).

Cloninger (1986; 1987; Cloninger et al., 1991) described a psychobiological model of the development of personality that includes three higher order dimensions, each of which was thought to be genetically independent of the others. These three personality dimensions are Novelty Seeking (NS), Reward Dependence (RD), and Harm Avoidance (HA), with each dimension including four lower order dimensions. Cloninger’s personality dimensions can be measured using the Tridimensional Personality Questionnaire (TPQ) (Cloninger et al., 1993; Stallings et al., 1996).

Cloninger (1986) defined Novelty Seeking as a “heritable tendency to be attracted to exploratory activity and intense excitement in response to novel stimuli.” Novelty Seeking has been strongly linked to impulsivity, and impulsivity is considered an important predictor of criminal activity (Cloninger, 1986). Harm Avoidance is defined as a “heritable tendency to respond intensively to aversive stimuli and to learn to passively avoid punishment, novelty, and non-reward” (Cloninger, 1986). Reward Dependence is
a “heritable tendency to have intense responses to rewards and to learn to maintain rewarded behavior, resulting in greater resistance to behavioral extinction” (Cloninger, 1986).

Cloninger proposed that combining severity levels of each of his three dimensions would identify the presence of Axis I and II disorders (e.g., high Novelty Seeking, high Harm Avoidance, and low Reward Dependence would indicate the presence of histrionic personality disorder). Although Novelty Seeking has emerged as a predictor of substance use disorders (Cannon et al., 1993), there is still significant debate about the utility of the Cloninger’s three factor model (Ball et al., 1997).

1.3 Personality Research and Forensic Populations

Historically, the criminal justice field has demonstrated difficulty accepting criminal behavior research focused on personality theory (Caspi et al., 1994; Miller & Lynham, 2001; Tennenbaum, 1977). Caspi (1994) reported that, between 1964 and 1992, the journal, Criminology, published only four articles on personality and crime. Several methodological concerns have been raised regarding the simultaneous study of personality and crime. Early personality questionnaires, such as the EPI and the Minnesota Multiphasic Personality Inventory Psychopathic Deviation (MMPI PD) scale, were devised to discriminate between individuals in the criminal population from individuals in the normal population by including subscale questions specifically about crime. However, these instruments did not offer a theoretical foundation to link specific personality traits to criminal behavior (Caspi, 1994). Additionally, early research frequently utilized less valid measures of personality, such as projective tests (Miller &
Lynam, 2001). Several authors have reported that limited data on the relationship between crime and personality exists in the literature and that additional research is needed in the field (Caspi, 1994; Miller & Lynam, 2001).

Personality disorder prevalence estimates have ranged from 20 to 75% in prison populations, and ten to 15% in the general population (Rasmussen et al, 1999; Paris, 2004). Teplin (1994) found that 49% of her sample of men incarcerated in a United States prison had ASPD at the time of testing, and Cote and Hodgins (1990) found a 62% lifetime prevalence rate in a similar sample. Additionally, for a sample of women prisoners, the ASPD prevalence rate was 11.9%, and the borderline personality disorder prevalence rate was 28% (Jordan et al., 1996). These prevalence rates are significantly higher than those in the general population (American Psychiatry Association, 2000).

Impulsivity has been reported as a key personality trait in predicting criminal behavior. Many researchers have linked impulsivity to ASPD (Eysenck & Eysenck, 1977; Moffitt, 1993; White et al., 1994). Lynam (2000) found that impulsivity was significantly related to all offenses, except drug offenses, for 13-year-old male delinquents, even when controlling for community and family socioeconomic status. In addition, Krueger and colleagues (Krueger et al., 1994) found that the subscale, Control, of the Multidimensional Personality Questionnaire, was negatively correlated with self-reported delinquency in 18-year-old males and females, with no significant gender differences. Although a significant amount of literature exists on the relationship between impulsivity and male criminal behavior, there is little research on impulsivity and female criminal behavior.
In addition, although no gender differences have been found in the overall prevalence of personality disorders, gender differences within specific clusters of personality disorder have been identified (Paris, 2004). The largest differences were found in Cluster B personality disorders; men were more likely to receive a diagnosis of ASPD, and women were more likely to receive a diagnosis of BPD. Additionally, in Cluster C, obsessive-compulsive personality disorder was more common in men, and dependent personality was more common in women (Paris, 2004).

Some research has suggested that distinguishing psychopathy from antisocial personality disorder is important. Rasmussen and colleagues (Rasmussen et al., 1999) suggested that distinguishing psychopathy from ASPD highlights the relationship between psychopathic personality traits and increased rates of reported crimes. Additionally, Rasmussen and colleagues (1999) identified a link between psychopathic personality traits and increased risks of substance abuse/dependency. Prisoners identified as psychopathic were significantly more likely than nonpsychopaths to have a diagnosis of cannabis abuse/dependence, amphetamine abuse/dependence, inhalant abuse/dependence, and opiate abuse/dependence; however, the two groups did not differ on any major mood, adjustment, or anxiety disorder (Rasmussen et al., 1999). In addition, identification of psychopathy was associated with an earlier onset of criminal activity (13.8 versus 27.9 years).

Research has linked personality disorders to increased rates of crime and, more specifically, to increased prevalence of violent crime (Johnson et al., 2000; Rasmussen et al., 1999). These studies have also indicated that adolescents with personality disorder symptoms commit more violent acts than do adolescents without personality disorder
traits (Bergvall et al., 2003; Johnson et al., 2000). Johnson and colleagues (2000) found that adolescents who met criteria for a Cluster A or Cluster B disorder (excluding antisocial personality disorder) were at increased risk of committing violent crimes. Importantly, substance abuse was not associated with increased risk of violent acts for adolescents with or without a personality disorder. Cluster C personality traits do not appear to be associated with increased risk of committing violent crimes. The relationship between Cluster A and Cluster B personality disorders and violent crime persists into early adulthood and has been well documented (Bergvall et al., 2003; Johnson et al., 2000). These high rates of personality disorders and their relationships with crime highlight the importance of personality trait and criminal behavior research.

1.4 Personality Assessment Instruments

A review of the personality literature with forensic populations reveals a number of key assessment instruments. The most commonly used personality instruments with this population are the Personality Assessment Inventory (PAI), Minnesota Multiphasic Personality Inventory –2 (MMPI-2), and the Millon Clinical Mutliaxial Inventory-III (MCMI-III; Rogers, 2003). Each of these instruments was specifically designed to distinguish clinical from non-clinical populations, severely limiting their use at identifying differences within non-clinical populations (Rogers, 2003).

1.5 Tridimensional Personality Questionnaire

In contrast to the aforementioned assessments, the Tridimensional Personality Questionnaire attempts to describe personality characteristics of heritable tendencies that
are genetically independent of each other. One benefit of the TPQ is the psychobiological theoretical approach of the instrument to identifying personality traits and those traits’ correlations with genetically independent neurobiological systems. Cloninger (1986) proposed that each higher order personality trait corresponded with a neurobiological system, such as behavioral activation, behavioral inhibition, or behavioral maintenance. In addition, each of these systems has been correlated with activity in monoaminergic pathways (Cloninger, 1986; Stallings et al., 1996). Thus, Cloninger proposed that these neurobiological systems and related personality traits interact to form behavioral responses.

In addition, as opposed to previous personality measures that were based on factor analysis alone (e.g. NEO-PI), the TPQ was conceptually based on a psychobiological framework that utilized research to suggest a link between personality and genetic factors (Ebstein et al., 2000). Research has revealed evidence that there may be a link between genetic profiles and personality (Benjamin et al., 1998; Ebstein et al., 2000), suggesting that personality measures, such as the TPQ, based upon an underlying genetic components, may be critical to meaningful assessments. Additional research with a probation sample and the TPQ may help screen biological risk factors for psychopathology and identify target areas for treatment.

The Tridimensional Personality Questionnaire (Cloninger et al., 1991) is a self-report questionnaire containing 100 true/false items. Consistent with Cloninger’s (1986) original theory, the TPQ measures three higher order personality dimensions (novelty seeking, harm avoidance, and reward dependence). Previous research has demonstrated that the TPQ has adequate validity and reliability. Internal consistency estimates have
ranged from .55 to .89 for the higher order scales (Sher et al., 1995; Svrakic et al., 1993). The TPQ’s test-retest reliability for the higher order scales ranged from .85 to .88 (Sher et al., 1995). Reward Dependence subscale two (RD2) and Novelty Seeking subscale one (NS1) loaded weakly onto their respective higher order scales. As a result, Cloninger refined his theory to remove Persistence as a subscale of reward dependence and include persistence as a fourth higher order dimension (Cloninger et al., 1993).

Normative data indicate that men tend to have higher novelty seeking, lower harm avoidance and lower reward dependence scores than do women (Sher et al., 1995). In addition, research has established a consistent relationship between novelty seeking and substance use (Cannon et al., 1993; Earleywine et al., 1992). There also appears to be a relationship between age and novelty seeking score, with novelty scores decreasing one point per 10 year increase in age, on average (Sher et al., 1995; Stallings et al., 1996).

1.6 Current Study

The current study was designed to examine a probation sample, using Cloninger’s psychobiological framework. In addition to being the largest portion of the criminal justice system, probationers are also supervised in the community, putting them at risk for reoffending. Furthermore, despite the increasing number of individuals involved with the criminal justice system, research has been limited to trait-based personality characteristics of probationers. Therefore, this study examined the factor-loading of the TPQ with a probation sample. Given the increasing proportion of women in the criminal justice system, this study, also, was designed to examine gender differences in higher-order TPQ personality traits within a probation sample. Specifically, it was hypothesized
that women would score significantly higher on the novelty seeking scale but not on the harm avoidance or reward dependence scales.

**Purpose and Hypothesis Summary**

Purpose: To explore the factor loading of items on the TPQ in an adult probation sample.

Hypothesis 1: The TPQ factor loadings obtained with probationers would not differ significantly from estimates previously generated by non-probation samples.

Purpose: To examine gender differences in the TPQ among an adult probation sample.

Hypothesis 2: Women on probation would have significantly higher novelty seeking scores than would men on probation. There would be no significant differences between men and women on the Harm Avoidance or Reward Dependence scales.

**Chapter 2: Methods**

Data for this study came from a de-identified archival dataset, collected by a researcher at Yale University, for a study on the treatment needs of adult probationers in Connecticut.

2.1 Participants
Seven hundred and seven adult probationers were recruited from the adult probation offices of the three largest cities in Connecticut between July 1, 2002 and July 1, 2005. Probationers from these three locations constituted 50% of the Connecticut probation population. Participation was voluntary, and participants were paid $30 for completing an interview and $10 for providing a urine sample. Inclusion criteria required individuals to be able to communicate in either English or Spanish. Exclusion criteria prohibited individuals from participating, if they were intoxicated at the time of participation, as measured by breathalyzer. Additionally, for the current study, subjects with incomplete TPQ data were accommodated by the AMOS 16 maximum likelihood model.

Prior to initiating participant recruitment, the Connecticut Department of Probation, Court Support Services Division (CSSD), provided a de-identified spreadsheet of demographic information including race, age, and gender for each location included in the study parameters. This demographic information was used to stratify the study sample to match the probation population in each city. Therefore, the final sample characteristics were representative of the demographic distribution provided by CSSD.

The final sample for this study consisted of 566 (80%) men and 141 (20%) women. Young adults (ages 18-24) represented 27% of the sample; the other age groups were: 25-29 years (14%), 30-34 years (15%), 35-39 years (15%), 40-44 years (13%), and 45 years and older (16%). The ethnic breakdown was representative of the probation population: African American 45%, Caucasian 30%, and Latino 25%. Forty-seven percent of the probationers reported obtaining
less than a high school education, 32% reported a high school education or a GED, 18% reported obtaining some college education, and 3% identified as college graduates.

2.2 Measures

Each probationer provided informed consent for participation. The researcher, first, conducted a semi-structured interview, then, administered multiple self-report assessments. The semi-structured interview was comprised of several assessments including a demographic questionnaire, the Substance Use Disorders Section of the Structured Clinical Interview for Diagnostic and Statistical Manual for Mental Disorders -IV (SCID; First et al., 1995), the Addiction Severity Index (McClellan et al., 1992), and the Arrestee Drug Abuse Monitor (ADAM). Self-report measurements included the Brief Symptom Inventory (Derogatis, 1993), Risk Assessment Battery (Navaline, 1994), Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996), and the TPQ (Cloninger, 1987). Data from the SCID, ADAM, and TPQ were examined in the current study.

The ADAM was the National Institute of Justice’s Protocol for drug use data collected through interviews of adult arrestees in booking facilities. The ADAM questionnaire includes items on demographics, housing situation, treatment and criminal history, and primary and secondary drug use.

The SCID (First et al, 1995) provides data on current and lifetime abuse and dependence on alcohol, cocaine (including crack), marijuana, heroin and
other opiates, hallucinogens (including PCP), amphetamines, and other illegal substances. Psychometric properties of the SCID vary widely based upon clinical diagnosis, evaluator training, and evaluator experience. However, reliability of the substance abuse and dependence section has the some of the highest inter-rater reliability rates that range from .75 to 1.0.

The Tridimensional Personality Questionnaire (Cloninger, 1987) is a 100-item self-report instrument that measures three dimensions of personality. The TPQ’s original and revised dimensions have previously demonstrated fair to good internal consistency: Novelty Seeking (.76), Harm Avoidance (.79), and Reward Dependence (.70; Cloninger et al, 1991). The Novelty Seeking alpha coefficients ranged from .68 to .75 across gender and ethnicity, Harm Avoidance alphas ranged from .77 to .85, and Reward Dependence alphas ranged from .61 to .69 (Cloninger et al, 1991).

2.3 Procedures

All participants were recruited onsite, in the lobby of the designated probation offices. Each participant was provided a brochure describing the voluntary and confidential nature of the study. If an individual notified the researcher of his/her interest in participating, the researcher either conducted the interview at that time or scheduled an interview at the probationer’s convenience. All participants were interviewed with structured, face-to-face measures and self-report assessments, and completed a urine drug screen.

All interviewers attended a full, two-day training program, conducted by the Project Coordinator and Principal Investigator. After training, reliability was
monitored through weekly supervision and by periodically spot-checking interviews (at least quarterly). In a previous study, reliability of diagnoses using these techniques was found to be excellent, with kappa coefficients ranging from 0.72 to 1.0 across diagnostic categories (Rounsaville et al., 1982).

Arrangements were made to maximize the convenience to participants. Spanish speaking interviewers were used, as needed, during the survey process. If a participant failed to keep the interview appointment, the researchers attempted multiple contacts to reschedule the interview. All attempts were made to schedule the interview as soon as possible to reduce no show rates. The researchers maintained a record of attempted contacts, completed contacts, completed interviews’ and refusal data. These records were checked by the project coordinator and reviewed again, weekly, at the study meeting with investigators.

Chapter 3: Results

3.1 Preparatory Analysis

Prior to the CFA analysis, data were evaluated by visual inspection for outliers. No outliers were detected. Normality of the indicators was examined using SPSS 16. Skewness and kurtosis were evaluated through a visual inspection of the histograms for each indicator. The histograms suggested no violation of normality of assumptions.

3.2 Analysis of Primary Hypotheses

Based upon prior theory and evidence on Cloninger’s model of personality, a three factor model was specified in which Exploratory Excitability versus Stoic Rigidity
(NS1), Impulsiveness versus Reflection (NS2), Extravagance versus Reserve (NS3), and Disorderliness versus Regimentation (NS4) loaded onto the latent variable Novelty Seeking, and in which Anticipatory Worry versus Uninhibited Optimism (HA1), Fear of Uncertainty versus Confidence (HA2), Shyness with Strangers versus Gregariousness (HA3), and Fatigability versus Vigor (HA4) loaded onto latent variable Harm Avoidance, and in which Sentimentality versus Insensitivity (RD1), Persistence versus Irresoluteness (RD2), Attachment versus Detachment (RD3), and Dependence versus Independence (RD4) loaded onto latent variable Reward Dependence. The indicators were subscales of the TPQ’s higher order scales and ranged scores from 0 to 11, with higher scores on each reflecting higher levels of the personality dimension. See Figure 1 for the three-factor model specification. NS1, HA1, and RD1 were used as marker indicators for Novelty Seeking, Harm Avoidance, and Reward Dependence, respectively. The measurement model contained no double loading indicators, and all measurement error was presumed to be uncorrelated. The latent factors of Novelty Seeking, Harm Avoidance, and Reward Dependence were permitted to be correlated based on prior evidence. Accordingly, the model was overidentified with $df=51$.

The sample variance-covariance matrix was analyzed using AMOS 16.0, and a direct maximum likelihood minimization function. Goodness of fit was evaluated using chi-square, root mean square of error of approximation (RMSEA), and its 90% confidence interval (90% CI), comparative fit index, and the Tucker Lewis index (TLI). As suggested by Hu and Bentler (1999) and Brown (2006), acceptable model fit was defined by the following criteria: RMSEA ($\leq .06$, 90% CI $\leq .06$), Chi Square ($\geq .05$), CFI ($\geq .95$), and TLI ($\geq .95$). Multiple indices were used because they provide different
information about model fit (i.e., absolute fit, fit adjusting for model parsimony, and fit relative to null model), and each has different strengths and weaknesses. When these indices are used together, they provide a more conservative and reliable evaluation of the solution.

### 3.3 Primary Hypothesis Results

Each of the overall goodness-of-fit indices suggested that the three-factor model did not fit the data well, $\chi^2(51) = 407.668, p < .001, \text{RMSEA} = .100 (90\% \text{ CI} = .091 - .109), \text{TLI} = .528, \text{CFI} = .692$. Completely standardized parameter estimates from this solution are presented in Figure 2. All freely estimated unstandardized parameters were not statistically significant. Factor loading estimates revealed that the indicators of the constructs were weakly related to their purported latent factors (range of $R^2$s = .001 - .568; see Table 1). With the exception of the subscale HA1 ($R^2 = .568$), no other subscales were strongly correlated with the latent factors. Four subscales (NS2: $R^2 = .415$, NS4: $R^2 = .351$, HA3: $R^2 = .404$, and HA4: $R^2 = .391$) were moderately correlated with the latent factors. This range of factor loading estimates ($R^2$s = .001 - .568) suggests that the TPQ scales are not reliable indicators of the constructs Novelty Seeking, Harm Avoidance, and Reward Dependence. The estimates of the three-factor correlations do seem to indicate moderate relationships between the higher-order factors. These correlations are presented in Table 2.

### 3.4 Analysis of Secondary Hypothesis
Because the factor analytic model was not supported, gender difference in the probation sample could not be evaluated.

3.5 Supplementary Results

Because the CFA had non-significant results, additional analyses were run to investigate sample characteristics. The average scores for each of the higher-order factors were similar to that of previous research (NS: M = 15.76, SD = 4.01 versus M = 13.02, HA: M = 14.05, SD = 6.19 versus M = 12.05, RD: M = 16.86, SD = 3.83 versus M = 18.72) with a sample size (n=572). Means are listed in Table 3.

Chapter 4: Discussion

The current study evaluated the factor structure of the TPQ with a sample of adult probationers. The results of this study did not support the original three-factor model of the TPQ in an adult probation sample. Results suggest that there may be an alternative model of the TPQ that better fits the personality structure of a probation sample. Results also raise the question of the applicability of the TPQ in its current form to measure personality traits within a probation sample.

The original three-factor structure of the TPQ was based on Cloninger’s psychobiological theory of personality dimensions. These personality dimensions (Novelty Seeking, Harm Avoidance, and Reward Dependence) were theoretically correlated with neurobiological systems, such as behavioral activation, behavioral inhibition, and behavioral maintenance (Cloninger, 1986). Some research has suggested that a four factor dimensional model serves as a better fit for women but that the three
factor dimensional model should be sufficient for men (Stallings, 1996). In previous research, the fourth dimensional factor was derived from the Reward Dependence Subscale (RD2), which measured Persistence (Stallings, 1996). The current findings indicated that RD2 was not strongly correlated with the higher-order factor; however, none of the Reward Dependence subscales were strongly related to the high-order factor. Therefore, these findings suggest that none of the indicators load onto the higher-order factor of Reward Dependence and the same factor structure may not be applicable to a probation sample. Similarly, Novelty Seeking and Harm Avoidance indicators were not strongly related to the high-order factors in the probation sample, contrary to previous research with the TPQ.

There are several possible explanations for the lack of model fit. First, given the large number of variables on the TPQ, the sample size of this study may have resulted in an underpowered analysis. Although several guidelines have been proposed for minimum power requirements to conduct Structural Equation Modeling (e.g., Hogarty, 2005; Kim, 2005; Muthén & Muthén, 2002), no standard has been widely accepted (Muthén & Muthén, 2002); however, using one common sets of guidelines (Kim, 2005), this study did have sufficient power to identify a meaningful factor structure. Second, it is possible that, unique characteristics of the probation population (e.g., higher rates of Axis I and Axis II disorder, high rates of substance use, low SES), may have resulted in items loading differently onto subscales than they did with a normal sample, suggesting one of two things: (1) that Cloninger’s theory of three higher-order personality dimensions cannot be validly applied to individuals on probation; or (2) that Cloninger’s theory may apply, but the TPQ, with the established factor loadings, does not provide a
valid measure of personality structure when used with individuals probation. Additional factor analytic research at the both the item and subscale levels should help clarify the discrepancy between factor analytic results with a probation sample and with a normal sample. Notably, however, previous research reported similar problems with the TPQ factor structure (Bollen & Long, 1993; Cannon et al., 1993), suggesting that there may be broader concerns about the TPQ’s validity. Based on the current findings, the application of the TPQ to specialized populations, including individuals on probation, should be approached with caution. Further analysis of the TPQ’s factor structure with specialized populations is warranted.

In order to evaluate potential sample bias, TPQ subscale means of this sample were compared to the national sample reported by Cloninger et al. (1991). The mean scores of the current sample were similar to that of previous research. These results suggest that the current sample did not demonstrate differences in the severity of the personality dimensions. Therefore, the current sample does not appear biased compared to the national sample collected by Cloninger et al. (1991).

Limitations

There are limitations to the current study. Although this sample was representative of the probation sample in the geographic area in which the study was conducted, additional probation samples are required to confirm the findings of this study. In addition, the sample size of the current study did not allow for an item level analysis of the data. Future analyses with larger samples will provide an opportunity to conduct item level analyses to determine whether the items may correlate differently within this population then the original theory predicted. Furthermore, an Exploratory
Factor Analysis (EFA) should be conducted to determine revised factor loadings on subscales because the original model was not confirmed with CFA. Although there have been many guidelines offered in the literature, Everitt (1975) and Hogarty (2005) recommend a ratio of at least 10 subjects per 1 variable. For the current study, a sample size of 1,000 subjects would be required to conduct an appropriate EFA and item level analysis. Overall, future research should focus on conducting an EFA with a larger sample size. This increased sample size will allow researchers to analyze the data at the item level and evaluate whether the TPQ subscales organize and load onto higher-order factors.

Table 1. TPQ Factor Loading Estimates

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Estimates (R²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty Seeking</td>
<td></td>
</tr>
<tr>
<td>NS1</td>
<td>.005</td>
</tr>
<tr>
<td>NS2</td>
<td>.415</td>
</tr>
<tr>
<td>NS3</td>
<td>.119</td>
</tr>
<tr>
<td>NS4</td>
<td>.351</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td></td>
</tr>
<tr>
<td>HA1</td>
<td>.568</td>
</tr>
<tr>
<td>HA2</td>
<td>.204</td>
</tr>
<tr>
<td>HA3</td>
<td>.404</td>
</tr>
<tr>
<td>HA4</td>
<td>.391</td>
</tr>
<tr>
<td>Reward Dependence</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. TPQ Higher-Order Scale Correlations

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Novelty Seeking – Harm Avoidance</td>
<td>-.424</td>
</tr>
<tr>
<td>Reward Dependence – Harm Avoidance</td>
<td>-.481</td>
</tr>
<tr>
<td>Reward Dependence – Novelty Seeking</td>
<td>.497</td>
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</table>

Table 3. Summary Statistics of TPQ

<table>
<thead>
<tr>
<th></th>
<th>Current Sample</th>
<th>Cloninger (1991)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean</td>
</tr>
<tr>
<td>Novelty Seeking</td>
<td>15.76 (4.01)</td>
<td>13.02</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>14.05 (6.19)</td>
<td>12.05</td>
</tr>
<tr>
<td>Reward Dependence</td>
<td>16.86 (3.83)</td>
<td>18.72</td>
</tr>
</tbody>
</table>
Figure 1. Confirmatory Factor Analysis Three-Factor Model

- Novelty Seeking
  - NS1 - Exploratory Excitability versus Stoic Rigidity
  - NS2 - Impulsiveness versus Reflection
  - NS3 - Extravagance versus Reserve
  - NS4 - Disorderliness versus Regimentation

- Harm Avoidance
  - HA1 - Anticipatory Worry vs. Uninhibited Optimism
  - HA2 - Fear of Uncertainty vs. Confidence
  - HA3 - Shyness w/ Strangers vs. Gregariousness
  - HA4 - Fatigability and Asthenia vs. Vigor

- Reward Dependence
  - RD1 - Sentimentality vs. Insensitivity
  - RD2 - Persistence vs. Irresolution
  - RD3 - Attachment vs. Detachment
  - RD4 - Dependence vs. Independence
Figure 2. Three Factor Model Factor Loadings
Bibliography


