

DEVELOPMENT AND TESTING OF THE TEXAS CHRISTIAN UNIVERSITY CRIMINAL
THINKING SCALES 3.0 (TCU CTS 3.0)

by

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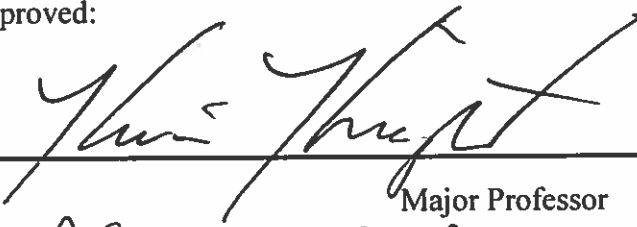
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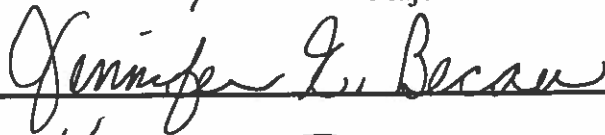
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For the College of Science and Engineering

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Development and testing of the Texas Christian University Criminal Thinking

Scales 3.0 (TCU CTS 3.0)

In 2020, there were approximately 2.3 million people incarcerated in the United States and another 3.8 million people under community supervision (Kaeble, 2021; Sawyer & Wagner, 2020). Individuals involved with the justice system experience elevated rates of behavioral health problems when compared to the general population (see Substance Abuse and Mental Health Services Administration, 2019 for a full review). This is troublesome considering most people involved with the justice system in need of behavioral health services do not receive treatment (Bronson et al., 2017; Sawyer, 2017). Further, people involved in the community justice system must overcome barriers such as transportation, employment, and insurance, precluding access to available care (e.g., Northcutt Bohmert, 2016; Sveinsdottir & Bond, 2017; Winkelman et al., 2016). This discrepancy between high treatment needs and limited access to treatment opportunities contributes, at least in part, to the high rates of recidivism in the United States. A longitudinal study assessing the incidence of recidivism in the United States found that 83% of people released from prison were rearrested within 9 years (Alper et al., 2018). As a result, a primary aim of the justice system is to maximize limited resources in terms of providing empirically supported services that target treatment risks and, in turn, mitigate clients' risk for recidivism (e.g., Hiller et al., 1999).

Providing effective services to people involved in the justice system depends on the identification of clients' needs and implementation of evidence-based services. The Risk-Need-Responsivity (RNR) model (Andrews & Bonta, 2010; Andrews et al., 1990) provides a systematic framework to assist correctional staff and treatment providers identify who should receive treatment and appropriate therapeutic targets (i.e., criminogenic needs). In brief, this

process includes: 1) assessing individuals' risk for recidivism at intake, 2) pinpointing clients' criminogenic needs, and 3) combining this information to create individualized treatment plans for those who enter treatment (Bonta & Andrews, 2007). Risks for recidivism include static factors (such as criminal history) that predispose a person or a particular group to subsequent involvement with the justice system. In a longitudinal study including more than 20,000 justice-involved people, the strongest predictors of recidivism were static factors such as age, assigned sex at birth, and self-reported criminal history (Caudy et al., 2013). Alternatively, client needs are modifiable factors (e.g., substance use, involvement with antisocial peers, antisocial attitudes) related to reoffending. Attitudes about violence, for example, added in the prediction of violent recidivism above and beyond risk assessments alone (Mills et al., 2004). Given client needs are theoretically malleable, a considerable amount of work has been devoted to understanding, and accurately measuring, the criminogenic needs predictive of criminal behavior.

The present study focused on the assessment of a criminogenic need consistently associated with recidivism: criminal thinking. More specifically, this study modified the Texas Christian University Criminal Thinking Scales (TCU CTS) using Item Response Theory (IRT). While measures of criminal thinking exist, this area could benefit from further evaluation with advanced analytic models and modification to incorporate constructs of criminal thinking that may serve as additional clinical targets. To that end, the following sections describe: 1) an overview of theoretical models for criminal thinking and behavior, 2) a review of empirical investigations examining the correlates of criminal thinking in justice-involved populations, and 3) a discussion on extant measures of criminal thought processes.

Theoretical Models of Criminal Thinking and Behavior

The concept of criminal thinking is generally integrated in the foundations of cognitive theory. Sykes and Matza (1957) theorized that criminal thinking involves neutralization techniques intended to undermine the seriousness of one's criminal behavior. This includes refusing to take responsibility for one's actions, denial of harm to others, and hostility towards authority figures. Based on their clinical work with adolescents, Yochelson and Samenow (1993) conceptualized criminal thinking patterns (e.g., anger, concrete thinking, lying) and automatic thinking errors (e.g., lack of trust, independence, personal irresponsibility) as fundamental components of the "criminal personality." More recently, Walters (1990, 2002a, 2006a) proposed their Lifestyle Theory that posits criminogenic cognitions, in conjunction with choices and conditions, are what maintain a "criminal lifestyle." Criminal thinking styles (e.g., Entitlement, Power Orientation, Cognitive Intolerance) are thought to be composed of sub-schematic networks created through the combination of individual schemas (e.g., ownership, uniqueness, necessity). In addition, these sub-schematic networks are theorized to be nested in generalized belief systems about oneself, the world, and others (Walters, 2006b).

Behavioral psychologists conceptualize subtle events (e.g., thoughts, feelings, emotions) as ontologically similar to public events (e.g., overt behavior; Kantor, 1978; Moore, 1980; Skinner, 1969). Further, all psychological terms can be understood behaviorally by examining the conditions under which the word is used (Skinner, 1945). For example, the concept of criminal thinking is perhaps most frequently used as a term describing maladaptive subtle events supportive of criminal involvement. Although these thought processes can take many different forms (e.g., Entitlement, Personal Irresponsibility, Power Orientation), this perspective would conceptualize these events as sharing the same functional response. Put differently, whether a

person dismisses accusations of criminal misconduct or justifies their actions, these behaviors are similar in that they select for the same environmental consequence (i.e., not having to confront the seriousness of one's behavior). This characteristic of criminogenic cognitions suggests these behaviors can be operationalized as an entire functional class (i.e., behaviors sharing the same function). Correspondingly, this study approached criminogenic cognitions as a response class of subtle behaviors intended to ameliorate aversive contingencies.

Current approaches describing criminal behavior, and in turn criminal thinking, have emphasized the situational factors responsible for evoking criminal thought processes (e.g., Akers & Jensen, 2008; Cohen & Machalek, 1988). Sutherland (1947) introduced the model of differential association arguing that criminal behavior (i.e., criminal thinking) is learned primarily in social situations. Sutherland's model has been criticized for not articulating *how* criminal behavior is learned and failing to generate a theoretical model that can be tested experimentally (e.g., Burgess & Akers, 1966; Cressey, 1952; Kornhauser, 1974). Burgess and Akers (1966) revised the differential association model by reconceptualizing Sutherland's ideas using the principles of operant conditioning. This revised version denotes that criminal behavior is a function of a person's learning history and environmental consequences. This contextual-based approach later provided the framework for Akers' (1973) social learning theory of deviant behavior, which highlights the contribution observational learning (i.e., associating with deviant peers) has in the development of criminal behavior (see Akers, 2002 for a comprehensive review).

All things considered, cognitive-oriented approaches have focused their attention on understanding the *topography* of criminal thinking styles (Sykes & Matza, 1957; Walters, 1990, 2002b, 2006b; Yochelson & Samenow, 1993; cf. Walters, 2012a), whereas behavioral

approaches have emphasized the *origins* of criminal thinking (Akers & Jensen, 2008; Burgess & Akers, 1966; Cohen & Machalek, 1988; Sutherland, 1947). In therapeutic contexts, cognitive approaches assume that attenuating antisocial thoughts is a practical means of reducing criminal involvement (Andrews et al., 1990, 2006; Walters, 2006a; Yochelson & Samenow, 1993). While cognitive-based interventions indirectly targeting criminal thinking have been associated with reductions in recidivism (Antonowicz & Ross, 2005; Bourgon & Armstrong, 2005; Friendship et al., 2003; Walters, 2005; cf. Juarez & Howard, 2021), laboratory research suggests rule-governed behavior (e.g., “Don’t experience this thought”) counterintuitively promotes behavioral insensitivity (Catania et al., 1989; Hayes et al., 1986; Hayes & Gifford, 1997). Consequently, clinical approaches to criminal thinking that emphasize function over topography (e.g., Hayes, 1987; Kohlenberg et al., 1993) provides an alternative, or perhaps complementary, approach to understanding these thought processes in clinical settings and how they should be measured.

Empirical Findings on Criminal Thinking

In empirical studies, criminal thinking patterns are approached as malleable criminogenic needs contributing to overt criminal behavior (e.g., Andrews et al., 2006). Indeed, meta-analytic studies have implicated criminal thinking as a robust predictor of criminal involvement (see Walters, 2002a, 2012a). Criminal thinking, as indicated by the Psychological Inventory of Criminal Thinking Styles (PICTS), prospectively predicted general and serious recidivism while controlling for psychopathy, age, and criminal history (Walters, 2009). Pride in delinquency and antisocial attitudes were positively correlated with self-reported measures of delinquent and aggressive behavior in a sample of youth involved in the juvenile justice system (Skilling & Sorge, 2014). Among justice-involved adults, superoptimism (i.e., the belief that the negative consequences of criminal behavior can be avoided) predicted reconviction at a 2-year follow up

(Palmer & Hollin, 2004a), and justification of criminal behavior was positively associated with the amount of acquisitive crime reported in the past 30 days (Packer et al., 2009).

Examining moderators of the criminal thinking-behavior relationship helps elucidate *for whom* and *when* criminal thinking is linked to criminal behavior. Studies in this area have focused on static factors (e.g., age, assigned sex, race, education) that moderate the relationship between criminal thinking and recidivism. In one such investigation, educational attainment qualified the criminal thinking-recidivism relationship; criminal thinking styles positively predicted recidivism for people with more than 12 years of education but not less (Walters, 2014; cf. Folk et al., 2018; Mandracchia & Morgan, 2012). Likewise, justice-involved people who were younger, racial minorities, had a psychological disorder, or were not receiving mental health services endorsed higher levels of criminal thinking (Mandracchia & Morgan, 2012). Males involved in the criminal justice system have frequently reported higher levels of criminal thinking when compared to their female counterparts (Sana & Batool, 2017; Staton-Tindall et al., 2007; Taxman et al., 2011; cf. Vaske et al., 2017). From a behavioral perspective, individual differences in criminal thinking can be understood in reference to one's history of learning in situations that select for criminal thought processes.

Aside from criminal involvement, people with a robust criminal thinking repertoire may be less responsive to interventions for substance use. People using substances with higher levels of criminal thinking, for example, have reported less treatment satisfaction, counselor rapport, and treatment participation (Best et al., 2009). Using the Criminogenic Thinking Profile (CTP), a lack of empathy for others was associated with greater client attrition (Mitchell et al., 2013). Reactive criminal thinking, defined as criminal thought processes that are impulsive, reckless, or emotional (Walters, 2016), carried the relationship between self-reported substance use and

recidivism in a longitudinal study including males in federal prison (Walters, 2012a). Criminal thinking may impede clients' progress in treatment and in turn increase their likelihood of reoffending. For example, criminal thinking was associated with less treatment engagement, which in turn predicted rearrest for males and females involved with the justice system (Yang et al., 2013). Together, criminal thinking is a dynamic risk factor associated with recidivism and worse substance use treatment outcomes. Assessments integrated in psychological theory that can effectively measure criminal thought processes are paramount to evaluating clients' needs, linking them with appropriate care, and assessing the effectiveness of programs designed to meet those needs.

Measures of Criminal Thinking

Among the extant scales for criminal thinking, the PICTS is a well-validated measure of the criminal thought processes that support a "criminal lifestyle" (Walters, 1990). This 80-item instrument takes approximately 25 min to complete and yields eight scale scores: Mollification, Cutoff, Entitlement, Power Orientation, Sentimentality, Superoptimism, Cognitive Intolerance, and Discontinuity (Walters, 2001). Another popular assessment of criminal thinking with strong psychometric properties is the Criminal Sentiments Scale-Modified (CSS-M; Simourd, 1997). The CSS-M is a 41-item measure of antisocial attitudes, values, and beliefs. Other relevant assessments of criminal thinking include the TCU CTS (Knight et al., 2006), Criminogenic Cognitions Scale (CCS; Tangney et al., 2012), Pride in Delinquency Scale (PDS; Simourd, 1997), Indigenous Criminal Thinking Scale (ICTS; Sana & Batool, 2017), Measure of Offender Thinking Styles-Revised (MOTS-R; Mandracchia & Morgan, 2011), Criminogenic Thinking Profile (CTP; Mitchell & Tafrate, 2012), and Measure of Criminal Attitudes and Associates

(MCAA; Mills et al., 2002). See Table 1 for a summary of relevant measures of criminal thinking.

Table 1

Measures of Criminal Thinking

Measure	Authors	Scales	Reliability (α)	# Of Items
TCU CTS	Knight et al. (2006)	Entitlement; Power Orientation; Justification; Personal Irresponsibility; Criminal Rationalization; Cold Heartedness	0.68-0.81	36
PICTS	Walters (1995)	Mollification; Cutoff; Entitlement; Power Orientation; Sentimentality; Superoptimism; Cognitive Intolerance; Discontinuity	0.64-0.79	80
CSS-M	Simourd (1997)	Attitudes Toward the Law; Court; Police; Tolerance for Violations; Identification with Criminal Others	0.70-0.76	41
PID	Simourd (1997)	Attitude Towards Offenses; Criminal Subculture	0.75-0.79	10
CCS	Tangney et al. (2012)	Entitlement; Failure to Accept Responsibility; Short-term Orientation; Negative Attitudes towards Authorities; Insensitivity to Impact of Crime	0.51-0.81	25
ICTS	Sana et al. (2017)	Criminal rationalization; Entitlement; Power Orientation; Vindication; Personal Irresponsibility	0.58-0.77	25
MOTS	Mandracchia & Morgan (2007)	Control; Cognitive Immaturity; Egocentrism	0.81-0.92	65

Table 1 (continued)

Measure	Authors	Scales	Reliability (α)	# Of Items
CTP	Mitchell & Tafrate (2012)	Disregard for Others; Demand for Excitement; Poor Judgement; Emotionally Disengaged; Parasitic/Explosive; Justifying; Inability to Cope; Grandiosity	0.73-0.92	62
MCAA	Mills & Kroner, 1999	Violence; Entitlement; Antisocial Intent; Antisocial Associates	0.63-0.84	46

Note. TCU CTS = Texas Christian University Criminal Thinking Scales, PICTS = Psychological Inventory of Criminal Thinking Styles, CSS-M = Criminal Sentiments Scale Modified, PID = Pride in Delinquency Scale, CCS = Criminogenic Cognitions Scale, ICTS = Indigenous Criminal Thinking Scale, MOTS = Measure of Offender Criminal Thinking Styles, CTP = Criminogenic Thinking Profile, MCAA = Measure of Criminal Attitudes and Associates.

Assessments of criminal thinking can be summarized into two broad categories: 1) maladaptive thinking patterns and 2) antisocial attitudes. Maladaptive thinking patterns refer to rigid thinking patterns or verbal conceptualizations associated with criminal involvement. Namely, most instruments of criminal thinking include scales for Entitlement, Power Orientation, Justification, Personal Irresponsibility, or other related constructs (e.g., Justifying, Vindication, Cognitive Intolerance). This correspondence across scales suggests maladaptive thinking patterns are an agreed upon feature of criminal thinking, and empirical studies have supported the validity of these concepts (Knight et al., 2006; Sana & Batool, 2017; Walters, 2002b). Furthermore, the referents of these processes are easily identifiable for researchers and practitioners working in the field. Personal Irresponsibility and Entitlement could manifest behaviorally in terms of someone verbally blaming others for their behavior or taking things from others without asking, respectively.

Antisocial attitudes towards authority figures or the justice system are assessed by a fewer number of scales (e.g., CSS-M, CCS, TCU CTS, MCAA). Simourd (1997) defined criminal attitudes as “attitudes/values/beliefs/rationalizations supportive of criminal conduct” (pg. 53). Circularity aside, antisocial attitudes have been correlated with criminal behavior in justice-involved populations (Mills et al., 2002, 2004; Walters & DeLisi, 2013). At a conceptual level, however, it remains unclear whether attitudes are predictors of behavior or an outcome (see Kroesen et al., 2017; cf. Ajzen, 1991; Fishbein & Ajzen, 1977). This is to say, it could follow that justice-involved people are more likely to hold negative beliefs towards authority figures because of their involvement in the justice system. Exacerbating this concern is that certain groups of people (e.g., racial and ethnic minorities) may hold negative attitudes about the justice system for reasons unrelated to criminal thinking (e.g., Smith et al., 2014; Wortley & Owusu-Bempah, 2009). Accordingly, including measures of attitudes towards the criminal justice system as an assessment of criminal thinking raises both conceptual and ethical concerns.

Texas Christian University Criminal Thinking Scales

The TCU CTS is a brief, cost-effective, and easily interpretable assessment measuring criminal thinking in six key dimensions: Entitlement (EN), Personal Irresponsibility (PI), Justification (JU), Criminal Rationalization (CN), Power Orientation (PO), and Cold Heartedness (CH). An advantage of the TCU CTS over other instruments of criminal thinking is that it measures the breadth of criminal thinking in a short 36-item instrument. The TCU CTS scales have demonstrated acceptable scale structure, internal consistency ($\alpha = 0.68-0.78$), and test-retest reliability (0.69-0.84; Knight et al., 2006). Succeeding examinations have supported the validity of the TCU CTS, having been correlated with treatment engagement, substance use severity, and prior criminal behavior (Dembo et al., 2007; Pankow et al., 2012; Simpson et al., 2012).

However, given uncertainty about the six-factor solution and lack of evidence about the use of the instrument to predict criminal involvement (see Taxman et al., 2011), there is an opportunity to improve the composition and evidence of the TCU CTS. Thus, the primary goal of this study was to re-assess and improve upon the TCU CTS using a combination of IRT and Classical Testing Theory (CTT) procedures.

As a secondary goal, this study addressed the behavioral approach to criminal thinking by introducing a novel assessment of criminogenic thought processes. Specifically, this study examined the inclusion of a scale measuring *response disinhibition*, the capacity to negate inappropriate or unwanted behavior in alignment with one's goals (Mostofsky & Simmonds, 2008). The term was originally introduced by Neill (1977), who theorized there was an inhibitory system responsible for regulating attention (i.e., behavior) in contexts with competing contingencies. In clinical populations, response disinhibition has been linked to a range of psychological disorders (see Wright et al., 2014 for a full review). Similarly, response disinhibition has been implicated with antisocial behavior, criminal behavior, and recidivism in samples of adults and youth involved in the justice system (Adjorlolo & Egbenya, 2016; Guan et al., 2015; Prateeksha et al., 2014; Vedelago et al., 2019). Conceptually, people with high *response disinhibition* may be unable to discern between the competing contingencies in their environment and experience difficulties selecting for behaviors that align with their values. This conceptualization implies response disinhibition is inherently manipulable, which contrasts mentalistic constructions of criminal thinking that more closely resemble personality characteristics (e.g., demand for excitement, parasitic, discontinuity). In turn, interventions that foster clients' capacity to contact their values in a variety of contexts could provide a means of buffering the associated consequences of high response disinhibition. For example, a client that

can access the value, “I strive to be a good person,” when distressed, angry, or upset may be less likely to engage in antisocial behavior.

In working towards a psychometrically strong assessment of criminal thinking, it is important to establish the validity of a revised instrument. A measurement is considered valid if it accurately measures the proposed theoretical construct (Svensson, 2011). While researchers cannot prove an assessment is valid, per se, a scale’s ability to measure a given construct can be determined using tests of content and criterion validity. For example, items on the TCU CTS should appear to be measuring the latent variable of interest (i.e., criminal thinking), which would be indicative of content validity (i.e., face validity). Psychometric studies evaluating the criterion validity of criminal thinking scales have assessed the relation between criminal thinking and measures of criminal history, disciplinary infractions, and recidivism (Palmer & Hollin, 2004b; Walters, 1996, 2012b). Therefore, as a measure of criterion validity, this study investigated whether the current version of the TCU CTS scales was associated with self-reported criminal history.

Current Study

The purpose of this study was to modify the TCU CTS scales, a widely used assessment of criminal thinking in justice-involved populations. This was achieved by removing items with poor face validity, rewording items that were difficult to understand, and adding new items to the PO, JU, CH, EN, and PI scales. The CN scale was removed because of conceptual concerns surrounding the inclusion of negative attitudes towards the justice system since responses to items within this scale might be accurately reflective of the justice system as opposed to being a criminal thinking pattern. The CN scale was replaced with a new scale measuring Response Disinhibition (RD). The author hypothesized that the revised version of the TCU CTS (referred

here forward as the TCU CTS 3.0) would load onto six factors: PO, JU, CH, EN, PI, and RD. It was also theorized that reliability estimates (i.e., Cronbach's alpha) would reach an acceptable value for all scales ($\alpha \geq 0.70$; Cortina, 1993). As an assessment of validity, the author expected that the proposed measures of criminal thinking would be positively associated with respondents' self-reported criminal history.

Based on simulation studies, the author determined a priori that responses from approximately 700-1,000 people were required to sufficiently power analyses and obtain accurate parameter estimates (De Ayala, 1994; Reise & Yu, 1990). All analyses presented herein were performed in R Studio Version 1.4.1717, and a critical p-value of .05 determined statistical significance. Data for this study were not analyzed until all responses had been collected.

Method

Participants

Following approval from the TCU Institutional Review Board, this study requested secondary TCU CTS 3.0 and demographic data from 866 justice-involved males and females incarcerated at four correctional drug treatment facilities located in the southern United States. Data were collected on scannable paper surveys and converted to an electronic file using SNAP Surveys. Prior to data analysis, the author examined study responses individually for quality assurance. Respondents who did not show any variability in their responses (e.g., acquiescent responding) or provided nonsensical answers (e.g., making patterns of the survey) were removed from the dataset. In total, 69 people (8.0%) were excluded from the dataset for providing low quality data.

As shown in Table 2, the final sample consisted of 528 males (66.2%) and 269 females with most between the ages of 25-44 ($n = 558, 70.0\%$). Most participants were White ($n = 621,$

77.9%), followed by Black/African American ($n = 70$, 8.8%), Multiracial ($n = 42$, 5.3%), or other (e.g., Asian, American Indian, Pacific Islander; $n = 64$, 8.0%). Nearly all of the people in this study were non-Hispanic or -Latino ($n = 749$, 95.2%). Two hundred and twenty-nine people (28.7%) self-reported unstable housing and 318 (39.9%) were without work during the 6 months prior to incarceration. Respondents most frequently self-reported being arrested between 11-50 times ($n = 308$, 38.6%) while 369 (46.3%) participants reported being convicted of a crime between 2-5 times. Altogether, approximately one-third ($n = 280$, 35.1%) of the participants in this study reported being incarcerated between 2-5 times in their life.

Table 2

Sample Characteristics (N = 797)

Characteristic	Total n	Percent (%)
Age		
18-24	59	7.4
25-44	558	70.0
45 +	180	22.5
Assigned Sex at Birth (% male)	528	66.2
Race		
<i>BIPOC</i>	158	22.0
<i>White</i>	621	77.9
Hispanic (% yes)	38	4.8

Table 2 (continued)

Characteristic	Total <i>n</i>	Percent (%)
Six Months prior to Incarceration (% no)		
<i>Employed</i>	318	39.9
<i>Stable housing</i>	229	28.7
Lifetime Arrests		
<i>0-5 times</i>	194	23.8
<i>6-10 times</i>	253	31.7
<i>11+</i>	346	43.4
# Times Convicted		
<i>0-5 times</i>	463	58.3
<i>6-10 times</i>	183	23.0
<i>Over 10 times</i>	148	18.6
# Times Incarcerated		
<i>0-5 times</i>	316	39.7
<i>6-10 times</i>	245	30.7
<i>Over 10 times</i>	235	29.5

Note. BIPOC = Black, Indigenous, People of Color.

Procedure

As outlined by Boateng and colleagues (2018), scale development was carried out in the following phases: 1) item development, 2) scale development, and 3) scale evaluation. In phase one, the author used the literature to articulate the domains of criminal thinking intended to be measured. Items with poor face validity (as determined by the author) were dropped and the

remaining items were evaluated for revisions. New items were generated to replace the dropped items and wording changes were made to the remaining items when necessary. Additional items were added to each scale for item reduction purposes. Finally, the CN scale was removed because of concerns about the validity of measuring negative attitudes towards the criminal justice system as a measure of criminal thinking. Scale items on the CN scale were replaced with items intended to measure RD. Items for the RD scale were created using the positive and negative urgency scales included within the TCU Adolescent Thinking Form (Knight et al., 2014). As written, these scales capture the extent to which someone behaves rashly when experiencing positive or negative emotions (Whiteside & Lynam, 2001). These items were revised to measure the degree to which people have difficulties regulating their behavior when overwhelmed.

The revised 60-item CTS 3.0 (10 items per scale) was reviewed by correctional staff and treatment providers for face validity (see Appendix A). This information was used to make further revisions to the items, address changes when necessary, and replace items deemed unrelated to criminal thinking. As an example of the changes made from this feedback, the name of the CH scale was changed to Unsympathetic (US) to avoid potentially stigmatizing language when sharing feedback with clients.

Measures

Demographic Information

Secondary demographic information was based on an adapted version of the TCU Global Risk Assessment (TCU RSKForm; Institute of Behavioral Research, 2008a; see Appendix B). This instrument asked respondents to report their age, race, ethnicity, housing stability, and employment status.

Self-Reported Criminal History

Secondary data on criminal history was based on the TCU Criminal History Risk Form (TCU CRHSForm; Institute of Behavioral Research, 2008b; see Appendix C); this is a 22-item assessment of self-reported criminal history. The measure asks respondents to report on their history of arrests, convictions, and incarcerations. Sample items include, “Altogether, how many times have you ever been in detention, jail, or prison” and “In total, how many times have you been arrested in your lifetime?” As an assessment of criminal history, this study requested data on Items 1, 2, and 4.

Criminal Thinking

The 60-item TCU CTS 3.0 replaced the current agency use of the TCU CTS and was administered at each site as a part of an updated routine data collection protocol. The TCU CTS 3.0 that was administered included the following scales: Entitlement (EN), Justification (JU), Power Orientation (PO), Unsympathetic (US), Personal Irresponsibility (PI), and Response Disinhibition (RD). The TCU CTS 3.0 items included a 4-point Likert scale response option (1 = *Strongly Disagree*, 4 = *Strongly Agree*) with respondents being asked to rate their agreement with each item. Scores for each scale were calculated by taking the mean of all items, with a higher score indicating a higher degree of criminal thinking.

Analytic Plan

Data were analyzed for missingness, and descriptive statistics were calculated for participants’ demographic information.

Item Level Analyses

Item evaluation and reduction was performed using a combination of IRT and CTT procedures. That is, item level analyses were generated using a graded response model

(Samejima, 2010) wherein ordinal polytomous items were tested within their respective scales. Scales were evaluated individually because multiple latent variables were thought to underlie the TCU CTS 3.0. To test the assumption of unidimensionality, scales were examined using principal components analysis (PCA), and Kaiser's criteria determined scale dimensionality (Kaiser, 1960). Item Characteristic Curves (ICCs; i.e., Option Characteristic Curves) were generated to test the assumption of functional form and determine whether scale responses (e.g., *Strongly Disagree*) corresponded to their measurement of the latent variable (i.e., criminal thinking). Responses of "*Strongly Disagree*" were expected to be related to low ability levels (i.e., low levels of criminal thinking) and responses of "*Strongly Agree*" were expected to be related to high ability levels (i.e., high levels of criminal thinking).

Next, scale items were examined using their Item Information Curves (IICs). Item Information Curves provide a visual representation of the amount of information captured by a particular item above and below the mean. Items with a slope in a positive direction capture a large amount of information, whereas items with a slope near zero do not discriminate between people at the construct level (Rolffs et al., 2018). Items with IICs shifted towards the y-axis assess low ability levels and items shifted away from the y-axis measure high ability levels. To maximize the efficiency of the instrument, the author planned to retain six out of the 10 items in each scale that provided the most information (per discrimination values) across varying levels of criminal thinking (e.g., Daks et al., 2021; Hambleton et al., 1991; Rolffs et al., 2018).

Item Reduction

The Kaiser-Meyer Olkin (KMO) Test for Sampling Adequacy and Bartlett's Test of Sphericity first assessed whether the variance among scale items could be explained by underlying components (Williams et al., 2010). The sample was randomly split in half (Fabrigar

et al., 1999), and PCA was used as an item reduction technique. The aforementioned procedures were conducted using an oblique rotation, thereby allowing factors to be correlated (Osborne, 2015). Scale items with item-total correlations less than 0.40 were removed from subsequent analyses (DeVon et al., 2007). Components with an eigenvalue greater than one were retained (Kaiser, 1960). Internal reliability scores (i.e., Cronbach's alpha) were calculated for each component (Cronbach, 1951). Internal reliability estimates greater than or equal to 0.70 were considered reliable (Cortina, 1993). Descriptive statistics and scale scores were calculated for the TCU CTS 3.0 by taking the mean of all items within each scale.

Confirmatory Factor Analysis

Using the other half of the sample, confirmatory factor analysis with robust standard errors (Li, 2016) sought to verify the scale structure using indices of model fit. Model estimation methods included minimum fit χ^2 , Tucker-Lewis Index (TLI), Root Mean Squared Error Approximation (RMSEA), Comparative Fix Index (CFI), and Standardized Root Mean Residual (SRMR). Hu and Bentler's (1999) criteria were used as a guideline for assessing model fit. To test whether the TCU CTS 3.0 was measuring the same construct among people belonging to different demographic backgrounds, measurement invariance was assessed across assigned sex at birth (males vs. females) and race group (White vs. Black, Indigenous, and People of Color [BIPOC]; Meredith, 1993; Putnick & Bornstein, 2016). A configural invariance model was fitted wherein the factor structure of the scale was forced onto each group (i.e., Males vs. Females; White vs. BIPOC). Next, items were examined in terms of their contribution to the latent variables by requiring the factor loadings to be equal across groups (i.e., metric invariance) followed by item intercepts being fixed across groups (i.e., scalar invariance). The configural

model, metric model, and scalar model were compared using a chi-squared test, with significant results indicative of measurement non-invariance.

Validity

Criterion validity was assessed by determining whether the TCU CTS 3.0 scales were correlated with each other and participant-reported criminal history.

Results

Missing Data

Preliminary examination of the data showed that 1.1% of the data was missing. A point-biserial correlation showed that age was significantly correlated with missingness ($r = -0.07$, $p = .036$, $R^2 < .01$), such that being older was associated with less missing data. A chi-square test showed that those who were BIPOC (37.0%) had more missing data when compared to people who were White (21.0%), $\chi^2(1) = 18.99$, $p < .001$, $\phi = .15$. Assigned sex at birth (male vs. female) and employment status prior to incarceration (employed vs. without work) were not related to missingness, $\chi^2_s(1) \leq 1.41$, $ps \geq .235$, $\phi_s \leq .04$. It was determined that missingness was occurring at random and therefore subsequent analyses were performed using listwise deletion (Bennett, 2001).

Item Level Analyses

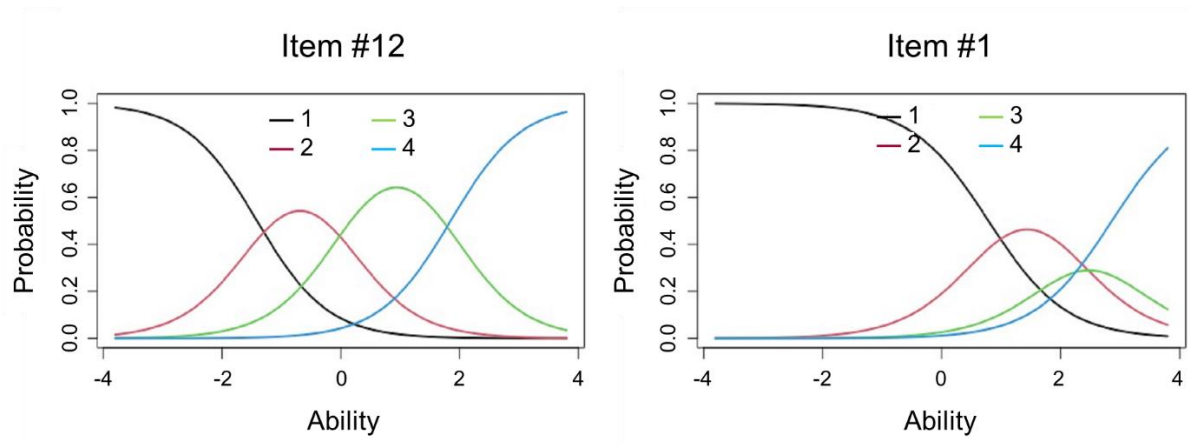
To test the assumption of unidimensionality, PCA was used to generate a components matrix for each theorized measure of criminal thinking (i.e., PO, JU, US, EN, PI, RD; see Abdi & Williams, 2010). All scales except for US loaded onto a single factor with component loadings greater than or equal to 0.40. According to the Kaiser's criteria (Kaiser, 1960), the 10-item US scale contained two components. Examining the scale's component matrix showed that four items (i.e., Items 4, 10, 22, 40) were loading onto a separate component. These items were

dropped resulting in a 6-item US scale that loaded onto a single component, satisfying the assumption of unidimensionality.

Item Characteristic Curves were generated to test the assumption of functional form. The *Strongly Disagree* response category on Item 12 (“When you feel rejected, you will say things that you later regret”) had the highest probability of being selected at low levels of criminal thinking whereas the *Strongly Agree* response category was most likely to be selected at high levels of criminal thinking (see Figure 1). At some point each response category had the highest probability of being selected, satisfying the assumption of functional form. In contrast, several items (e.g., 1, 7, 11, 23, 41, 15, 27, 28, 52, 24, 26) violated the assumption of functional form and were removed from subsequent analyses.

Figure 1

Assessing the Assumption of Functional Form



Note. Legend indicates 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly Agree*.

A graded response model generated item level statistics and IICs for the 56-item TCU CTS 3.0 (see Table 3). As illustrated in Figure 2, Item 6 (“When you are upset, you often act without thinking”) measured low, medium, and high levels of criminal thinking whereas Item 16 (“It is okay to lie and manipulate others to get what you want”) measured moderate to high levels of criminal thinking. Looked at differently, Item 16 had a larger discrimination value (i.e., slope; $a = 2.27$) than Item 6 ($a = 1.76$), suggesting this item is more adept at discriminating between respondents albeit at a different ability level. The item with the highest discrimination value was 59 (i.e., “Your family and/or friends are to blame for your criminal behavior”; $a = 3.39$) and item with the lowest discrimination value was 27 (i.e., “You like to be in control”; $a = 0.76$). Ideally, a psychological assessment would include highly discriminatory items that measure all ability levels (see Thomas, 2011 for a full review). However, most scales on the TCU CTS were measuring moderate to high ability levels (see Figure 3). The exception to this trend was the US and RD scales. The US scale measured low ability levels and the RD scale measured low, medium, and high ability levels. Collectively, given most items measured high ability levels with moderate to high discrimination values, the author was unable to further reduce the scales to six items. Put another way, most items on the TCU CTS were comparable and therefore it was not appropriate to use the item level analyses as a means of item reduction.

Table 3*Item Discrimination and Difficulty Scores*

Item #	a	b_1	b_2	b_3
US				
16	2.27	0.43	1.68	2.48
34	2.89	0.10	1.29	2.18
46	1.91	-0.09	1.45	2.68
58	3.11	-0.07	1.15	1.94
PI				
5	1.71	-0.06	1.32	2.33
17	2.09	-0.10	1.07	2.15
29	2.87	0.32	1.50	2.17
35	2.45	0.24	1.38	1.93
47	2.46	0.13	1.37	2.07
53	3.07	0.15	1.33	1.90
59	3.39	0.28	1.32	2.00

Table 3 (continued)

Item #	<i>a</i>	<i>b₁</i>	<i>b₂</i>	<i>b₃</i>
PO				
3	1.32	-0.86	0.87	2.65
9	2.14	-0.07	1.36	2.41
21	1.75	-0.37	1.05	2.46
33	2.72	0.00	1.14	2.09
39	1.72	-0.56	0.78	2.06
45	2.56	-0.29	0.93	1.98
51	1.69	-0.48	1.15	2.85
57	2.15	-0.21	1.22	2.52
JU				
2	1.74	0.44	1.71	2.86
8	1.80	-0.04	1.39	2.59
14	2.21	0.24	1.35	2.45

Table 3 (continued)

Item #	<i>a</i>	<i>b₁</i>	<i>b₂</i>	<i>b₃</i>
20	2.24	0.21	1.32	2.51
26	2.19	-0.12	1.32	2.51
32	3.28	0.29	1.40	2.21
38	2.40	0.29	1.41	2.22
44	2.21	0.08	1.49	2.36
50	2.10	-0.17	1.09	2.77
56	2.46	-0.04	1.28	2.40
EN				
13	2.88	0.34	1.43	2.88
19	2.20	0.14	1.45	2.20
25	2.44	-0.07	1.40	2.44
31	2.97	0.37	1.51	2.97
37	2.27	-0.03	1.55	1.67

Table 3 (continued)

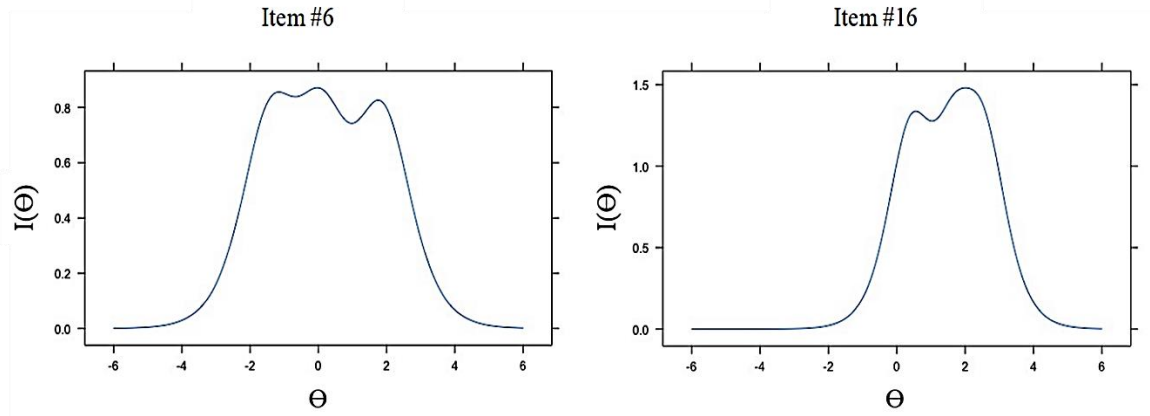
Item #	<i>a</i>	<i>b₁</i>	<i>b₂</i>	<i>b₃</i>
43	1.67	-0.41	1.33	2.34
49	3.33	0.23	1.47	2.14
55	2.10	-0.06	1.41	2.40
RD				
6	1.76	-1.40	0.08	1.88
12	1.68	-1.41	0.03	1.85
18	1.67	-1.19	0.35	1.85
30	2.30	-0.92	0.20	1.64
42	1.89	-0.53	0.76	2.11
48	1.54	-1.11	0.15	2.12
54	2.09	-0.94	0.11	1.83
60	2.35	-0.70	0.28	1.57

Note. UN = Unsympathetic; PI = Personal Irresponsibility; PO = Power Orientation; JU = Justification; EN = Entitlement; RD =

Response Disinhibition; *a* = Discrimination; *b* = Difficulty.

Figure 2

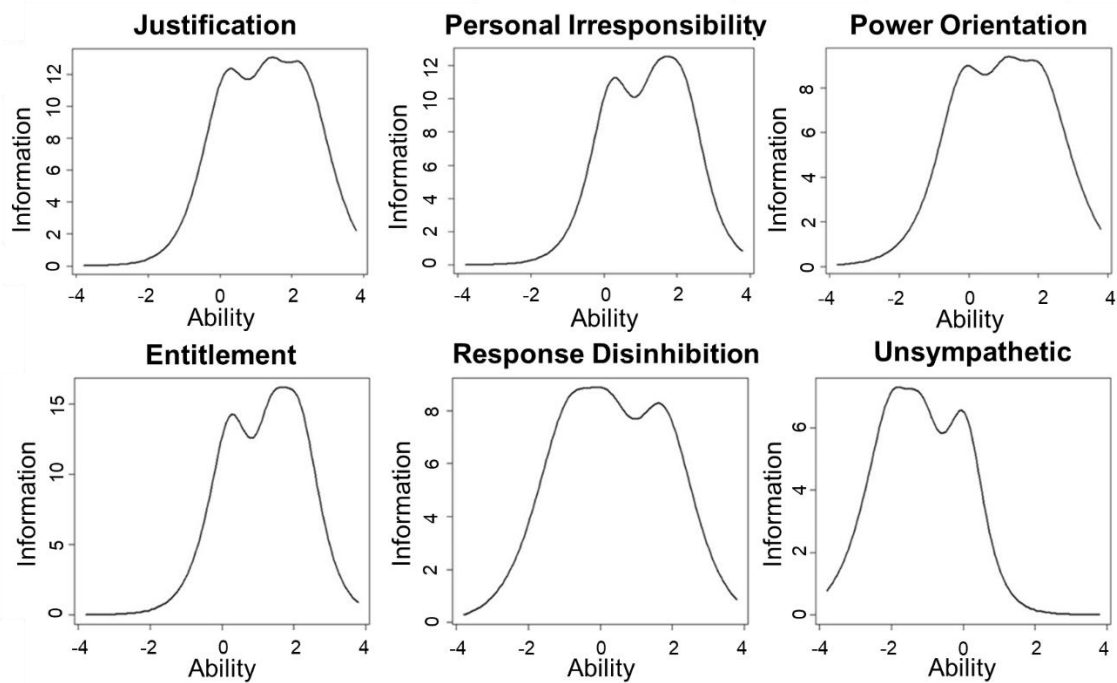
Example Item Information Curves



Note. Θ = Ability Level, $I(\Theta)$ = Item Discrimination.

Figure 3

Test Information Curves for the TCU CTS



Item Reduction

The KMO Test for Sampling Adequacy (0.95) and Bartlett's Test of Sphericity ($\chi^2 = 7983.68, p < .001$) showed the dataset was suitable for PCA. Thus, PCA was used as an item reduction technique using a random half of the sample ($n = 394$). Results showed the 45-item instrument contained six components with an eigenvalue greater than 1 (1st eigenvalue = 16.85, 2nd eigenvalue = 3.66, 3rd eigenvalue = 1.51, 4th eigenvalue = 1.40, 5th eigenvalue = 1.21, 6th eigenvalue = 1.11), which explained 57.21% of the observed variance in the data.

A Promax rotation provided the clearest interpretation of the data converging on an oblique solution. The rotated component matrix showed that Items 2, 3, 9, and 47 had loadings less than 0.40 and were removed (DeVon et al., 2007). Six components were then extracted with the remaining 41 items resulting in a solution that was conceptually meaningful. Although many items did not load on their theorized scale, the second component was clearly RD, the fourth was JU, and the fifth component was PO. The first, third, and sixth components were identified using the item with the largest component loading on each scale. This showed the first component was PI, the second US, and sixth EN. Visual examination of the individual items showed that Item 50 ("You make excuses to justify the crimes you have committed") and Item 56 ("You justify your crimes by telling yourself that your crimes really weren't all that bad") did not fit on the EN scale. In addition, Item 49 ("It is okay to commit a crime to live the life you deserve") and Item 31 ("It is okay to commit a crime to live the life you want") on the PI scale were redundant. When removing items 50, 56, and 49, most items loaded onto a single component with minimal cross-loadings (see Table 4) and item total correlations exceeded 0.40.

Table 4*Rotated Factor Loadings (N = 340)*

Item #	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
13. It is okay to commit crime to pay for the things you want.	0.69	-0.02	-0.01	0.12	-0.08	0.15
16. It is okay to lie and manipulate others to get what you want.	0.63	0.02	0.20	-0.05	0.15	-0.25
19. Society owes you a better life.	0.45	-0.05	0.25	0.22	0.16	-0.24
20. Breaking the law is no big deal if you do not physically harm someone.	0.67	0.00	-0.20	-0.00	0.35	0.01
25. Your good behavior should allow you to be irresponsible sometimes.	0.42	0.02	0.29	0.13	0.11	-0.08
29. You are not responsible for the crimes you have committed.	0.79	-0.06	-0.05	0.09	-0.09	0.01
31. It is okay to commit a crime to live the life you deserve.	0.71	0.04	-0.11	0.06	-0.01	0.22
32. You justify the crimes you commit by telling yourself that if you had not done it, someone else would have.	0.53	0.07	-0.05	0.14	0.06	0.30
38. The victims of some of your crimes were asking for it.	0.49	0.05	0.08	0.07	0.06	0.13
53. You are not to blame for your criminal behavior.	0.58	0.01	0.25	0.05	-0.27	0.18

Table 4 (continued)

Item #	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
6. When you are upset, you act without thinking.	0.12	0.85	-0.04	-0.07	-0.14	-0.02
12. When you feel rejected, you say things that you later regret.	-0.211	0.62	-0.13	0.27	0.11	0.09
18. It is hard for you to resist acting on your emotions.	0.11	0.77	-0.17	0.12	0.00	-0.09
30. When you are upset, you make matters worse because you act without thinking.	0.13	0.83	-0.17	0.12	0.00	-0.09
42. When you become frustrated, you get out of control.	-0.09	0.42	0.48	-0.02	0.07	-0.02
48. When you feel overwhelmed, you have a difficult time making good decisions.	-0.16	0.67	-0.09	0.17	-0.03	0.12
54. When you are angry, you do things that have negative or bad consequences.	-0.03	0.75	0.14	-0.11	-0.08	0.08
60. When you are angry, you do not think of the consequences of your actions.	0.02	0.70	0.27	-0.25	0.00	0.00
44. You have committed crimes because your life has been more difficult than everyone else's.	0.07	-0.08	0.71	0.24	-0.21	0.14
46. You have no problem lying to family and close friends.	-0.27	-0.10	0.77	0.09	0.25	0.02

Table 4 (continued)

Item #	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
57. When not in control of a situation, you will take control by any means necessary.	-0.02	0.12	0.63	0.06	0.14	0.02
58. You have no problem manipulating others to get what you want.	0.18	0.12	0.58	-0.23	0.10	0.11
59. Your family and/or friends are to blame for your criminal behavior.	0.20	-0.08	0.63	0.23	-0.12	0.07
5. When you are arrested or locked-up, it's because you had a run of bad luck.	0.21	0.00	-0.03	0.62	-0.02	-0.02
8. When asked about your motives for engaging in crime, you point out how hard your life has been.	0.02	0.01	0.19	0.59	0.02	0.10
14. You find yourself blaming the victims of some of your crimes.	0.21	0.02	0.05	0.48	0.03	0.13
17. You are not to blame for everything you have done.	0.21	-0.05	0.08	0.54	0.10	0.01
26. You find yourself blaming society and external circumstances for your problems with the criminal justice system.	0.28	0.17	0.15	0.44	0.07	-0.17
21. If someone disrespects you, then you have to straighten them out.	0.15	-0.12	0.01	0.06	0.81	-0.20
33. You must get back at people who mess with you.	0.31	0.01	-0.19	-0.02	0.57	0.23

Table 4 (continued)

Item #	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
34. You are willing to take advantage of others to get what you want	0.35	0.02	0.10	-0.23	0.47	0.21
39. The only way to protect yourself is to be ready to fight.	-0.24	0.05	0.15	0.12	0.69	0.07
45. You feel the need to get back at someone who disrespects you.	-0.05	-0.03	0.20	-0.02	0.62	0.23
35. You should not be held responsible for the crimes you have committed.	0.52	0.02	-0.26	0.05	-0.02	0.42
37. You expect to be treated better than the people around you.	0.15	-0.12	0.45	-0.13	0.08	0.43
43. Your thoughts and ideas are better than the people around you.	0.18	-0.08	0.17	-0.03	0.01	0.59
51. You become upset when people do not do what you tell them to do.	-0.18	0.18	0.14	0.22	0.16	0.51
55. You deserve to live a better life than the people around you.	0.30	-0.21	0.34	-0.01	-0.18	0.46

Note. Bold indicates factor loading is above 0.4. Extraction Method = Principal Components Analysis. Rotation Method = Promax.

The final components matrix included a 10-item measure of PI, an 8-item measure of RD, and four 5-item measures of US, JU, PO, and EN (i.e., 38 items in total). In examining the face validity of the six scales, Items 19, 25, 29, and 53 on the PI scale were conceptual outliers and thus removed. This scale was then renamed to Insensitivity to the Impact of Crime (IN) based on the theoretical construct the remaining items appeared to be measuring. A similar measure exists on the CCS (see Tangey et al., 2012), indicating that IN is a valid domain of criminal thinking. Furthermore, the EN scale appeared to be measuring a sense of superiority with respect to others and was named Grandiosity (GR). Finally, the 5-item US scale contained a mix of items that were conceptually ambiguous that were removed from the final instrument (see Appendix D). Table 5 depicts the descriptive statistics and internal reliability estimates for the final 29-item scale using the full sample ($N = 797$).

Confirmatory Factor Analysis

Using the other half of the dataset ($n = 403$), confirmatory factor analysis with robust standard errors tested the model fit of the 29-item scale when forced onto five factors. Results showed that the 5-factor model reasonably fit the data (see Table 6).

Table 5

Descriptive Statistics of the TCU CTS 3.0 Using the Full Sample

	Mean	SD	33 rd percentile	67 th percentile	α
Insensitivity to Impact of Crime	1.53	0.57	1.00	1.83	0.87
Power Orientation	1.84	0.66	1.40	2.00	0.83
Justification	1.72	0.60	1.40	2.00	0.79
Grandiosity	1.72	0.57	1.40	2.00	0.78
Response Disinhibition	2.29	0.64	2.00	2.63	0.86

Note. SD = standard deviation. α = Cronbach's alpha.

Table 6*Confirmatory Factor Analysis Model Fit Statistics*

Test	χ^2	SRMR	RMSEA	CFI	TLI
Full Model	< .001	0.05	0.06	0.91	0.90
By Assigned Sex					
Configural	< .001	0.06	0.07	0.88	0.87
Metric	< .001	0.07	0.07	0.88	0.87
Scalar	< .001	0.07	0.07	0.88	0.87
By Race Group					
Configural	< .001	0.06	0.07	0.87	0.86
Metric	< .001	0.07	0.07	0.87	0.86

Note. SRMR = Standardized Root Mean Square Residual, RMSEA = Root Mean Square Error of Approximation, CFI = Comparative of Fit Index, TLI = Tucker Lewis Index.

Measurement invariance procedures were performed to determine whether the TCU CTS 3.0 measured a similar construct when sample was separated by assigned sex at birth and race. When the sample was separated by sex (males vs. females), the configural invariance model was not significantly different from the metric invariance model, $\Delta\chi^2 = 34.45$, $df = 24$, $p = .077$. Alternatively, the scalar invariance model was significantly different from the metric invariance model, $\Delta\chi^2 = 49.81$, $df = 24$, $p = .001$, suggesting that weak measurement invariance could be assumed for assigned sex (Meredith, 1993). The sample was then separated by race group (White vs. BIPOC), which showed the configural invariance model was significantly different from the metric invariance model, $\Delta\chi^2 = 36.57$, $df = 24$, $p = .048$. Thus, measurement non-invariance was assumed for race and weak invariance was assumed for sex at birth.

Table 7*Bivariate Correlations*

Scale	1	2	3	4	5	6	7	8
1. Insensitivity to Impact of Crime	--							
2. Power Orientation	0.71**	--						
3. Justification	0.73**	0.60**	--					
4. Grandiosity	0.71**	0.67**	0.65**	--				
5. Response Disinhibition	0.39**	0.51**	0.43**	0.43**	--			
6. Times Arrested	0.04	0.05	0.02	0.01	0.05	--		
7. Times Convicted	0.03	0.07	-0.03	0.02	0.08*	0.56**	--	
8. Times Incarcerated	0.04	0.04	0.03	0.02	0.08*	0.70**	0.53**	--

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

Correlation Analysis

As shown in Table 7, correlation analysis using the complete sample revealed the TCU CTS 3.0 scales were correlated in a theoretically consistent direction. As scores on one criminal thinking measure increased, so did scores on the other measures of criminal thinking. The RD scale was also associated with respondents' self-reported history of arrests. The remaining correlations among criminal thinking and self-reported criminal history did not reach statistical significance.

Discussion

A fundamental aim of the justice system is to provide empirically supported services that help clients acquire the necessary skills as well as achieve behavioral and cognitive changes required to successfully transition back into the community. According to the RNR model (Andrews & Bonta, 2010; Andrews et al., 1990), correctional rehabilitation programs with the greatest effectiveness are those that match the level of care with the client's individual risk. This task greatly depends on assessments that can measure the criminogenic needs theorized to support criminal involvement. Criminal thinking patterns are one such criminogenic risk-factor repeatedly associated with criminal behavior (e.g., Packer et al., 2009; Palmer & Hollin 2004a; Skilling & Sorge, 2014; Walters, 2002b, 2009, 2012b). As such, instruments that can accurately measure criminal thinking patterns assist correctional staff and treatment providers in successfully identifying clients' risk level. While measures of criminal thinking exist, advanced analytic models allow for more rigorous psychometric testing that can be used to refine existing psychological assessments with greater precision.

The purpose of this study was to assess the TCU CTS 3.0 and develop an IRT-optimized instrument of criminogenic cognitions for justice-involved populations (see Appendix E). The assumption of unidimensionality and functional form were met, indicating a graded response model was an appropriate analysis for the dataset and that the TCU CTS 3.0 should be presented on a 4-point Likert scale, respectively. Item-level analyses showed that most items on the TCU CTS had moderate to large discrimination values. In addition, item difficulty scores revealed that the revised TCU CTS was most capable of measuring criminal thinking in people with moderate to high ability levels. Principal components analysis was used as an item reduction technique, resulting in a 29-item scale that measured criminal thinking in five key dimensions: GR, JU, PO,

IN, and RD. The internal reliability estimates for these scales were acceptable ($\alpha > .70$; Cortina, 1993), and confirmatory factor analysis supported the five-factor solution.

Aside from JU and PO, the remaining scales of criminal thinking obtained in this study diverged from the original TCU CTS scale structure (see Knight et al., 2006). For instance, the original assessment included 36-items measuring EN, PO, JU, PI, US, and CN. The CN scale was removed a priori because of concerns about using negative attitudes towards the criminal justice system or authority figures as an assessment of criminal thinking. This change improved the face validity of the measure and decreases, but does not eliminate, the chance that people belonging to historically marginalized communities will have elevated test scores for reasons unrelated to criminal thinking. The US (i.e., Unsympathetic) scale on the original assessment was composed of five reverse-coded items measuring callousness or a lack of emotional involvement with others. Studies using this scale have obtained poor internal reliability estimates and non-significant correlations with the other scales of criminal thinking (e.g., Knight et al., 2006; Sease et al., 2022; Simpson et al., 2012; Taxman et al., 2011; cf. Knight et al., 2014). The items on the US were revised as part of this study, however the final scale contained a mix of items that were not measuring the same construct. The US scale was therefore removed from the final version of the TCU CTS 3.0 instrument in lieu of retaining a scale that had poor conceptual validity.

As an addition to the criminal thinking literature, this study introduced a novel assessment of criminal thinking. Response Disinhibition refers to the ability to successfully engage in goal-oriented behaviors in situations with competing contingencies. Empirical studies have demonstrated a clear link between RD and criminal involvement such that people with high RD are more likely to engage in criminal behavior (Adjorlolo & Egbenya, 2016; Guan et al., 2015;

Prateeksha et al., 2014; Vedelago et al., 2019). Item level analyses showed the RD scale contained items with moderate discrimination values that measured low, moderate, and high ability levels. This measure also achieved an acceptable internal reliability score ($\alpha = 0.86$) and was moderately associated with the other measures of criminal thinking ($r_s \geq .039$). Scales measuring criminal thinking patterns have historically focused on attribution styles that can be conceptualized behaviorally in the form of avoidance (e.g., Entitlement, Justification, Power Orientation, Personal Irresponsibility); however, RD may be another category of criminal thinking patterns that represents a behavioral need or deficit. Interpreting RD as a behavioral need suggests that interventions for criminal thought processes may further benefit from providing supportive situations that allow clients to learn new skills (e.g., self-regulation, mindfulness, distress tolerance) that may augment their psychosocial functioning prior to release.

Insensitivity to the Impact of Crime was another novel measure on the TCU CTS, which was composed of items from the original PI scale. The new IN scale included items, such as, “The victims of some of your crimes were asking for it,” “It is okay to commit a crime to live the life you deserve,” and “Breaking the law is no big deal if you do not physically harm someone.” These items are conceptually similar to those measured on the IN scale within the CCS. For example, items on the CCS scale include, “The victims of crime will get over it with time,” “My crime(s) did not really harm anyone,” and “Society makes too big of a deal about my crime(s).” Psychometric research on the CCS has shown IN is significantly related to other relevant criminal thinking patterns (e.g., Entitlement, Failure to Accept Responsibility, Short-Term Orientation) and is associated with antisocial personality symptoms, violent risk level, and prison misconduct (Tangey et al., 2012).

The final measure of criminal thinking on the revised TCU CTS was GR. Grandiosity (or Narcissistic Grandiosity in some literature) refers to “intensely felt needs for validation and admiration” (Pincus & Roche, 2011, pg. 32) and is a common symptom in clients with narcissistic personality disorder (e.g., Pincus et al., 2014; Vater et al., 2013; Weiss & Miller, 2018). The phenotype of GR has been historically conceptualized as a personological characteristic thought to have at least a mild to moderate genetic origin (e.g., Luo et al., 2014; Sieradzka et al., 2015 cf. Larsson et al., 2006). As a clinical phenomenon, Ronningstam (2005a, 2005b) proposed that GR is a defense mechanism against dysfunctional self-esteem that creates a hyperbolic sense of superiority or uniqueness. These behaviors are captured on the TCU CTS with items like, “You should not be held responsible for the crimes you have committed,” “Your thoughts and ideas are better than the people around you,” and “You expect to be treated better than the people around you.” Among people involved with the justice system, GR has been associated with Entitlement, justification of violence, externalizing behaviors, aggression, and delinquent behavior (Calvete, 2008; Krusemark et al., 2018).

The concepts of criminal thinking measured by the TCU CTS 3.0 can be collectively understood as a response class of subtle events. While this description deviates from existing literature integrating these private events within the framework of cognitive theory (e.g., Sykes & Matza, 1957; Walters, 1990, 2002a, 2006a; Yochelson & Samenow, 1993), the functional-based approach presented herein represents an alternative theoretical framework for predicting and influencing criminogenic cognitions in clinical setting. More specifically, a behavioral approach emphasizes, and in fact requires, that criminal thinking patterns be examined with respect to the immediate and historical contexts supporting their ontogenetic development. This affords clinical staff the opportunity to observe criminal thinking patterns and their perspective without having

to evaluate or comply with the content of these thoughts. Instead, treatment providers can aim to create a supportive environment that allows clients to learn new behaviors in the presence of criminal thought processes that can be used in situations that have previously selected for overt criminal behavior.

Future Directions and Limitations

The present study has several limitations that can be used to improve the scale through future research. First, this study collected data from justice-involved males and females at four correctional drug treatment facilities located in the southern United States. This resulted in a final sample that consisted mostly of White males, which is somewhat atypical of justice-involved populations (Federal Bureau of Prisons, 2022). This raises the justified concern as to whether these findings would generalize to a more diverse sample. This study also used a sample of people who were currently incarcerated; thus, this study does not provide information as to how these items function for people involved with the justice system in other ways (e.g., probation, parole, juvenile justice). Succeeding investigations are needed to provide normative data with these samples and assess whether the scales are measuring relevant information in these populations as well. Relatedly, measurement invariance procedures showed that the TCU CTS 3.0 may be measuring different constructs in people belonging to different racial backgrounds (i.e., White vs. BIPOC). This warrants caution for future studies or treatment programs testing for racial differences in criminal thinking. It may also be worth replicating these results to confirm, or deny, whether measurement non-invariance can be assumed for race or if these results were a product of low statistical power among people in the BIPOC group ($n = 99$ vs. $n = 304$).

Another potential criticism of the TCU CTS 3.0 could be that the instrument is composed of items that have a high degree of response difficulty. This was exemplified in the current study by the lack of variability in participants' responses on some of the items. Scale scores were positively skewed, and mean scores were much lower than that of normative samples using the original scale (Simpson et al., 2012). Forthcoming research should consider this as a potential limitation of the instrument and perhaps consider presenting the instrument on a dichotomous scale (0 = No, 1 = Yes) as a means for forcing variability. In addition, scale items could be further revised or added to measure low levels of criminal thinking more accurately. These additional items could focus on measuring thoughts or behaviors theorized to be related to criminal involvement without explicitly mentioning the respondents' crimes. For example, people in this study were more likely to endorse the item "When you feel rejected, you say things that you later regret" as compared to "Breaking the law is no big deal if you do not physically harm someone" or "You find yourself blaming the victims of some of your crimes." This concern may be especially important when administering the scale in prison settings when clients may feel pressured to respond in a socially desirable way.

Finally, this study was not able to establish the construct validity of the revised TCU CTS 3.0. Correlation analysis showed that the individual scales were correlated in a theoretically consistent direction but not associated with individual items of self-reported criminal history. The original measures on the TCU CTS had demonstrated strong validity in the past (e.g., Dembo et al., 2007; Pankow et al., 2012; Simpson et al., 2012), perhaps providing indirect evidence for the content validity of the revised instrument. Nonetheless, more research is needed to test whether the revised measures are measuring their theorized constructs. Ideally, this would include investigating the correlations among the TCU CTS and validated assessments of criminal

thinking (e.g., PICTS, CSS-M, CCS, PDS). Critically, prospective data is needed to conclude whether the TCU CTS 3.0 is correlated with overt criminal behavior (e.g., disciplinary infractions, subsequent arrests, recidivism), success in substance use treatment (e.g., improved readiness for change, treatment engagement, treatment participation), and overall psychosocial functioning post-release (e.g., depression, anxiety, psychological well-being).

Conclusion

In summary, this study developed a 29-item instrument of criminal thinking patterns (TCU CTS 3.0) using a combination of IRT and CTT. The resultant instrument measured five key areas of criminogenic cognitions (e.g., JU, PO, IN, RD, GR) that can be used by treatment providers to pinpoint clients' treatment needs with greater precision. This knowledge can be used to make more informed treatment decisions that are individualized for the client and test the effectiveness of evidence-based interventions for justice-involved populations. To this end, the current instrument has the potential to contribute to the nationwide effort devoted to improving health, psychological well-being, and recidivism risk among justice-involved populations.

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Appendix A

TCU CTS 3.0 (Draft)

Instructions: Below are a list of items that represent thoughts and feelings that you may or may not be experiencing. Please rate your agreement with each statement as it represents your current thoughts and feelings. There are no correct answers. We are only interested in your honest response.

Please mark how much you agree or disagree with each statement.	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Strongly Agree</i>
	(1)	(2)	(3)	(4)
1. You have paid your dues in life and are justified in taking what you want.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. You rationalize your criminal behavior with statements like, "Everyone else is doing it, so why shouldn't I?".....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. You become angry when people tell you what to do.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. You feel people are important to you.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. When you are arrested or locked-up, it's because you had a run of bad luck.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. When you are upset, you act without thinking.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. You feel you are above the law.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. When asked about your motives for engaging in crime, you point out how hard your life has been...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. When not in control of a situation, you feel the need to exert power over others.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. You worry when a friend is having problems.....
11. Nothing you do is going to make a difference in the way you are treated.....
12. When you feel rejected, you say things that you later regret.....
13. It is okay to commit crime to pay for the things you want.....
14. You find yourself blaming the victims of some of your crimes.....
15. You argue with others over relatively unimportant matters.....
16. It is okay to lie and manipulate others to get what you want.....
17. You are not to blame for everything you have done.....
18. It is hard for you to resist acting on your emotions..
19. Society owes you a better life.....
20. Breaking the law is no big deal if you do not physically harm someone.....
21. If someone disrespects you, then you have to straighten them out.....
22. You feel bad for the crimes you have committed...
23. You find yourself blaming external circumstances for the problems in your life.....
24. When you feel bad, you are unable to stop your actions that make you feel worse.....
25. Your good behavior should allow you to be irresponsible sometimes.....
26. You find yourself blaming society and external circumstances for your problems with the criminal

- justice system.....
27. You like to be in control.....
28. You look out only for yourself and your needs.....
29. You are not responsible for the crimes you have committed.....
30. When you are upset, you make matters worse because you act without thinking.....
31. It is okay to commit a crime to live the life you deserve.....
32. You justify the crimes you commit by telling yourself that if you had not done it, someone else would have.....
33. You must get back at people who mess with you...
34. You are willing to take advantage of others to get what you want.....
35. You should not be held responsible for the crimes you have committed.....
36. In the heat of an argument, you say things that you later regret.....
37. You expect to be treated better than the people around you.....
38. The victims of some of your crimes were asking for it.....
39. The only way to protect yourself is to be ready to fight.....
40. You feel bad for the people you have harmed.....
41. Nothing you do is going to change the way you act.....

42. When you become frustrated, you get out of control.....
43. Your thoughts and ideas are better than the people around you.....
44. You have committed crimes because your life has been more difficult than everyone else's.....
45. You feel the need to get back at someone who disrespects you.....
46. You have no problem lying to family and close friends.....
47. You shouldn't be charged with a crime if you are drunk or high at the time.....
48. When you feel overwhelmed, you have a difficult time making good decisions.....
49. It is okay to commit a crime to live the life you want.....
50. You make excuses to justify the crimes you have committed.....
51. You become upset when people do not do what you tell them to do.....
52. You trust no one, including your family and close friends.....
53. You are not to blame for your criminal behavior.....
54. When you are angry, you do things that have negative or bad consequences.....
55. You deserve to live a better life than the people around you.....
56. You justify your crimes by telling yourself that if you had not done it, someone else would have.....

- 57. When not in control of a situation, you will take control by any means necessary.....
- 58. You have no problem manipulating others to get what you want.....
- 59. Your family and/or friends are to blame for your criminal behavior.....
- 60. When you are angry, you do not think of the consequences of your actions.....

Appendix B

1. What is your age group?
 - a. Under 18
 - b. 18-24
 - c. 25-44
 - d. 45-60
 - e. Over 60
2. Are you Hispanic or Latino?
 - a. Yes
 - b. No
3. Are you? (MARK ONE box)
 - a. American Indian/Alaska Native
 - b. Asian
 - c. Native Hawaiian or Other Pacific Islander
 - d. Black or African American
 - e. White
 - f. More than one race
 - g. Other (please specify)
4. In the 6 months prior to entering this facility, were you unemployed and not looking for work?
 - a. Yes
 - b. No
5. In the 6 months prior to entering this facility, were you without stable housing or homeless?
 - a. Yes
 - b. No
6. Approximately how long have you been in this facility?
 - a. 3 months or less
 - b. 4-6 months
 - c. 7-9 months
 - d. 10-12 months
 - e. More than 12 months
7. Approximately how long until your release date?
 - a. 3 months or less
 - b. 4-6 months
 - c. 7-9 months
 - d. 10-12 months
 - e. More than 12 months

Appendix C

1. In total, how many times have you been arrested in your lifetime?
 - a. None
 - b. 1-5 times
 - c. 6-10 times
 - d. 11-50 times
 - e. Over 50 times
2. In total, how many times have you been convicted (found guilty) of a crime, as an adult or juvenile?
 - a. None
 - b. Once
 - c. 2-5 times
 - d. 6-10 times
 - e. Over 10 times
3. Altogether, how many times have you ever been in detention, jail, or prison?
 - a. None
 - b. Once
 - c. 2-5 times
 - d. 6-10 times
 - e. Over 10 times

Appendix D

Insensitivity to Impact of Crime

13. It is okay to commit crime to pay for the things you want.
16. It is okay to lie and manipulate others to get what you want.
20. Breaking the law is no big deal if you do not physically harm someone.
31. It is okay to commit a crime to live the life you deserve.
32. You justify the crimes you commit by telling yourself that if you had not done it, someone else would have.
38. The victims of some of your crimes were asking for it.

Response Disinhibition

6. When you are upset, you act without thinking.
12. When you feel rejected, you say things that you later regret.
18. It is hard for you to resist acting on your emotions.
30. When you are upset, you make matters worse because you act without thinking.
42. When you become frustrated, you get out of control.
48. When you feel overwhelmed, you have a difficult time making good decisions.
54. When you are angry, you do things that have negative or bad consequences.
60. When you are angry, you do not think of the consequences of your actions.

Justification

5. When you are arrested or locked-up, it's because you had a run of bad luck.

8. When asked about your motives for engaging in crime, you point out how hard your life has been.
14. You find yourself blaming the victims of some of your crimes.
17. You are not to blame for everything you have done.
26. You find yourself blaming society and external circumstances for your problems with the criminal justice system.

Power Orientation

21. If someone disrespects you, then you have to straighten them out.
33. You must get back at people who mess with you.
34. You are willing to take advantage of others to get what you want.
39. The only way to protect yourself is to be ready to fight.
45. You feel the need to get back at someone who disrespects you.

Grandiosity

35. You should not be held responsible for the crimes you have committed.
37. You expect to be treated better than the people around you.
43. Your thoughts and ideas are better than the people around you.
51. You become upset when people do not do what you tell them to do.
55. You deserve to live a better life than the people around you.

Appendix E

TCU CTS 3.0 (Final Version)

Instructions: Below are a list of items that represent thoughts and feelings that you may or may not be experiencing. Please rate your agreement with each statement as it represents your current thoughts and feelings. There are no correct answers. We are only interested in your honest response.

Please mark how much you agree or disagree with each statement.	Strongly		Strongly	
	Disagree	Disagree	Agree	Agree
	(1)	(2)	(3)	(4)
1. It is okay to commit crime to pay for the things you want.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. When you are upset, you act without thinking.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When you are arrested or locked-up, it's because you had a run of bad luck.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. If someone disrespects you, then you have to straighten them out.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. You should not be held responsible for the crimes you have committed.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. It is okay to lie and manipulate others to get what you want.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. When you feel rejected, you say things that you later regret.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. When asked about your motives for engaging in crime, you point out how hard your life has been.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. You must get back at people who mess with you.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. You expect to be treated better than the people around you.....
11. Breaking the law is no big deal if you do not physically harm someone.....
12. It is hard for you to resist acting on your emotions.....
13. You find yourself blaming the victims of some of your crimes.....
14. You are willing to take advantage of others to get what you want.....
15. Your thoughts and ideas are better than the people around you.....
16. When you are upset, you make matters worse because you act without thinking.....
17. It is okay to commit a crime to live the life you deserve.....
18. When you feel overwhelmed, you have a difficult time making good decisions.....
19. The only way to protect yourself is to be ready to fight.....
20. When you are angry, you do things that have negative or bad consequences.....
21. You justify the crimes you commit by telling yourself that if you had not done it, someone else would have.....
22. You are not to blame for everything you have done.....
23. You deserve to live a better life than the people around you.....
24. You feel the need to get back at someone who

disrespects you.....

25. The victims of some of your crimes were asking for it.....
26. You find yourself blaming society and external circumstances for your problems with the criminal justice system.....
27. You become upset when people do not do what you tell them to do.....
28. When you are angry, you do not think of the consequences of your actions.....

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ABSTRACT

DEVELOPMENT AND TESTING OF THE TEXAS CHRISTIAN UNIVERSITY CRIMINAL THINKING SCALES 3.0 (TCU CTS 3.0)

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Among people involved with the justice system, criminal thinking patterns are modifiable service needs that can be influenced as a part of treatment to ameliorate clients' risk for recidivism. Self-report measures that can measure criminal thinking patterns allow correctional staff and treatment providers to identify clients' individual needs and make more informed decisions about appropriate treatment options. The present study developed a revised measure of criminal thinking based on the Texas Christian University Criminal Thinking Scales. Using a sample of 797 people currently incarcerated, results showed the revised 29-item instrument assessed criminal thinking patterns in five key areas: 1) Power Orientation, 2) Justification, 3) Insensitivity to Impact of Crime, 4) Grandiosity, and 5) Response Disinhibition. Confirmatory factor analysis supported the resultant five-factor solution and weak measurement invariance was assumed for assigned sex at birth (male vs. female). Implications and future directions are discussed.