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Eysenck's Personality Model and Criminal Thinking Style within a Violent and Nonviolent Offender Sample: Application of Propensity Score Analysis

Daniel Boduszek

*University of Ulster, Londonderry, UK; University of Huddersfield,
Huddersfield, UK*

Mark Shevlin, Gary Adamson, and Philip Hyland

University of Ulster, Londonderry, United Kingdom

Previous studies within criminal population have indicated a significant relationship between personality traits and criminal thinking style. However, none of the empirical research has adequately addressed selection bias in cross-sectional data investigating criminal thinking style. The current study investigates the impact of personality traits (Eysenck's model) on criminal thinking style using propensity score matching methodology. The research is based on 133 violent and 179 nonviolent male recidivistic prisoners incarcerated in high-security prison. A post-matching multiple regression model explained 49% of variance in the criminal thinking style indicating five significant predictors: psychoticism, extraversion, neuroticism, associations with criminal friends, and criminal identity. Our results suggest for the first time that personality traits predict the ways of thinking that are characteristic of persistent criminals and that individual differences in these psychological traits can have profound effects on an individual who operates within an environment dominated by criminal others. Further implications in relation to theory and previous studies are discussed.

INTRODUCTION

Empirical studies of criminal behavior consistently indicate that criminal thinking style is one of the most significant predictors of future involvement in criminal activity. This link has been well established in both social and criminal psychology research suggesting that individuals who have internalized a concept of criminal thinking are at a greater risk of engaging in criminal conduct (Engels et al. 2004; Mills et al. 2002; Nesdale et al. 2009; Simourd 1999; Stevenson et al. 2003; Vitaro et al. 2000).

Holsinger (1999) also suggested that people who have been socialized in criminal settings, such as within the company of a criminal peer group, and have acquired antisocial thinking are more likely to commit a crime in the future. Further, findings reported by Losel (2003) suggested that through interactions with a criminal group, individuals develop attitudes, values,

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Address correspondence to Daniel Boduszek, Department of Behavioural and Social Sciences, University of Huddersfield, HD1 3DH, Huddersfield, UK. E-mail: d.boduszek@hud.ac.uk

and self-related cognitions that encourage criminal behavior. Similarly, Mills and colleagues (2004) reported that the normative influence of criminal friends interacts with criminal thinking, and importantly, when these variables are strongly associated, the relationship to criminality is especially strong (see also Andrews and Kandel 1979). Additionally, a prison-based study by Rhodes (1979) found that individuals who enter prison with a low level of criminal attitudes, tend to acquire more deviant attitudes while serving their sentence as a consequence of the persistent contact with criminal others. These investigations provide strong empirical evidence regarding the role of social and contextual variables as they relate to criminal behavior; however, very little empirical research work has been undertaken to determine the role of psychological factors such as one's personality, or identity in the prediction of habitual thinking style.

Mills and colleagues (2004) stated that the presence of antisocial personality may be sufficient to indicate the presence of criminal thinking, but the absence of antisocial personality would not necessarily denote the absence of criminal thinking. In spite of these hypothetical suggestions, there is scant research to suggest that personality traits are reflected in criminal thinking and beliefs. A Dutch prison study conducted by Bulten and colleagues (2009) revealed that criminal lifestyles were supported by criminal belief systems which incorporated criminal thinking styles, and were also supported by specific personality traits such as "Impulsivity." Egan and colleagues (2000) studied 54 detained, mentally disordered offenders. Their findings suggested a moderate relationship between neuroticism ($r = .37$), agreeableness ($r = .38$), sensation-seeking ($r = .33$), and criminal thinking style. No relationship between extraversion and criminal thinking was recorded.

The trait approach to personality is one of the major theoretical areas in the study of personality. Eysenck (1977) is one of the few trait-psychologists who explicitly constructed theory on the link between personality and crime (see also Eysenck and Gudjonsson 1989). He suggested that based on biological and conditioning processes, criminals score high on all three basic dimensions of personality (psychoticism, extraversion, and neuroticism). Recent research strongly supports Eysenck's position that people likely to commit criminal behavior will score high on psychoticism (Boduszek et al. 2012c; Cale 2006; Center et al. 2005; Heaven et al. 2004; Kemp and Center 2003; Levine and Jackson 2004; van Dam et al. 2005; Walker and Gudjonsson 2006). This is to be expected since high scorers are generally described as cold, hostile, aggressive, and insensitive to the needs of others. Neuroticism has generally shown a significant relationship with offending, although not as strong as the psychoticism (Cale 2006). The neuroticism does well in predicting serious crimes (Kemp and Center 2003) and is somewhat successful in predicting recidivism (van Dam et al. 2005). The power of the extraversion is more in question, as several studies have found only a weak connection to offending (Cale 2006; Center et al. 2005; Kemp and Center 2003). However, Eysenck (1987) pointed out that incarcerated persons cannot properly answer the social activity questions that are part of the extraversion scale (see also van Dam et al. 2005).

Boduszek and colleagues (2011) in their recent research provided empirical evidence of a link between personality traits (as defined by Eysenck) and criminal thinking. Using multiple regression analysis, the authors were able to explain 71% of variance in criminal attitudes on the basis of a model including psychoticism, association with criminal friends, and level of recidivism. While all three variables made a unique statistically significant contribution to the prediction of criminal attitudes, psychoticism emerged as the strongest predictor ($\beta = .41$).

Most recently, Boduszek and colleagues (2012a) carried out a larger-scale empirical investigation on the role of personality traits in the relationship between criminal social identity and

criminal thinking style within a general prison population. Results indicated that all three dimensions of personality as defined by Eysenck (1977) significantly contributed to the amount of explained variance in criminal thinking style, with psychoticism ($\beta = .35$) as a best predictor followed by neuroticism ($\beta = .11$) and extraversion ($\beta = .11$). Additionally, results from regression analysis indicated that criminal social identity (Boduszek et al. 2012c) also contributes to a better understanding of the presence of criminal thinking among prisoners. What these results suggest is that the presence of criminal friends and the presence of an antisocial personality trait may not be sufficient in order to acquire criminal thinking style without first establishing strong identifications with that particular group. In other words, the development of a criminal social identity is the prerequisite to there being any observable associations between personality traits and criminal thinking styles.

Very few studies with sound methodological designs exist which have investigated the role of personality, as defined by Eysenck (1977), and criminal thinking within an appropriate criminal population. Thus, the primary objective of this article is to provide further empirical evidence regarding the possible direct effects of criminal personality on criminal thinking styles using a relatively large sample of recidivistic violent and nonviolent offenders incarcerated in a high security prison. To control for selection effects, we needed to match prisoners based on whether or not they committed violent offenses. This was accomplished through a propensity score matching procedure. Propensity score matching mimics experimentation by isolating the effect of the treatment and thus stronger assertions about causality can be made, whereas multiple regression analysis conducted without propensity score matching only holds constant the influence of potential confounding variables. Also, post matching multivariate analysis (multiple regression in this particular case) can be used with a much larger number of covariates than would be appropriate for multiple regression without propensity score matching (Guo and Fraser 2010).

METHOD

Participants

The sample consisted of 133 violent and 179 nonviolent male recidivistic prisoners incarcerated in Nowogard High Security Prison. The respondents ranged in age from 20 to 66. The average age for participants was 33.85 ($M = 33.85$, $SD = 9.38$). Most offenders (88.1%; $n = 275$) come from urban areas. 52.2% ($n = 163$) of offenders reported possessing a primary school education, 45.5% ($n = 142$) possess a secondary school education, and 2.2% ($n = 7$) indicated some college or university educational experience. 68.3% ($n = 213$) of prisoners indicated their marital status as single, 11.9% ($n = 37$) as married, 18.6% ($n = 58$) as divorced or separated, and 1.3% ($n = 7$) as widowed. The frequency of imprisonment reported by offenders ranged from 1 to 19 times ($M = 3.57$; $SD = 2.48$) and number of reported police arrests from 1 to 20 ($M = 4.85$; $SD = 4.09$).

Procedure

The sample was recruited over a period of 3 months (March–May 2011) in Nowogard High Security Prison for recidivists. The Ethical approval for this project was granted by the Polish Prison Service. Appropriate prison staff members were instructed by the principal researcher about procedures involved in conducting this study. The questionnaires were delivered to prison by

the principal researcher. Of offenders, 362 volunteered their participation; however, only 312 (due to substantial missing data) were considered for the final analysis. Participants completed anonymous, self-administered, paper-and-pencil questionnaires that were compiled into a booklet along with an instruction sheet and a consent form attached to the front of the booklet. Each participant was provided with a brief description of the study, how to complete the questionnaire, and the general expected completion time. Participants were assured about the confidentiality of their participation and informed that they could withdraw from the study at any time. Participants completed the questionnaires within the prison in their living units. After completing the questionnaire, prisoners were asked to return it to the prison educational coordinator in a sealed envelope.

Materials

The Measure of Criminal Attitudes and Associates (MCAA; Mills and Kroner 1999) is a two-part self-report measure of criminal thinking style and associations with criminal friends. *Part A* of the measure intends to quantify associations with criminal friends. Participants were asked to recall four individuals with whom they spent most of their time before incarceration and then answered four questions regarding the degree of criminal involvement of their associates: (a) "Has this person ever committed a crime?," (b) "Does this person have a criminal record?," (c) "Has this person ever been to jail?," and (d) "Has this person tried to involve you in a crime?"

Part B is a 46-item measure of criminal thinking style (criminal attitudes) including four sub-scales: Violence (12 items), Entitlement (12 items), Antisocial Intent (12 items), and Associates (10 items). For the purpose of the current research only 3 subscales (Violence, Entitlement, and Antisocial Intent) were considered in final analysis. Sample statements included: "It's understandable to hit someone who insults you" (Violence); "A person is right to take what is owed them, even if they have to steal it" (Entitlement); "For a good reason, I would commit a crime" (Antisocial Intent). Participants responded to a dichotomous choice of yes or no. Each approval on an antisocial test's item (or rejection on a pro-social one) received 1 point, whereas each rejection on an antisocial item (or acceptance on a pro-social one) yielded 0 points. For each sub-scale, then scores were summed, with higher scores reflecting higher criminal attitudes. The reliability for the entire measure was sufficient (Cronbach's Alpha = .87).

The Measure of Criminal Social Identity (MCSI; Boduszek and colleagues 2012b) is an 8-item measure that was adopted and modified from Cameron's (1999) Social Identity Scale (12 items). The instrument intends to measure prisoners' criminal social identity. Each item was scored on a 5-point Likert scale: 1 = *strongly disagree*, 2 = *disagree*, 3 = *sometimes*, 4 = *agree*, 5 = *strongly agree*. Three items included in the scale were scored in a reverse direction (i.e., *strongly disagree* = 5 and *strongly agree* = 1). Possible scores ranged between 8 and 40, with higher scores indicating higher level of criminal identity. The measure included 3 sub-scales: In-Group Ties (3 items) subscale measures the level of personal bonding with other criminals; Cognitive Centrality (3 items) subscale measures the psychological salience of a criminal's group identity; and In-Group Affect (2 items) sub-scale measures a criminals felt attitude toward other in-group criminals. Sample items measured each aspect of criminal social identity: Cognitive Centrality (e.g., "I often think about being a criminal"); In-group Affect (e.g., "In general I'm glad to be a part of criminal group"); and In-group Ties (e.g., "I have a lot in common with other people who committed a crime"). The reliability for the entire measure was sufficient (Cronbach's Alpha = .88).

The Eysenck Personality Questionnaire Revised–Abbreviated (EPQR–A; Francis and colleagues 1992) is a 24-item inventory of 4 sub-scales with 6 items each: Extraversion (E; Cronbach’s Alpha = .73), Neuroticism (N; Cronbach’s Alpha = .71), Psychoticism (P; Cronbach’s Alpha = .61) and a Lie scale (L). It was scored on Yes (1) and No (0) format and possible scores ranged between 0 and 6, with higher scores indicating higher levels of the personality trait. Sample questions included; “Do you often feel lonely?” (N), “Do other people think of you as being very lively?” (E), “Is it better to follow society’s rules than go your own way?” (P), and “Do you always practice what you preach?” (L).

Analysis

This research project utilized a quasi-experimental design with propensity score matching in order to minimize the effect of selection bias (Rudner and Peyton 2006; Rosenbaum and Rubin 1985). It was assumed that the “treatment group” (violent offenders) would differ from the “control group” (nonviolent offenders) on a number of psychological variables, and that these variables may also predict the outcome variable (criminal thinking style). These potential confounding variables (covariates) were used to estimate a propensity score (ranging from 0 to 1) that represents each participant’s probability of being assigned to the treatment group. The propensity score is then used to create a matched sample of treatment and control participants. Thus, the propensity score is a balancing score of covariates, meaning the distribution of the covariates are the same for the treatment and control group. In order to estimate the propensity score, all covariates included in the study are combined into a single propensity score using logistic regression predicting violent offending group membership. Eight continuous covariates were included in the model. The covariates were age, level of recidivism (measured based on the frequency of incarcerations “*How many times have you been in prison?*”), associations with criminal friends, criminal thinking, criminal social identity, and personality (psychoticism, extraversion, and neuroticism). From the logistic regression model, the predicted probability (propensity score) is calculated for each offender in the sample.

After obtaining the propensity scores for each offender, a matching algorithm is utilized to match violent and nonviolent offenders. The propensity score matching procedure utilized in this study was greedy matching (nearest neighbor matching without replacement; Guo and Fraser 2010). The “MatchIt” package in R version 2.14.1 was used to perform “greedy matching,” which minimizes the total distance between treatment and control groups on their propensity scores. This allows for propensity scores to be used as a way of matching the nonviolent offenders and violent offenders at a 1:1 ratio. The algorithm attempts to retain the matches for the experimental group with the least possible number of matches first. With this new matched sample multiple regression analysis was performed to investigate what variables can be included in regression model to predict criminal thinking style.

RESULTS

Propensity Score Results

The original sample size is 312, of which 179 were nonviolent offenders and 133 were violent offenders. The first step is to assess the differences between groups on all covariates and the

outcome variable. Previous research strongly suggests that *t*-test scores can be misleading, due to statistical significance being partially influenced by the sample size (Austin 2008; Loughran et al. 2010; Rosenbaum and Rubin 1985). Therefore, the first step in determining covariate imbalance is to calculate the average difference in means, as a percentage of the average standard deviation. The standardized absolute percentage difference is based on the means, and not influenced by the unit of measurement or the sample size (Loughran et al. 2010; Rosenbaum and Rubin 1985). The following formula is used to calculate the standardized absolute differences in percentages:

$$100(M_t - M_c) / [(s_t^2 + s_c^2) / 2]^{1/2}$$

where M_t and M_c are the means for the treatment and control groups, respectively, and s_t^2 and s_c^2 are the variances. Rosenbaum and Rubin (1985) suggested that a standardized absolute difference equal to or greater than 20% is an indication of imbalance. Table 1 indicates that three of the covariates (recidivism, extraversion, and criminal identity) are imbalanced in the original full sample (before matching) and one (criminal friends) is approaching the cut-off point. This indicates the necessity of using propensity score matching.

Nearest Neighbor Matching

P_i and P_j are the propensity scores for treated and control participants, respectively, I_t is the set of treated participants, and I_o is the set of control participants. A neighborhood $C(P_i)$ contains a control participant j (i.e., $j \in I_o$) as a match for a treated participants i (i.e., $i \in I_t$), if the absolute difference of propensity scores is the smallest among all possible pairs of propensity scores between i and j , as

$$C(P_i) = \min_j \|P_i - P_j\|, \quad j \in I_o$$

Once a j is found to match i , j is removed from I_o without replacement. If for each i there is only a single j found to fall into $C(P_i)$, then the matching is nearest neighbor pair matching or 1-to-1 matching (Guo and Fraser 2010).

TABLE 1
Absolute Standardized Difference between Violent and Nonviolent Offenders before and after Matching

	<i>Before matching</i>	<i>After matching</i>
Age	9.84	4.10
Recidivism	42.54	34.68
Criminal friends (MCAA)	19.91	14.27
Criminal thinking (MCAA)	-1.34	6.77
Neuroticism (EPQR-A)	4.45	10.03
Extraversion (EPQR-A)	26.93	-5.99
Psychoticism (EPQR-A)	14.22	10.75
Criminal identity (MCSI)	21.73	10.99

After running propensity score matching (greedy matching) 133 successful paired matches were obtained ($N = 266$). More precisely, 46 cases from the control group were eliminated from the study. As shown in Table 1 only one variable (recidivism) exceeded 20% suggesting that the balance was achieved in relation to remaining variables. Finally, in order to determine the percentage difference in bias reduction for initially imbalanced covariates, the following formula was used (D'Agostino 1998; Rosenbaum and Rubin 1985):

$$100(1 - b_m/b_i)$$

where b_i and b_m are the violent and nonviolent covariate mean differences after matching and before matching, respectively. The results in Table 2 indicate that of six out of eight variables improved their balance after matching; however, criminal thinking and neuroticism standardized biases were increased.

Post-Matching Multiple Regression Analysis

Standard multiple linear regression analysis was employed to help determine which of the set of the predictor variables (violent offense, age, recidivism, associations with criminal friends, personality traits, and criminal identity) could be used to predict the presence of criminal thinking style within the current sample of prisoners. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. The proposed regression model explained 49% of the variance in the criminal thinking style ($F(8, 257) = 30.35, p < .001$). Five predictor variables were statistically significant, with psychoticism recording a higher B value than extraversion, neuroticism, criminal social identity, and associations with criminal friends (see Table 3). These results suggest that personality traits as defined by Eysenck contribute to the presence of criminal thinking style within the sample of violent and nonviolent offenders.

TABLE 2
Characteristics of Unmatched ($n = 312$) and Matched ($n = 266$) Sample and Balance Improvement after Matching

Covariates	Means before matching		M difference	Means after matching		M difference	% Balance improvement
	V	NV		V	NV		
Distance (propensity score)	.47	.39	.082	.47	.43	.039	53.24
Age	34.02	33.01	1.004	34.02	33.61	.406	59.55
Recidivism	4.19	3.12	1.071	4.19	3.30	.887	17.13
Criminal friends	17.44	14.89	2.548	17.44	15.58	1.857	27.11
Criminal thinking	30.18	30.29	-.110	30.18	29.62	.556	-405.57
Neuroticism	3.43	3.34	.093	3.43	3.23	.203	-117.41
Extraversion	4.48	4.02	.459	4.48	4.57	-.090	80.34
Psychoticism	2.17	1.97	.193	2.17	2.02	.150	22.22
Criminal identity	21.54	19.79	1.754	21.54	20.66	.879	49.84
Sample size	133	179		133	133		

V = Violent Offenders; NV = Nonviolent Offenders; 46 cases unmatched.

TABLE 3
Post-Matching Multiple Regression Analysis Predicting Criminal Thinking Style

	R^2	$adjR^2$	B	SE	t	p
Model	.49	.47				.001
Violent offense			-.39	.74	-.53	.599
Age			-.04	.04	-.95	.343
Recidivism			.15	.16	.97	.333
Criminal friends			.13	.04	3.63	.001
Neuroticism			.44	.20	2.20	.028
Extraversion			1.04	.27	3.89	.001
Psychoticism			2.16	.28	7.68	.001
Criminal identity			.30	.05	5.75	.001

DISCUSSION

The current study's primary aim was to provide a more robust understanding of the role of personality traits in the development of criminal thinking styles through the application of a relatively new statistical methodology. Criminal thinking has been well established in the emergence of criminal behavior; however, little is understood with respect to the development of criminal thinking itself. One psychological factor that has been proposed as a possible causal agent in the development of criminal thinking is individual differences in personality. Previous research work has provided tentative support for an association between personality and criminal thinking (Boduszek et al. 2011, 2012a; Bulten et al. 2009; Egan et al. 2000). However, to date no evidence exists regarding the predictive relationship of personality traits to criminal thinking styles. Traditional methodological approaches to inferring prediction such as controlled experimental manipulation and observation or large-scale longitudinal research designs are extremely difficult to implement in the context of the variables of interest herein. Applying propensity score analysis and participant matching, prior to carrying out the multivariate analysis, allows for mimicking of experimental randomization and controlling of confounding variables within a cross-sectional study design. Consequently, inferences about prediction between independent and dependent variables within a multiple regression model can be drawn with a much greater degree of certainty than was previously possible. The present study thus provides the first piece of empirical evidence of a predictive pathway between personality traits and criminal thinking styles.

Personality was measured with respect to Eysenck's (1977) three-factor conceptualization, and all three personality traits emerged as statistically significant predictors of criminal thinking. Neuroticism possessed the least robust predictive relationship to criminal thinking and also exhibited the smallest effect on criminal thinking styles of the three personality factors, while psychoticism was found to make the strongest impact on criminal thinking followed by extraversion. While these results suggest that increased levels of neuroticism, extraversion, and psychoticism all appear to lead to greater levels of criminal thinking, the most important personality factor in the development of criminal thinking is psychoticism.

These results support and advance prior findings from Boduszek et al. (2011) who found an association between psychoticism and criminal attitudes among ex-offenders, and Boduszek et al.

(2012a) who demonstrated that extraversion moderates the relationship between criminal identity and criminal thinking. While these findings had certainly suggested that personality factors were related to criminal thinking in a number of interesting ways, the present findings provide strong evidence of a predictive pathway between psychoticism, extraversion, and neuroticism, respectively, and criminal thinking.

Two other predictor variables were found to significantly contribute to the level of criminal thinking observed among the current sample of recidivistic prisoners. Associations with criminal peers possessed a robust, although weak, predictive relationship with criminal thinking, providing further empirical support for the important role of social factors in the materialization of criminal thinking (Holsinger 1999; Losel 2003). This finding supports the concept of “prisonization,” which proposes that residing in an environment filled with individuals with strong criminal identities and high levels of criminal thinking styles naturally produces increases in an individual’s own level of criminal thinking. Although it is often argued that the central role of imprisonment is to rehabilitate anti-social members of society, current findings provide a logical explanation for why so many individuals who are released from prison go on to reoffend: residing in an environment where one’s only associations are with other individuals who are criminals leads to the development of greater levels of criminal thinking, which in turn increases the probability of engagement in criminal behavior.

Criminal identity was also discovered to be a predictor of criminal thinking styles. The more strongly one views oneself as a “criminal” the more likely that person is to develop a habitual pattern of criminal thinking. In their theory of Criminal Social Identity, Boduszek and Hyland (2011) hypothesized that the internalization of a criminal identity would consequently give rise to increased levels of criminal thinking. The findings of the current study are supportive of Boduszek and Hyland’s hypothesis.

The current research project is not without its limitations. First, although the use of propensity score analysis does simulate experimental designs within a cross-sectional methodology, and thus allows for much greater confidence in the predictive relationship between variables, one should interpret the inferred causal relationships suggested by the current findings as somewhat tentative. Given that this study is the first to suggest a predictive relationship between personality and criminal thinking, replication of this study with similar methodological approaches are clearly warranted. Second, the sample included in the current study was comprised of only males, therefore generalizations to the criminal population as a whole cannot be made on the basis of current findings.

Although there is a substantial empirical support for Eysenck’s theory of crime, the research relies on the self-report measure of personality. Some studies have suggested that these scales are subject to response bias (Farrington et al. 1982); therefore, future research should consider application of different models of personality in explaining development of criminal thinking style.

Despite these limitations, findings of the current study provide a substantial contribution to the scientific literature and have a number of important implications. Our results suggest for the first time that personality traits predict the ways of thinking that are characteristic of persistent criminals and that individual differences in these psychological traits can have profound effects on an individual who operates within an environment dominated by criminal others. There now exists robust scientific evidence of the importance of personality in understanding the emergence and development of criminal thinking.

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DANIEL BODUSZEK is a Lecturer in Criminal Psychology at the University of Huddersfield. He is a quantitative researcher with a special interest in application of advanced statistical analysis and methodology to criminal psychology. He has published in areas of homicidal behavior, recidivism, criminal thinking, and criminal social identity.

MARK SHEVLIN is a Professor of Psychology at the University of Ulster. He is a quantitative researcher with a special interest in application of advanced statistical analysis and methodology to mental health. He has published in areas of trauma, psychological well-being, PTSD, and criminal psychology.

GARY ADAMSON is a Professor of Psychology at the University of Ulster. He is a quantitative researcher with a special interest in application of advanced statistical analysis and methodology to mental health. He has published in areas of alcohol abuse, trauma, health psychology, and criminal psychology.

PHILIP HYLAND is a Researcher at the University of Ulster. His areas of research include cognitive behavior therapy, forensic psychotherapy, trauma, and criminal psychology. He has published in areas of police counseling, criminal identity, recidivism, and mental health of government at-risk employees.