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Applying crime scene analysis to the prediction of sexual recidivism in stranger rapes

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Abstract

The current study sought to improve the predictive accuracy of sexual recidivism using the Static-99 risk assessment tool by the addition of detailed crime scene analysis (CSA). CSA was carried out using a Behavioral Thematic Analysis (BTA) approach, the gold-standard in CSA. BTA was conducted on a sample of 167 stranger rape cases using non-metric multi-dimensional scaling (MDS). The BTA procedure revealed three behavioral themes of hostility, criminality and sexual exploitation, consistent with previous research in sexual offending CSA. Logistic regression analysis indicated that the criminality theme was significantly predictive of sexual recidivism and also significantly correlated with previous sexual offense history. Further, the criminality theme led to a significant increase in the incremental validity of the Static-99 actuarial risk assessment instrument for the prediction of sexual recidivism.

Key Words: Risk Assessment, Sexual Aggression, Crime Scene Analysis, MDS, Static-99

PRE-PUBLIC

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Applying crime scene analysis to the prediction of sexual recidivism in stranger rapes

A continued debate surrounds sexual violence research over how to best predict whether a sexual offender will reoffend sexually upon release (e.g., sexual recidivism) and what risk factors might be available to enhance the prediction (Hanson, Morton, & Harris, 2003). However, the issue of sexual recidivism has implications for researchers in the field of sexual violence as well as many others, in particular Investigative Psychology (IP). IP has been defined as an area of study that focuses on the contributions that psychology (and other disciplines, such as criminology, sociology and statistics) can make to police investigations (Canter, 1994). Potential contributions can be in the form of identifying the “salient aspects of criminal activities, the basis for linking a series of crimes to a common offender, and procedures for guiding the prioritisation of suspects” (Canter, 2004; pg. 7). Whereas forensic practitioners analyze the pattern(s) of a crime for risk factors to predict recidivism (Kröber, 2010), investigative psychologists analyze crime(s) to predict offender characteristics to prioritize suspects (Alison, Goodwill, Almond, van den Heuvel, & Winter, 2010). Thus, both fields of research are based on similar premises and have relatively similar goals – they assume criminal behaviors are potentially related to the characteristics of that offender. As such, it has been argued that although IP and sexual violence research has for the most part existed as separate entities the two disciplines have considerable overlap and thus may be able to inform one another (Beauregard, 2010).

In IP, quantitative crime scene analysis (CSA) is used to analyze criminal behavior with the hypothesis that behaviors will relate to offenders characteristics, such as age (Goodwill & Alison, 2007) or prior criminal antecedents (Goodwill, Alison, & Beech, 2009). Within the IP domain the relationship between criminal behavior or “actions (A)” and an offender’s “characteristics (C)”, is known colloquially as the A to C equation (Canter, 1995), or more recently as the “homology assumption” by Mokros and Alison (2002). The homology

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assumption essentially dictates that the psychological aspects of an offender's actual criminal behavior during a crime, such as gratuitous aggression, will correspond to evidence of gratuitous aggression in the offender's life and even their non-criminal behavior. It is hypothesized that actual crime scene behavior will also be reflective of other psychological and pragmatic aspects of an offender's characteristics, such as risk of recidivism.

In sexual violence and risk assessment literature, criminal behavior is utilized to investigate potential predictors of recidivism; however, few utilize crime scene related variables to do so. Recent meta-analytic reviews of sexual assault recidivism (Gerhold, Browne, & Beckett, 2007; Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2004; McCann & Lussier, 2008) found that crime scene related variables were utilized only in relation to victim-offender relationship (e.g., stranger, acquaintance, spouse), broad victim characteristics (e.g., age, sex), offense type (e.g., contact or non-contact offense) and in some cases to gauge the amount of violence used (e.g., weapon use, victim injury).

Researchers in the field of forensic psychology increasingly emphasize the importance of crime scene analysis for risk assessment (e.g., Beech, Fisher, & Thornton, 2003; Müller, Köhler, & Hinrichs, 2005; Osterheider & Mokros, 2006; West, 2000). Beech et al. (2003) stress the point that a functional analysis including the identification of the *modus operandi* is one of four major components of a thorough risk assessment. Further, Pierschke (2001) points out that the main reason for lower levels of predictive accuracy is the lack of examination of the index offense. In fact, Pierschke (2001) reports that this is even more apparent in cases where an offender has violent and sexual assault histories. Yet to date there has been little research investigating the added contribution of crime scene analysis to the *actuarial* risk prediction of sexual recidivism or how it should be incorporated into the document review risk assessment process (West, 2000).

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Crime Scene Analysis (CSA)

Crime scene analysis has been one of the predominant focuses of researchers within Investigative Psychology (IP; Canter, 2004) and police investigators (Ressler, Burgess & Douglas, 1988) for many years. Researchers, police, and practitioners have commonly used a combination of idiographic and nomothetic approaches for crime scene analysis paralleling the methodology used in the recidivism and risk assessment literature (Alison, West & Goodwill, 2004). Idiographic prediction of recidivism and clinical, police-investigative CSA both attempt to understand the offense in its unique context on a case-by-case basis (Musolff, 2001). Conversely, nomothetic (e.g., actuarial) methods of risk assessment and statistical approaches to CSA seek a generalizable basis (e.g., rules, relationships, etc.) for prediction and analysis of offense and offender behavior (Hanson, 2000). As Canter (2000) points out, CSA is no different than other scientific endeavors; it must be based on a nomothetic scientific methodology using the collection of empirical data to support idiographic inferences about the relationship between crime scene variables.

Accordingly CSA has similarities to the methodological basis of risk assessment in which classification of offenders into homogeneous groups is important (Hall & Hirschman, 1991; Prentky & Burgess, 2000). Grubin and Kennedy (1991) as well as Kröber (2010) suggest that the reliable classification of an offender is essential for accurate risk assessment, especially with sexual and violent offenders. Nevertheless, emerging research assessing sexual offending behavior has begun to support a dimensional rather than a typological approach (e.g., Guay, Ruscio, Knight, & Hare, 2007; Knight, 2010).

In the context of utilizing CSA for offender profiling (e.g., predicting offender characteristics), previous efforts to classify sexual offenders utilized similar methods to the early clinical classifications (Cohen, Seghorn, & Calmas 1969; Groth, 1979). However, the problem with many early clinical classification systems was their emphasis on the offender's

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motivation, which is a covert entity, not externally identifiable (Palmer, 1988) and as a consequence “its addition fatally weakens the structures it is meant to support” (Grubin & Kennedy, 1991, p. 125). Canter and Heritage (1990) took the argument a step further by arguing that even the *analysis* of offense behavior should be separated from offenders’ intentions or motivations. In this regard, Canter and Heritage were among the first researchers to classify sexual offenders on the basis of observable or directly inferred crime scene behavior alone.

Despite Canter and Heritage’s early theorizing, CSA and offender profiling was still predominantly carried out using non-statistical intuitive police-investigative techniques, such as the FBI’s Criminal Profiling Analysis (see Hazelwood, Ressler, Depue, & Douglas, 1987) or clinical-idiographic classification methods (Wilson, Lincoln, & Kocsis, 1997). Ultimately, these early techniques for CSA were criticized for lacking scientific rigor, reliability and for their limited empirical validation (Canter, Alison, Wentink, & Alison, 2004; Canter & Wentink, 2004; Goodwill et al., 2009).

However, as offender profiling research and its application became increasingly nomothetic, major clinical classification were adopted for CSA (Knight, Warren, Reboussin, & Soley, 1998), such as the Massachusetts Treatment Center (MTC) rape classification system (MTC:R3; Knight & Prentky, 1990). The MTC:R3 addressed some of the limitations of early clinical-based classification methods and has been empirically tested and validated (Knight, Prentky, & Cerce, 1995; Prentky, Knight, Lee, & Cerce, 1995). Nevertheless, some researchers such as McCabe and Wauchope (2005) argued that the MTC:R3 is still limited for CSA because it combines behaviors, motives, and cognitions without differentiating among them.

Behavioral Thematic Analysis (BTA)

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Echoing Canter and Heritage's message some years later, Alison, Bennell, Mokros, and Omerod (2002) argued that CSA should only be conducted by examining behaviors at a general observable level, limiting the use of behavioral inference of motives and cognitions. In essence, the analysis should be based around largely observable behaviors with inferences made (typically *a priori*) based on the latent (or observable) dimensions and themes within the data. Loosely, this process is referred to as Behavioral Thematic Analysis (BTA), a cornerstone of IP research (Canter, 2004), and is arguably the *gold-standard* for behavioral-based classification of offenders using CSA at present (Goodwill et al., 2009).

BTA has been used to conceptualize a number of sexual offending processes, such as the role of the victim for the offender (Canter, 1994), the interaction between victim and offender (Alison & Stein, 2001), and the levels and varieties of violation in rape (Canter, Bennell, Alison, & Reddy, 2003). BTA has also been used as a predictive tool exploring the relationship between crime scene actions and offender characteristics with notable success (Goodwill et al., 2009; Häkkänen, Lindlöf, & Santtila, 2004; Häkkänen, Puolakka, & Santtila, 2004; Santtila, Häkkänen, Canter, & Elfgrén, 2003). For the conceptual thematic investigation of crime scene information most studies partition the content domain under study (e.g., stranger rape) into qualitatively different regions or themes. Studies employing BTA of stranger rape offense details have found the presence of five (Canter & Heritage, 1990), four (Alison & Stein, 2001; Canter et al., 2003) or three (Canter, 1994; Häkkänen et al, 2004) themes of offense behavior. Although the BTA of these previous studies differed in interpretation, we would argue, in line with Wilson and Leith (2001), that each was consistent in finding themes of hostility, criminality, and involvement. For example, we would argue that the previously found separate themes of theft and control could be interpreted as a single criminality theme.

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When one investigates the composition of these themes one finds considerable overlap to three commonly found themes/dimensions within the sexual violence literature: hostility, general criminality, and sexual deviance, respectively (Knight, 2010; Mann, Hanson, & Thornton, 2010). Therefore, in an effort to increase the construct validity of the BTA in the present paper, interpretation of the Multi-Dimensional Scaling (MDS) plot was achieved using a combination of the IP and sexual violence literature's operationalization of the three dimensions, as discussed forthwith.

Hostility

The general theme of hostile sexual aggression already appears in the aforementioned clinical classifications as anger motivated rape (Cohen et al., 1969; Groth, 1979). Here the offender's aim is primarily aggressive and the offender wants to punish the victim (e.g., for rejections or sexual transgression). Therefore, the victim is used as a vehicle for venting his anger and frustration (Canter, 1994). The hostility theme reflects an overtly aggressive interaction between offender and victim. Such offenses will involve nonstrategic violence (Felson & Krohn, 1990), which means violent and aggressive behaviors beyond that necessary to commit the offense. Therefore the victim may be more likely to react aggressively and strongly resist (Porter & Alison, 2004). Typical BTA behaviors of this offending style include acts of physical (e.g., kicking, punching) and verbal (e.g., threats to kill the victim) violence. Knight and Prentky (1990) would most likely characterize these offenders as pervasively angry, the rapist type they found to cause the most physical damage to their victims. Accordingly, hostile offenders are most likely to have prior criminal histories of violence (Canter & Heritage, 1990) and most likely reoffend with a violent offence (Mann et al., 2010).

Criminality

The general theme of criminality also occurs in a variety of forms throughout the literature on sex offender classification (Groth, 1979). Guttmacher and Weihofen (1952)

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described an aggressive, antisocial criminal, who is out to pillage and rob. For the criminal offender the rape is one among many antisocial behaviors (Knight, 1999) whereas here he steals sexual satisfaction rather than money or property (Kopp, 1962) and the victim is solely treated as an object (Canter, 1994). Previous studies using BTA found the themes of theft and control (Canter et al., 2003), which were later summarized into the theme of criminality (Wilson & Leith, 2001). Here the offender could use threats to control the victim and to hold it off reporting the crime or use the opportunities presented by the crime to steal from the victim (valuables, clothing, and personal things). In line with Wilson and Leith (2001) the criminality theme is further characterized by behaviors indicating some level of planning (e.g., bringing a weapon to the crime scene) and forensic awareness of the offender. Because general criminality is strongly associated with recidivism (Hanson & Bussiere, 1998) it is thought that the theme of criminality will correlate with the subscale of *criminality* (Category V) of the Static-2002 (Phenix, Doren, Helmus, Hanson, & Thornton, 2008). Similarly, Canter and Heritage (1990) suggest that criminal behavior and intent (e.g., criminality theme) should correlate with previous criminal offences.

Involvement

Previous typologies describe offenders with a primary sexual aim where the offender is living out a sexual fantasy he is preoccupied with (Cohen et al., 1969; Groth; 1979; Seghorn & Cohen, 1980). Such sexual fantasies could involve the victim receiving intense pleasure during the offense and falling in love with the offender (e.g., Seghorn & Cohen, 1980). Similarly, previous studies using BTA consistently described a theme where the offender tries to establish some kind of interpersonal “intimacy” with the victim (Canter & Heritage, 1990). Behaviors indicating an attempt to bond with the victim (e.g., extend time), showing affection (e.g., offender states that he love the victim) or living out sexual fantasies (e.g., cunnilingus) would be expected to be included in the involvement theme. Such

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behavioral indicators of intimacy may reflect an offender's deviant fantasies and cognitive distortions (Polaschek & Gannon, 2004) and therefore may be correlated with a history of previous sexual offenses. Further, sexual deviance is strongly associated with sexual recidivism (Hanson & Bussiere, 1998) such that the theme of involvement will correlate with the subscales of *sexual deviance* (Category III) of the Static-2002 (Phenix et al., 2008).

However, to date there is no research investigating the utility of BTA in the prediction of offender recidivism. Only recently, Dahle, Biedermann, Gallsch-Nemitz, and Janka (2010) and Dahle, Biedermann, and Gallsch-Nemitz (2012) investigated the possibility of predicting sexual recidivism in a German sample of 955 male sexual offenders based on variables of crime scene behavior. In its current version the Crime Scene Behavior Risk measure (CBR; Dahle et al., 2012) included 7 dichotomous variables (no group offense, evidence of planning, direct searching for a victim, straight approach, male victim, visual-sexual behavior, sexualized communication), which correlated significantly with sexual recidivism. The CBS demonstrated predictive accuracy (AUC = .76) and incremental validity (beyond established risk measures). Whereas Dahle et al. developed their CBS based on the empirical relationship of variables with recidivism, this paper is following a more theory-driven approach and tries to link sexual recidivism to organized patterns of crime scene behavior, which could help to explain the psychological meaning behind those crime scene variables. Therefore, the aim of the current paper is to build up on this promising way of improving risk assessment based on CSA, in particular using BTA, to improve the prediction of sexual recidivism beyond the Static-99, which is currently the gold-standard in sexual recidivism prediction.

Purpose of study

The present study had four main objectives. The first objective was to replicate the BTA structure of previous studies (specifically, hostility, criminality, and involvement) of crime scene variables within stranger rape with a German sample. However, our interpretation

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of the thematic regions will also be informed by, and as a result, parallel to, the existing and abundant sex offender literature. Second, the construct validity of the themes will be tested by examining the content of the BTA themes in relation to an offender's previous offense history and the subscales of the Static-2002 risk assessment measure, as discussed. Third, the predictive validity of the behavioral thematic model will be investigated. Fourth, the incremental validity of BTA-based crime scene analysis in predicting sexual recidivism beyond the Static-99 risk assessment tool (see Hanson & Morton-Bourgon, 2009) will be tested.

Method

Sample

The current sample consists of 167 stranger rape cases ($N = 167$) committed by lone male offenders in Berlin between 1994 and 2001, and was a subsample of those included in Dahle et al. (2010, 2012). The 167 cases represent 167 unique offenders; only offenders of solved crimes were included as offender identities were necessary for collecting recidivism information. All offenders had a fixed time at risk of five years after release from prison or forensic psychiatric sentence for the determination of sexual recidivism. The offenders have been convicted of the index offense of rape. Of the 167 offenders, 10% had prior convictions for a sexual offense and 14% of the sample committed a new sexual offense within 5 years after release. For the purpose of this study, a "stranger rape" was defined as a rape where the offender and victim were not known to each other, or known only for a brief period of time (less than 24 hours; e.g., met in a bar) prior to the assault (Goodwill et al., 2009). The age of the offender was recorded as the age at the time of the index offense. The range of the offender's age at the time of the offense was 16 to 64 ($M = 31.2$; $SD = 9.5$).

Data

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The data used in this study were derived from computerized police databases and paper records. The computerized police databases contained information about the offender, the victim, and the crime. In the majority of the cases, the paper records included police interrogation of the offender and the victim as well as records of the investigation. On occasion, they also included witness statements, court decisions, and official expert opinion. Recidivism was measured by any subsequent convictions for a sexual offense within the 5 years of follow-up. Official criminal records taken from the National Conviction Registry were evaluated to tabulate prior convictions as well as 5-year recidivism rates.

Coding

In the context of cooperative venture between the Institute for Forensic Psychiatry Berlin and the State Office of Criminal Investigations in Berlin more than 300 crime scene variables were coded for the 167 stranger rapes. These variables were arranged chronologically corresponding to the onset of the offense, course of the offense, and end of the offense. The current study variables were selected from the corpus of 300 variables if the variable was utilized in previous studies by Canter and Heritage (1990), Canter (1994), Alison and Stein (2001), Canter et al. (2003), or Häkkinen et al. (2004) (see Table 2). As a consequence of these restrictions, 45 variables were identified and selected for this study. By systematically sampling crime scene variables (e.g., items) used and considered relevant by previous researchers from within the “universe” of crime scene information, content validity is increased (Cronbach & Meehl, 1955).

Five of the 45 variables selected were recoded to match the coding framework proposed in the aforementioned comparative studies. The variables single violence and multiple violence were replaced by force control and force physical, the variable victim resistance was divided into physical and verbal resistance, the variable offender compliments the victim was replaced by the offender stating that he loves the victim and finally the

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variable offender lays and waits was replaced by offender searches for a victim. Furthermore, the two variables offender gags and blindfolds the victim had to be excluded due to low frequency (< 1%).

To assess the reliability of crime scene variable coding the third and fourth author coded a random subsample of 42 cases. The proportion of overall agreement (p_o) – the proportion of cases for which both raters agree – as well as Cohen's Kappa (κ) were calculated. The percent agreement for the 45 variables ranged from .76 to 1.00, with a median value of .95. Kappas ranged from .45 to 1.00, with a median value of .81. For 6 variables, Kappas could not be computed. For 5 variables (searching, offender makes sexual comment, weapon from crime scene, offender steals clothing, and offender steals valuables), kappa was unacceptably low (< .45), but they were included due to the high percent agreement (Range: 83-98%). These items were also retained in order to replicate previous research and because they were considered essential for the current hypothesis. Static-99 and Static-2002 scores were determined for each offender based on the Federal Central Criminal Register of Germany, police databases and paper records of the index-offense according to the official manuals (Harris, Phenix, Hanson, & Thornton, 2003; Phenix et al., 2008).

Data Analysis

To perform BTA to identify the underlying structure of the offense variables MDS analysis using the PROXCAL module from PASW for Windows (ver. 18) at an ordinal level of measurement not allowing for ties was used.

MDS analysis provides a multidimensional visualization plot of the similarity among pairs of objects (e.g., crime scene variables) which represents similarity as distances between points in an n-dimensional space (Borg & Groenen, 1997). Hence, in the MDS plot distances between variables in the MDS solution can be regarded as an approximation of their similarities, the closer they are in the plot the more similar they are to each other. MDS

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analysis is a common form of CSA and forms the statistical framework for much of the BTA research (for example, Canter & Heritage, 1990; Canter et al., 2003; Canter & Wentink, 2004; Häkkänen et al., 2004).

Similarity between objects can be derived in several ways, the most common to IP research is to utilize a Jaccard measure of association (Jaccard, 1908). The Jaccard measure of association is computed from a 2x2 contingency table ($a/[a+b+c]$) to transform the dichotomous data into a similarity coefficient matrix. According to Canter et al. (2003), Jaccard's measure is the most appropriate association to use in 'noisy' behavioral data, because the method excludes mutual non-occurrences from the tabulation and hence the strength of the associations. As Taylor, Donald, Jaques and Conchie (2012) recently suggested that coefficients other than Jaccards may produce more geometrically stable results, the internal consistency of themes was also computed. To test the internal consistency of variables per theme in accordance with Canter et al. (2003) the Kuder-Richardson 20 (*KR 20*) coefficient was calculated for each of the hypothesized themes.

In contrast to previous studies we did not try to assign offenders to mutually exclusive action themes. Following a dimensional rather than typological approach for each offense the number of crime scene variables the offender showed per thematic region was counted. For each of the themes this resulted in a continuous score of crime scene behavior called the *Thematic Sum Score* (TSS). The TSS's were then used to predict sexual recidivism and prior sexual offenses using logistic regression analysis. To test the incremental validity of the MDS behavioral theme model in relation to the Static-99, the risk assessment scores were inserted into the first block of a hierarchical logistic regression followed by the inclusion of the TSS of each theme in the second block.

For the prediction of previous sexual offenses and sexual recidivism AUC was used as an effect size statistic for dichotomous outcome variables (Swets, Dawes, & Monahan, 2000)

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where AUC's of .56, .64, and .71 were considered as small, medium, and large (Rice & Harris, 2005).

Results

Figure 1 shows the two-dimensional MDS solution with a Stress-1 index of 0.19 in 55 iterations indicating a fair MDS solution (Kruskal, 1964). In Figure 1 each point represents one of the 45 offense behavior variables. The closer two points are, the more likely it is that the variables will co-occur in an offense. As can be seen in Figure 1 high frequency variables (see Table 2 for frequencies) cluster at the center of the plot whereas variables with lower frequencies radiate out towards the edges.

Figure 1

Frequencies

The variables vaginal penetration, clothing disturbed, force control, and physical resistance of the victim each occur in over 55% of the cases suggesting that they are general characteristics of the majority of stranger rapes and thus not particularly useful for differentiation between offense themes. Therefore, these four variables are excluded from the BTA and circled in the MDS plot to delineate this fact. These four high frequency behaviors correspond relatively well with the high frequency behaviors found (and generally excluded from BTA) in Canter and Heritage (1990), Canter (1994), Canter et al. (2003), and Häkkänen et al. (2004). In accordance with Canter et al. (2003) variables occurring in over 20% of the cases include sexually motivated behaviors such as offender kisses the victim, offender sexual comment, and ejaculation. Accordingly, variables of moderate frequency (6-20%) include physically and sexually violent behavior such as offender threatens to kill, weapon to scene, offender threatens that a weapon is present, offender demeans victim, anal penetration and penetration with finger as in Canter et al. (2003). Behaviors of low frequency ($\leq 5\%$) also corresponded to Canter et al. (2003) indicating primarily personally violating behaviors such

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as offender steals personal items, offender steals victim's clothing, offender implies knowing the victim, offender identifies victim, offender threatens the victim not to report the crime, offender binds the victim, and offender extends time.

Themes

In line with previous studies (Canter, 1994; Häkkänen et al., 2004) the current study identified three different themes of offence behavior. In particular, we were able to replicate the criminality and hostility themes. However, the third theme identified, sexual exploitation, cannot be interpreted as singularly an involvement theme. Instead, it corresponds to an amalgamation of sexuality and intimacy themes as proposed by Canter and Heritage (1990). As a consequence of this novel partitioning of the MDS only 28 of the 45 variables fell into expected regions (see Appendix for a full list of variable descriptions and their hypothesized themes), however, item misplacements are not uncommon in interpersonal research (Plutchik & Conte, 1997). Nevertheless, correspondence of variables to the themes found in a range of disparate research studies was still high. The mean number of variables (e.g., behaviors) committed per offense was 7.45 ($SD = 3.41$, *Range* 1-21). The means, standard deviations, observed ranges and possible ranges as well as the proportion of the sample who had scores greater than zero on the TSS dimensions are summarized in Table 1. As can be gleaned from the MDS plot the center of the thematic partitioning is not from the exact geometric midpoint of the MDS, which is not a requirement of MDS interpretation (Guttman & Greenbaum, 1998). Instead, thematic partition lines are derived based on a combination of previous research and the internal reliability of variables to themes based on KR-20 coefficients.

It is important to reiterate that offender themes are not 'types' but constructs that may be related to one another. For example, an offender may be high (or low) simultaneously on hostility, criminality, and sexual exploitation. The intercorrelations of the three themes indicate a significant correlation between sexual exploitation and criminality ($r = .16$, $p < .05$)

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and between criminality and hostility ($r = .15, p < .05$), albeit both small effects (Table 1).

Therefore, the themes can be perceived as distinct and measuring different constructs.

*Table 1***Sexual Exploitation**

A priori hypotheses, based on the literature, suggested finding a theme relating to offender “involvement” (Canter et al., 2003; Canter & Heritage, 1990; Wilson & Leith, 2001). However, a theme which encompassed nine “involvement” type variables, five “sexuality” variables (Canter & Heritage, 1990) and the variables offender demeans the victim and offender binds the victim, seemed to suggest a theme of sexually degrading and controlling behaviors and as such was labeled as sexual exploitation (see Table 2). The *KR-20* value of the 16 items was .60, which is reasonable considering the data were not originally collected for empirical research (Canter et al., 2003).

Criminality

Based on previous research (e.g., Canter & Heritage, 1990) eleven variables were predicted to form the criminality region, yet only eight were found (Table 2). Furthermore, the two variables offender identifies victim and offender implies knowing the victim were also found in this region and seem to indicate an attempt to control and/or threaten the victim. Further, the offender threatens that a weapon is present also seems to be an attempt to control and intimidate the victim. Only the variable reveals self-detail seems inconsistent with the overall interpretation of this theme, unless the offender has intentionally given spurious information to set investigators on the wrong track. The *KR-20* coefficient for this theme was .71.

Hostility

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The proposed hostility theme (Table 2) contained thirteen variables indicative of a hostile interaction between offender and victim. Nine of these thirteen variables were expected to fall into this region based on previous research (Canter & Heritage, 1990; Canter et al., 2003). The four additional variables seem to characterize an angry and impulsive offender (Groth, 1979), who searches for a suitable target, then follows the victim, intrudes into the victim's home, and impulsively uses a weapon from the crime scene. The moderate lack of correspondence in this theme ($KR-20 = .41$) was unexpected and may or may not be problematic. Low internal consistency can be a result of situations in which the correlation between some behavioral indicators of the same underlying construct is negative. For example, the use of a weapon from the crime scene may be inversely correlated to the use of physical violence (e.g., punching) even though both could be considered external manifestations of violence and hostility.

*Table 2***Construct Validity of the Action Themes**

To assess the construct validity of the three themes each of the themes TSS's were correlated (e.g., point-biserial) with their previous criminal (e.g., theft and/or robbery), sexual and non-sexual violent convictions, as well as the Static-2002 subscales (see Table 3).

As predicted the correlations of the TSS for sexual exploitation with convictions for prior sexual offenses ($r_{pb} = .15, p < .05$) and sexual deviance ($r = .16, p < .05$) were significant. Further, significant correlations with previous convictions for theft and robbery ($r_{pb} = .15, p < .05$) as well as with the criminality scale ($r = .13, p < .05$) were found to be correlated with high TSS levels of sexual exploitation.

Interestingly, high levels of criminal exploitation were found to not be significantly correlated with theft or robbery alone, but significantly correlated for versatile criminals with

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prior convictions for both theft and robbery ($r_{pb} = .26, p < .01$). Offenders with high TSS scores for criminal exploitation were also found to more often have previous sexual convictions, suggesting offenders with extensive criminal histories and antisocial behavior ($r_{pb} = .25, p < .01$). Accordingly, the criminal exploitation theme was significantly correlated with the Static-2002 subscales of criminality ($r = .14, p < .05$) and persistence ($r = .16, p < .05$) supporting the underlining picture of an antisocial offender.

As expected high TSS scores in the hostility theme correlated with prior violent and sexual convictions ($r_{pb} = .14, p < .05$ and $r_{pb} = .17, p < .05$, respectively).

*Table 3***Previous Sexual Convictions**

Whether or not an offender had a previous sexual conviction was regressed onto the sexual, criminal and hostility theme TSS scores using logistic regression and was found to produce a significant model ($\chi^2_{(3)} = 11.53; p < .01$; see Table 4). However, the criminality TSS was the only significant predictor. Hosmer-Lemeshow goodness-of-fit test was non-significant indicating the model was an adequate fit of the data. The AUC of the overall model was .73 indicating a large effect (see Table 6).

Sexual Recidivism

Whether the offender was convicted of another sexual offense within five years of their release from prison (i.e., sexual recidivism) was regressed onto the three theme TSS scores using logistic regression and again produced a significant model ($\chi^2_{(3)} = 10.81; p < .05$; see Table 4). Again, the criminality TSS was the only single significant predictor, after controlling for other predictors in the model. Hosmer-Lemeshow goodness-of-fit test was non-significant indicating the model was an adequate fit to the data. The AUC of the overall model was .65 indicating a moderate effect (see Table 6).

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*Table 4***Incremental Validity**

To test the incremental validity of using the BTA model of crime scene analysis for the prediction of sexual recidivism beyond the capabilities of the Static-99 a hierarchical block logistic regression was used. The Static-99 score was entered into the first block of the regression and the TSS's of the three themes entered in the second block. To test which thematic predictors added incremental validity to the Static-99, if any, a backward-method (i.e., likelihood ratio method) was employed. In block 1, the Static-99 was significant ($\chi^2_{(1)} = 15.09; p < .001$) and accounted for 15% of the variance. In block 2, the regression analysis revealed that the criminality theme ($B = .36, p < .05$) was the only single significant predictor to add incremental validity to the Static-99. The model including the Static-99 and the criminality theme explained 21% of the variance, a significant increase from block 1 ($\chi^2_{(1)} = 5.59; p < .05$; see Table 5). The AUC for the model only including the Static-99 was .72 whereas the AUC for the model including both Static-99 and the criminality TSS was .75. Both models indicate a large effect (see table 6).

*Table 5**Table 6***Discussion**

The purpose of this study was to replicate, in a German sample, the Behavioral Thematic Analysis (BTA) structure of previous studies of crime scene variables, and to link these themes to the risk for recidivism. In line with previous research (Alison & Stein, 2001; Canter, 1994; Canter & Heritage, 1990; Canter et al., 2003; Häkkänen et al., 2004) we identified the three themes of criminality, hostility, and sexuality. Furthermore, we assessed the ability of detailed crime scene analysis (by means of a Behavioral Thematic Approach) to

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predict an offender's prior sexual offense history and future sexual recidivism. The results show that the criminality theme is a significant predictor of prior sexual offense history as well as sexual recidivism.

As hypothesized, vaginal penetration of the victim and having their clothing disturbed constituted the core features of sexual offending according to the MDS analysis. Additionally, the use of a low level of force by the offender and physical resistance by the victim were also found at the core of the MDS plot. This seems comprehensible, as to control a victim to carry out an offense some level of force (e.g., strategic violence) is likely to be employed by the offender (Felson & Krohn, 1990). It is further posited that the level of physical force employed by the offender will be related to the level of physical resistance by the victim, unless of course, the offender is motivated by gratuitous violence or sadism.

In accordance with previous research (Canter, 2000) the MDS plot was partitioned into radial thematic regions by examining the correspondence of the underlying structure of the variable relationships with the existent literature on rapist behavior. Examination of the MDS plot revealed three thematic regions a) hostility, b) criminality and c) sexual exploitation. The first two regions (a and b, above) are analogous in theory to previous research findings (Canter & Heritage, 1990; Canter et al., 2003; Häkkänen et al., 2004) while the third region (c) seems an aggregation of previously found sexuality and involvement themes (Canter & Heritage, 1990). This further corresponds to Canter et al. (2003) who hint at a more general division of stranger rapes into overtly violent rapes (e.g., hostility) and those that are less violent (e.g., involvement). Also Felson and Krohn (1990) state that rape has three major outcomes: sexual intercourse ("sexual exploitation"), harm to the victim ("hostile assault") and domination of the victim ("control"). Moreover, the findings of this study resemble the discriminating dimensions among rapists based on previous clinical classifications, as summarized by Prentky and Knight (1991).

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In this study we propose that objective crime scene behavior could help to infer the psychological meaning of the crime for the offender. Inferences concerning psychological meaning need to be informed and justified by both theory and evidence. When interpreted in the context of previous findings, our results suggest that there are reasonable stable patterns of crime scene variables for stranger rapists. Furthermore, these patterns are similar to the general literature on sexual offender types. Specifically, the three behavioral themes (criminality, sexuality, and hostility) resemble the three major components of the revised structure of the MTC classification (Impulsivity, Sexualization, and Violence) proposed by Knight (2010).

The criminality theme seems to represent offenders with lower levels of aggression and sexualisation coupled with antisocial personality traits, corresponding to an 'opportunistic' offender according to Knight (2010). However, stranger rapists scoring high on the criminality TSS seem to also reveal aspects of organization in their offenses, for example, bringing a weapon to the crime scene, using a condom, and being forensically aware. This may indicate 'planned impulsiveness' (Pithers, 1990) in which the offender acts impulsively but has somewhat planned the attack in a rudimentary way. The construct validity of the criminality theme was evidenced by significant correlations with categories of general criminality and persistent sexual offending as per the Static-2002. Interestingly, this theme seems to represent versatile criminals with several previous convictions for theft and robbery, corresponding to previous studies (Pritchard & Bagley, 2000; Weinrott & Saylor, 1991). For example, Häkkänen et al. (2004) found that offenders with prior property crimes were more likely to be identified as belonging to a "theft" theme. House (1997) revealed that those offenders with the most "criminal" behavior were the most likely to have previous convictions in general. Further, Davies et al. (1998) found that offenders who took precautions not to leave fingerprints at the crime scene (e.g., forensically aware), were four times more likely to

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have previous convictions for burglary. Likewise, Scully and Marolla (1985) point out that robbery and theft commonly accompany rape and Kröber (2009) concludes that rape is foremost a dissocial crime and frequently is committed by offenders with prior criminal histories.

The construct validity of the hostility theme was verified by significant correlations with prior non-sexual and sexually violent offenses. This corresponds to the work by Davies et al. (1998) indicating that offenders who use extreme violence during the course of an offense are almost three and a half times more likely to have a previous conviction for a violent offense. The behaviors in this theme would relate strongly to Knight and Prentky's pervasively angry rapists as they are also the MTC:R3 type that has been found to inflict the most damage upon their victims (Knight & Prentky, 1990). Pervasively angry offenders have also been found not to be particularly as antisocial (e.g., criminality) or sexualized (e.g., sexuality). This suggests that the hostility theme variables are contributing some unique explanatory purpose in conceptualizing sexual offending processes for CSA.

In the current study, the variables offender extends time (e.g., typical of abduction and/or confinement of the victim), offender bites the victim, and offender uses physical force were found along the sexuality-hostility partition of the MDS plot suggestive of sexually motivated violence, such as sexual sadism. Similarly, Nitschke, Osterheider, and Mokros (2009) suggest that offense characteristics such as offender tortures the victim, engages in acts of cruelty, offender abducts or confines the victim, and offender engages in gratuitous violence toward or wounds of the victim are defining variables of sexual violence. According to Groth (1979) and Cohen et al. (1969) in rare cases of sexual sadism, sexual and aggressive behaviors can coexist and become fused into a single psychological experience for the offender. Overall, the correspondence of those offenders with a history of violent offenses and

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their accordance with the hostility theme provides validity to a distinct thematic construct of hostility.

The theme of sexual exploitation seems to match offenders who apply a low level of aggression and have no discernible antisocial personality (Prentky & Knight, 1991). No variables indicating an intention of the offender to harm the victim were found in this region. However, the variable “offender binds the victim” may constitute an attempt by the offender to incapacitate the victim using strategic violence (Felson & Krohn, 1990) or for sexual gratification and/or to perform gratuitous sexual acts on an incapacitated victim (McCabe & Wauchope, 2005). Accordingly, the sexual exploitation theme was significantly correlated with offenders that had previous sexual offenses and sexually deviant interests (Static-2002 subscale) indicating that some behaviors within this theme may be indicative of offenders with paraphilic interests. Recently, Knight (2010) has suggested that sexualisation, a term used to refer to sexual exploitation, deviance and hyper-sexuality, is an independent factor to antisociality (or impulsiveness) and hostility in sexual offending types. Offenders high in sexualisation will be of the sadistic or vindictive types and less likely pervasively angry (e.g., hostile) or opportunistic (e.g., criminal) types, again giving support to the specification of sexual exploitation as a unique and important explanatory theme in the current research. Sexualisation has also been suggested to disinhibit aggressive, sadistic fantasies when coupled with Factor 1 affective aspects (e.g., callousness and unemotionality) of the PCL-R (Hare, 2003) to lead to sexual coercion of females. In particular, we would emphasize the concept of mental simulations where an offender imagines committing a sexual crime in considerable detail (e.g., penetration with finger, anal penetration) and sexual fantasies may provide a means through which this type of offending is acquired and refined (Ward & Hudson, 2000). Overall, the theme of sexual exploitation offers support for the inherent sexual nature of rapes as a means to gain sexual access to a female (for example, see Scully & Marolla, 1985).

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Interestingly, the results suggest that only the criminality theme is a significant predictor of prior sexual offense history and sexual recidivism, after controlling for the other themes. Perhaps surprisingly, sexual exploitation was found to be a weak non-significant predictor of sexual offense history and sexual recidivism. A possible explanation could be that sexual deviance seems to be a more important predictive factor for child molesters than rapists, whereas general criminality may be more predictive for rapists (Rice & Harris, 1997). Similarly, hostility also was not related to sexual recidivism, after controlling for the other themes. A possible explanation here could be that most of the variables are indicators of offense severity (e.g., physical force, blitz attack) whereas severity has not been identified as a major risk factor for recidivism (Hanson & Morton-Bourgon, 2004; Quinsey, Harris, Rice, & Cormier, 2006). Furthermore, hostility seems to be related to violent and general recidivism rather than sexual recidivism (Mann et al., 2010).

As Goodwill et al. (2009) state, odds ratios provide relative risk information about the likelihood of a certain offender type (e.g., based on criminal behavior) having a certain type of previous convictions (e.g., prior sexual convictions). Statistical probabilities used in this fashion then have a direct application to criminal investigations by providing guidelines for prioritizing suspects based on offense histories. Further, predictive models such as these offer investigators the scientific warrant needed to support their decisions when prioritizing suspects (Goodwill et al., 2009). The current study showed that as the TSS for the criminality theme increased by one unit (e.g., the presence of an additional behavior in that theme), the odds of the offender having a previous conviction for a sexual offense increased by 1.4 times.

Several previous studies of rapists and stranger rapists have found a link between offense criminality and previous and future sexual offending. Hanson and Bussiere (1998) found that general criminality was significantly related to sexual recidivism. Straub and Witt (2002) reported that rapists with stranger victims had significantly more previous convictions

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than rapists with known victims. Habermeyer, Passow, Puhlmann, Vohs, and Herpertz (2009) found that sexual offenders with a high risk of reoffending had a history of versatile delinquency and antisocial personality traits or disorders. Further, a history of antisocial behavior is one of the “Big Four” risk factors as outlined by Andrews and Bonta (2010). In accordance with this literature the current study found that criminality significantly correlated with previous sexual convictions and was a significant predictor of sexual recidivism over a 5-year follow-up period. Further, the study found significant correlations between the criminality theme and the criminal and sex offending persistence subscales of the Static-2002 indicating a relationship between criminality and a history of antisocial behavior. In sum, the results indicate that specific “criminal” crime scene behavior, as outlined herein, within a stranger rape is significantly associated with an increased chance of future sexual offending. Therefore, these results could have practical implication for offender treatment and especially for the risk and need principle (Andrews & Bonta, 2010). The risk principle states that the intensity of treatment should be matched to the recidivism risk of the offender. Stranger rapists showing high levels of “criminal” crime scene behavior therefore should receive high intensity services. The need principle argues correctional treatment should focus on criminogenic needs. We would argue that future research should investigate in how far the three themes could be indicators of such criminogenic needs.

The criminality theme showed incremental validity and significantly improved the predictive accuracy of the Static-99. This means that the twelve crime scene variables of the criminality theme capture important predictive information, which does not seem to be captured by the Static-99. The development of actuarial risk assessment instruments, such as the Static-99, is accomplished through the theoretical accumulation and statistical integration of crime and offender related aspects or variables that have a supposed predictive value in predicting recidivism. However, Zietzen and Dahle (2005) point out that the sizes of the

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effect of some of these predictor variables vary greatly between studies. Furthermore, Rettenberger, Gaunersdorfer, Schilling, and Eher, (2009) emphasize that actuarial risk assessment instruments have problems with the prediction of recidivism for antisocial sex offenders; however, this finding is yet to be replicated.

As hypothesized at the outset of this study, another potential limiting factor on the predictive accuracy of actuarial risk assessment tools is that the majority of them do little to incorporate the index offense's crime scene behaviors. Instead, tools such as the Static-99 rely heavily on past criminal convictions, which can be problematic when the information is simply unknown (e.g., foreign offenders) or in cases where the offender has only committed one known offense, the index offense. A major finding of the current study is thus the fact that the integration of detailed crime scene analysis can significantly improve the predictive accuracy of the Static-99 for predicting recidivism in stranger rapists. Furthermore, crime scene information can be incorporated into risk assessment very effectively via record review as was the case in the study at hand.

Future Directions

Given the moderate internal consistency of the hostility theme future studies should investigate the construct validity of the three proposed themes in more detail. One clear limitation of the BTA methodology used is that variables near thematic borders will be (at least) statistically more related to variables very close to it in adjoining themes than to variables within its theme that are situated geometrically farther away. Due to this fact, it is entirely possible that the thematic regions of the MDS plot are not optimal and further investigation is warranted.

It was further evident that some CSA variables had low frequency and low correspondence to themes. This is not particularly surprising given that the data is not

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collected for experimental or research purposes and are thus subject to any manner of reliability issues (for discussion see Farrington & Lambert, 1997, and Alison, Snook & Stein, 2001). Accordingly, the exact nature, number and utility of the variables used to define the crime scene for BTA is suspect to further investigation, Nevertheless, the current study strived to increase construct validity by utilizing variables from previous BTA studies and assessing the validity of resultant themes by correlation to previous offense histories and Static-2002 subscales. To this end, the themes revealed significant correlations to previous offense and subscale predictions albeit the relationships were generally smaller than .30, indicating only a small effect.

Conclusions

In conclusion, the current study has shown that a behavioral thematic analysis of crime scene behaviors has both *scientific* utility in predicting prior and future sexual offending and a *pragmatic* application to police investigators and clinicians providing risk assessments. This study showed the construct validity of the three identified themes by considering the predictive validity (e.g., sexual recidivism), the convergent validity (e.g., previous offenses), the content validity (e.g., crime scene variables), and their intercorrelations. In addition we were able to unify two often disparate domains of crime scene analysis and risk assessment. Finally, the results have also increased our scientific knowledge of stranger rape and our ability to predict prior and future sexual offending based on crime scene behavior and actuarial risk assessment tools.



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Appendix

Variables used to describe behaviors during the offense of rape. All variables were coded dichotomous with values based on the presence or absence of each behavior. Variables are sorted by hypothesized themes.

Criminality

- (1) Searching. Offender searches for a victim.
- (2) Forensically aware. Demonstrates knowledge of forensic procedures (e.g., DNA, finger prints).
- (3) Condom. Offender uses a condom during the act.
- (4) Binds victim. Use of articles, at any time during the offence, to bind the victim.
- (5) Disguise. Offender wore a disguise during the attack.
- (6) Threatens no report. Offender threatens victim not to report the incident to the police or any other person.
- (7) Weapon to scene. Offender brought weapon to crime scene (e.g., gun).
- (8) Weapon from scene. Offender took weapon from crime scene (e.g. kitchen knife).
- (9) Steals cloth. Offender steals clothing of the victim.
- (10) Steals personal. Offender steals personal items (e.g. photos, letters, ID).
- (11) Steals valuables. Offender steals valuables (e.g., money, jewelry, money card).

Involvement

- (12) Confidence approach. Offender used a ploy or subterfuge.
- (13) Intrude. Offender had no permission be in the victim`s home or at some point was asked to leave.
- (14) Extends time. Offender extended the time spent with the victim after the attack.
- (15) Revealed self-detail. Offender revealed information about himself (true or not true).
- (16) Apologetic. Offender apologized to the victim.
- (17) Reassure. Language used by the offender that appeared to be used to comfort or reassure the victim.
- (18) Victim drugged (used drugs). Offender drugged the victim.
- (19) Fondle. Offender fondled the victim.
- (20) Masturbate. Offender masturbated.
- (21) Kiss. Offender kissed or attempted to kiss the victim.
- (22) "I love you". Offender says that he loves the victim sometime during the attack.
- (23) Cunnilingus. Offender performed (or attempted) a sexual act on the victim`s genitalia using his mouth.
- (24) Identifies victim. Offender took steps to obtain victim details that would identify her.
- (25) Offender sexual comment. Offender made sexual comments during the attack.
- (26) Implies knowing victim. Offender implies or reveals they know details about the victim.

Hostility

- (27) Blitz attack. Sudden, highly aggressive attack.
- (28) Victim resistance physical. Victim fought back.
- (29) Victim resistance verbal. Victim verbally resisted (e.g., screamed, cried).
- (30) Threatens to kill. Offender threatens to kill the victim.
- (31) Threatens weapon present. Offender made threat of physical presence of a weapon.
- (32) Ejaculation. Offender ejaculated during the offence.
- (33) Penetration with finder. Offender inserted finger(s) into the victim`s vagina.
- (34) Bites. Offender bit the victim during the attack.
- (35) Offender intoxicated. Offender was noticeably intoxicated by alcohol or drugs during the offence.
- (36) Forces victim sexual comment. Offender asked or forced the victim to make sexual comments or moan.
- (37) Anal penetration. Offender penetrated (or attempted to penetrate) the victim`s anus.
- (38) Fellatio. Offender forced the victim to perform oral sex.
- (39) Verbal violence. Offender used profanities to threaten the victim at some time during the attack.

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- (40) Physical control. Offender holds or pushes the victim down some time during the attack.
- (41) Physical force. Offender uses physical force (e.g., kicks, punches).
- (42) Demeans. Offender demeans or insults the victim during the attack.
- (43) Tears/rips clothing. Offender ripped victim`s clothing during the offence.

Core

- (44) Disturbed clothing. Offender removed victim`s clothing.
- (45) Vaginal penetration. Offender vaginally penetrated (tried) the victim.

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Table 1

Summary of Psychometric Properties of the Three TSS

	Sexual Exploitation	Criminality	Hostility
Mean (SD)	1.98 (1.87)	.61 (1.26)	2.25 (1.58)
Observed range	0-10	0-8	0-9
Possible range	0-16	0-12	0-13
Score > 0 in %	76.6	29.9	88.0
KR-20	.60	.71	.41
Correlations			
Sexual Exploitation	-	.16*	.03
Criminality	-	-	.15*
Hostility	-	-	-

* $p < .05$

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Table 2

*Commonality of Current Study Offense Variables across Stranger Rape Research by BTA**Thematic Regions (Current Study Percentage Frequencies are in Brackets).*

Sexual Exploitation	Criminality	Hostility
Confidence approach ^{2,3} (43)	Offender threatens that a weapon is present ^{1,2,5} (17)	Physical force ^{1,2,3,4,5} (48)
Offender makes sexual comment ^{3,4,5} (26)	Weapon (to scene) ^{1,2,3,4,5} (11)	Victim resists verbal ^{2,3} (36)
Ejaculation ⁵ (23)	Forensically aware ³ (5)	Verbal violence ^{1,2,3,4,5} (34)
Offender kisses the victim ^{3,4,5} (21)	Offender threatens no report ^{1,2,3,4,5} (5)	Blitz attack ^{1,3} (33)
Fellatio ^{1,2,3,4,5} (21)	Offender reveals self detail ^{3,5} (5)	Victims clothing is torn ^{1,2,3,4} (28)
Penetration with finger ^{3,5} (15)	Offender steals valuables ^{1,2,3,4,5} (5)	Offender threatens to kill the victim ⁵ (13)
Anal penetration ^{1,2,3,4,5} (12)	Condom ⁵ (4)	Searching ³ (11)
Offender fondles the victim ³ (8)	Offender identifies the victim ^{2,3,4,5} (3)	Offender is intoxicated ³ (7)
Offender demeans the victim ^{1,2,3,4,5} (8)	Offender implies he knows the victim ^{1,2,3,4,5} (2)	Weapon (from scene) ^{1,2,3,4,5} (5)
Offender masturbates ⁵ (7)	Offender steals personal ^{1,2,3,4,5} (2)	Offender apologizes ^{1,3,5} (5)
Cunnilingus ^{1,2,3,4,5} (5)	Offender steals clothing ^{1,2,3,4,5} (1)	Private crime scene (intrude) ⁵ (2)
Offender binds the victim ^{1,2,3,4} (2)	Disguise ^{1,2,3,4} (1)	Offender used drugs ⁵ (1)
Offender reassures the victim ^{2,3,5} (2)		Offender bites ⁵ (1)
Offender extends time ^{3,5} (2)		
Offender states "I love you" ^{1,2,3,4,5} (2)		
Victim forced to make sexual comment ^{1,2,3,4,5} (1)		

¹Canter & Heritage (1990); ²Canter (1994); ³Alison & Stein (2001); ⁴Canter et al. (2003);⁵Häkkinen et al. (2004)

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Table 3

Correlations between BTA Themes and Previous Offences (Point-Biserial), Static-2002 Subscales, and Static-99 (Pearson).

	Sexual Exploitation	Criminality	Hostility
Prior Criminal Convictions			
Theft or Robbery	.10	.00	.10
Theft and Robbery	.15*	.26**	.02
Prior Sexual Conviction	.15*	.25**	.17*
Prior Violent Conviction	.12	.06	.14*
Static - 2002			
Sexual Deviance	.16*	.10	.08
Criminality	.13*	.14*	.11
Persistence	.10	.16*	.13
Static-99	.05	.19**	.18*

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

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Table 4

*Prediction of Prior Sexual Convictions and Sexual Recidivism for a Fixed 5-year Follow-up**Period*

	Previous Sexual Conviction ¹		Sexual Recidivism ²	
	<i>B (SE)</i>	<i>Exp b (95% CI)</i>	<i>B (SE)</i>	<i>Exp b (95% CI)</i>
Constant	-3.64*** (.63)		-2.67** (0.49)	
Criminality	.34* (.16)	1.40 (1.03-1.90)	0.37* (0.15)	1.45 (1.08-1.95)
Sexual exploitation	.16 (.13)	1.18 (.92-1.51)	0.11 (.14)	1.12 (.85-1.47)
Hostility	.28 (.16)	1.32 (.97-1.81)	0.14 (.11)	1.15 (.92-1.43)

¹ $R^2 = 0.14$ (Nagelkerke). Model $\chi^2_{(3)} = 11.53^{***}$ ² $R^2 = 0.11$ (Nagelkerke). Model $\chi^2_{(3)} = 10.81^*$ * $p < .05$, ** $p < .01$, *** $p < .001$

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Table 5

Incremental Validity of the Criminality TSS in Relation to the Static-99

	<i>B (SE)</i>	95% <i>CI</i> for exp <i>b</i>		
		Lower	Exp <i>b</i>	Upper
Constant	-4.08*** (0.70)			
Criminality	0.36* (0.16)	1.06	1.44	1.96
Static-99	0.46** (0.14)	1.21	1.58	2.06

$R^2 = 0.21$ (Nagelkerke). Modell $\chi^2_{(2)} = 20.68$; * $p < .05$, ** $p < .01$, *** $p < .001$

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Table 6

Predictive Accuracy of the Themes, BTA Model, Static-99, Combined Model

	Previous Sexual Conviction	Sexual recidivism
	AUC (95% CI)	AUC (95% CI)
Criminality	.69 (.55-.84)	.64 (.51-.77)
Sexual exploitation	.59 (.42-.76)	.61 (.48-.73)
Hostility	.64 (.52-.76)	.59 (.45-.72)
BTA Model	.73 (.60-.87)	.65 (.52-.78)
Static-99	-	.72 (.61-.84)
Combined Model (Static-99 plus Criminality)	-	.75 (.63-.87)

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Figure 1. Two-dimensional MDS solution of 45 crime scene actions in 167 stranger rapes with regional interpretations (see Table 2 for frequencies).

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