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The Measurement of Psychopathy: Dimensional and Taxometric Approaches

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This article extends the debate over personality disorders as dimensional or taxonic phenomena to the study of psychopathy and relates this issue to questions surrounding whether behaviors or personality traits best represent psychopathy. Proponents of dimensional measurements of psychopathy consider personality traits to be important constructs of psychopathy, whereas proponents of taxometric measurements consider behaviors to be important characteristics of psychopathy. After a brief introduction to the measurement of psychopathy, taxometric and dimensional measurement techniques are explained, their assumptions addressed, and their strengths and weaknesses discussed. Empirical evidence for each technique is then critiqued, and methodological problems are described. It is argued that methodological problems of existing studies largely preclude conclusions regarding whether psychopathy is dimensional or taxonic. Suggestions for future research are provided to address some of these methodological limitations. This review informs readers about each measurement approach and identifies problems regarding the dimensional or taxonic measurement of psychopathy.

Keywords: *psychopathy; taxonomies; personality disorders; measurement*

The concept of psychopathy is important to researchers, clinicians, decision makers, and offenders who work or are confined in the criminal justice system. Researchers are concerned with psychopathy as it relates to the prediction of institutional misconduct or community recidivism (Gacono & Bodholdt, 2001; Hare, 1996, 1999a; Hart, 1998; Hemphill, Hare, & Wong, 1998; Salekin, Rogers, & Sewell, 1996; Walters, 2003). Clinicians use the concept for screening, assessment, and treatment planning (Bodholdt, Richards, & Gacono, 2000; Gacono, 2000; Gacono, Loving, Evans, & Jumes, 2002; Hare, 1996; Loving, 2002), and they may be called upon for expert testimony regarding its usefulness in clinical settings (Gacono & Hutton, 1994; Gacono et al., 2002; Shipley & Arrigo, 2001; Zinger & Forth, 1998). Criminal justice administrators and decision makers often consider psychopathy scores when sentencing offenders (Shipley & Arrigo, 2001; Zinger & Forth, 1998), classifying offenders (Hare, 1996), and releasing them from custody (Zinger & Forth, 1998). Offenders considered psychopathic are often seen as a high risk to recidivate and as untreatable (Ogloff, Wong, & Greenwood, 1990; Shipley & Arrigo, 2001; Zinger & Forth, 1998).[1] Thus, it is clear that psychopathy is an important construct considered by many in forensic settings; as such, it is important that both the conceptualization and operationalization of psychopathy are valid and reliable.

Recent articles published in the psychological literature reveal a debate that centers on whether personality disorders are best measured as dimensional entities, which incorporate abnormality at the extremes of a scale, or as taxonic entities, which comprise separate and distinct classes (for a special issue on this topic, see Ball, 2001; Livesley, 2001; McCrae et al., 2001; Miller, Lynam, Widiger, & Leukefeld, 2001; Pincus & Wilson, 2001; Reynolds & Clark, 2001; Trull, Widiger, & Burr, 2001; see also Cole, 2004; Lenzenweger, 2004; Meehl, 2004; Ruscio & Ruscio, 2004). This debate is not new in the personality disorder literature (see Grove & Tellegen, 1991), but it is relatively new with regard to psychopathy. Although psychopathy is not recognized as a personality disorder by the *Diagnostic and*

Statistical Manual of Mental Disorders (American Psychiatric Association, 1994), it has been defined as such (Hare, 1996) and has garnered much evidence in psychology and psychiatry as a personality disorder (Brinkley, Newman, Widiger, & Lyman, 2004; Harpur, Hart, & Hare, 1994; Miller et al., 2001). In addition, recent articles directly assessing the taxonic or dimensional nature of psychopathy have also appeared in the literature (e.g., Edens, Marcus, Lilienfeld, & Poythress, 2006), indicating that a similar debate is beginning to materialize within the study of psychopathy.

Whether psychopathy is a taxonic or dimensional construct is important to researchers and to mental health professionals, although the debate is of most interest to researchers because of the theoretical question it inherently raises—that is, whether psychopaths are qualitatively different than other people (a taxon) or whether they represent extreme variants of normality (a dimension). In addition, the conceptualization of psychopathy as a categorical or dimensional phenomenon largely affects the measurement technique (e.g., factor analysis or taxometric procedures) that is used by researchers to study psychopathy. Mental health professionals, on the other hand, are less concerned with discussions over this matter because they use psychopathy as both a dimension and a taxon and because psychopathy is not a clinical diagnosis (Bodholt et al., 2000; Gacono & Bodholt, 2001; Gacono et al., 2002). Forensic professionals often use the concept of psychopathy in their assessment of or treatment planning for offenders, as well as when providing expert testimony (Bodholdt et al., 2000; Gacono, 2000; Gacono & Hutton, 1994; Gacono et al., 2002; Loving, 2002; Shipley & Arrigo, 2001; Zinger & Forth, 1998). In doing so, mental health professionals often use the Psychopathy Checklist–Revised (PCL-R; Hare, 1991) to examine individuals' scores of psychopathy (a dimension) and to identify those individuals scoring at or above 30 on the PCL-R (a taxon). Therefore, in practice, the concept of psychopathy is used both as a dimension and a taxon (Gacono, 2000); however, the conceptualization and subsequent measurement of psychopathy are still being considered in academia.

This review attempts to inform the conceptualization and measurement of psychopathy as a dimension or a taxon by highlighting the underlying assumptions of dimensional and taxometric measurement approaches, reviewing their strengths and weakness and discussing methodological problems in existing studies. Specifically, I first explain the assumptions, strengths, and weaknesses of taxometric and dimensional measurement techniques and critique the empirical evidence for each. As will be dis- cussed, research assessing the nature of psychopathy is relatively new, and the studies assessing this topic are diverse in their methodologies, which most likely leads to mixed findings across studies. I argue that the diverse sample characteristics, various measures and assessments of psychopathy, and different statistical analyses used in existing taxometric studies of psychopathy may contribute to mixed findings regarding the structure of psychopathy. I suggest that, given the methodological inconsistencies across studies addressing this topic, conclusions regarding the dimensional or taxonic structure of psychopathy are premature at this time. Simply more evidence is needed in this area—I recommend that future researchers compare dimensional and taxometric techniques within the same samples to determine whether both techniques identify the same persons as psychopaths.

Measuring Psychopathy

Although psychopathy is not a new concept, relatively little empirical attention had been devoted to it until Cleckley's (1941) *The Mask of Sanity* was published. Cleckley primarily used personality traits to described the psychopath and asserted that psychopaths are unreliable, insincere, untruthful, devoid of remorse or shame, poor decision makers, and incapable of love, among other things. Cleckley's work spurred much debate over the concepts incorporated in psychopathy, but the lack of sound psychometric tests and the fallibility in assessing personality traits during the time period led to the notion that behavioral characteristics could more reliably measure psychopathy than

could personality characteristics (Salekin, 2002).

More recently, Hare (1996) asserted that psychopathy is a "socially devastating disorder defined by a constellation of affective, interpersonal, and behavioral characteristics" (p. 25). Bridging the gap between personality traits and behavioral aspects of psychopathy, Hare (1996, 1999b) employed both in the operationalization of psychopathy when he devised the Psychopathy Checklist and, later, the PCL-R (Hare, 1991). The PCL-R has since become the "measure of choice" (see Cooke & Michie, 2001, p. 171) for identifying psychopathy and has demonstrated high construct validity in measuring psychopathy (Lilienfeld, 1998). The key components of psychopathy in the PCL-R are included in two factors: the emotional/interpersonal factor (Factor 1) and the social deviance factor (Factor 2). Factor 1 reflects personality traits such as egocentricity, manipulativeness, lack of remorse, and callousness, whereas Factor 2 reflects behavior characteristics such as displaying poor behavioral controls, leading an unstable lifestyle, and being impulsive or antisocial (Hare, 1996, 1999b).

Despite general agreement regarding the use of the two-factor PCL-R, some researchers are now turning to three-, four-, and five-factor models of psychopathy (e.g., Cooke & Michie, 2001; Hall, Benning, & Patrick, 2004; Hare, 2003; Miller et al., 2001; Vitacco, Rogers, Neumann, Harrison, & Vincent, 2005). For instance, Hare (2003) recently offered a four-facet model of psychopathy, which separates the interpersonal and affective facets of Factor 1 and the lifestyle and antisocial facets of Factor 2 into four separate facets, whereas Cooke and Michie (2001) developed a three-factor model of psychopathy comprised of factors related to arrogant/deceitful interpersonal style, deficient affective experience, and impulsive/irresponsible behavioral style. Regardless of the chosen model, most researchers agree that the conceptualization of psychopathy should include personality traits and behavioral aspects; however, there is less agreement regarding the relative importance of these aspects in the operationalization of psychopathy (for a similar discussion on antisocial behavior, see Vitacco et al., 2005). Relevant to the

focus here is that dimensional and taxometric approaches place differential importance on personality traits and behaviors when assessing psychopathy.

The theoretical question regarding whether psychopathy is dimensional or taxonic inherently asks the question, "[Do] people fall into two separate, non-overlapping classes or [do they] simply differ in the degree to which they exhibit antisocial tendencies?" (Skilling, Quinsey, & Craig, 2001, p. 451). This question has implications for whether personality disorders should be operationalized as disorders that are made of a number of categorical or separate phenomena or as dimensional disorders that are continuous and incorporate abnormality at the extremes of a scale (Pickles & Angold, 2003). This is closely tied to the conceptual question of whether psychopathy is best captured by personality features or by behavioral indicators.

Method

Only studies that evaluated the structure of psychopathy and made specific reference to the dimensional or taxonic nature of it were included in this review. To systematically identify studies, I searched the Social Science Citation Index for the following terms or combination of terms: *measurement of psychopathy, psychopathy dimensions, psychopathy taxon or categories,* and *personality taxon or dimension*. In addition, I examined references from studies related to the measurement of psychopathy.

Once a potential study was identified, a preliminary screening of it was made on the basis of the title, abstract, analyses, and any other available information.[2] Studies that did not evaluate the structure of psychopathy or make specific reference to the dimensional or taxonic nature of it were not included. Due to these criteria, research assessing the three-, four-, and five-factor models of psychopathy are excluded, as are evaluations of the validity and reliability of various tools for measuring psychopathy. Given the few studies that have examined this topic directly, all studies meeting the above

criteria were included in this review. Table 1 contains the eight studies that speak directly to the measurement of psychopathy as dimensional or taxonic. It should be noted that the studies presented are very different methodologically, despite their attempts to examine the same underlying structure of psychopathy.

Dimensional Approaches

Researchers who support the dimensional approach to psychopathy contend that the core features of psychopathy are the personality traits of the individual, and not the individual's past behaviors (Lilienfeld, 1998). Proponents of psychopathy as a personality-based entity suggest that personality disorders are dimensional in nature and are best assessed using continuous scales. They maintain that dimensional attributes (such as callousness) vary in kind or degree from normality (Lilienfeld, 1998). These attributes can be converted into categories by specifying cutoff points along the scale, but the underlying phenomena on the scale remain continuous (Blackburn, 2000).

Strengths

Dimensional analyses of personality and personality disorders have garnered much empirical support over the years (Blackburn, 2000; Haslam, 2003; McCrae & Costa, 1995). In addition, they have demonstrated high construct validity in providing a picture of the underlying structure of personality (Haslam, 2003; Lilienfeld, 1998) and have yielded reliable and valid data regarding psychopathy (Blackburn, 2000). Many researchers agree that a dimensional approach to personality is consistent with the fundamental nature of personality, in that personalities differ in degree and kind along dimensions, and there is considerable empirical support for the three- and five-factor models of personality (Haslam, 2003; Lilienfeld, 1998; McCrae & Costa, 1995).

Factor analytic techniques have long been used in the study of personality and have been found to generate highly reliable

dimensions of personality disorders (Pickles & Angold, 2003). Factor analytic techniques are useful because they identify underlying constructs with factors produced by intercorrelated variables. Factor analysis therefore achieves parsimony by reducing a large number of variables into a smaller number of factors, simplifying the interpretations of the ways in which variables are related (Tabachnick & Fidell, 2001). Factors are believed to reflect the underlying processes that create the correlations between the variables; a set of variables that consistently yield similar factor structures is reliable and valid because the same underlying construct is repeatedly revealed.

Factor analytic techniques are used to create the five factors of personality, referred to as the Five Factor Model (FFM; Digman, 1990; McCrae & Costa, 1987) or the Big Five personality traits. The FFM measures common personality domains, such as Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness, as dimensional entities. By correlating the personality domains of the FFM to psychopathy, several studies depicted in Table 1 provide evidence that the structure of psychopathy is dimensional. For instance, Miller et al. (2001) studied the dimensional structure of psychopathy by examining the correlations between the FFM and psychopathy. These researchers devised an expert-based prototype of psychopathy based on the 30 facets of the FFM and correlated the profile with the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), which is a self-report questionnaire that measures normal personality dimensions based on the FFM of personality. Based on correlations between the psychopathy profile and NEO-PI-R measures, Miller et al. concluded that psychopathy could be understood as dimensional in nature, and that Factor 1 of psychopathy may represent low agreeableness and low neuroticism, whereas Factor 2 may represent low agreeableness, conscientiousness, and high neuroticism. Miller

Table 1
Studies Assessing Structure of Psychopathy as Dimensional or Taxonic

| Study | Sample Characteristics | | | Psychopathy Assessment Tool | Statistical Analysis | Structure of Psychopathy | |
	Participants	Age	Gender			Dimensional	Taxonic
Dimensional analyses							
Blackburn and Coid (1998)	Psychiatric offenders, prison inmates	Adult	Male	PCL-R[a]	Pearson correlation	X	
Miller, Lynam, Widiger, and Leukefeld (2001)	General	Young adult	Male and female	LSRP,[b] expert-based psychopath prototype	Intraclass Q correlation[c]	X	
Miller and Lynam (2003)	General	Young adult	Male and female	Expert-based psychopath prototype	Intraclass Q correlation	X	
Lynam et al. (2005)	General	Youth	Male	CPS[d]	Hierarchical regression, Pearson correlation	X	
Taxometric analyses							
Harris, Rice, and Quinsey (1994)	Psychiatric offenders, prison inmates	Adult	Male	PCL-R	MAXCOV-HITMAX, iterative methods		X
Marcus, John, and Edens (2004)	Jail inmates, prison inmates	Adult	Male and female	PPI[e]	MAMBAC, MAXEIG, L-MODE	X	
Vasey, Kotov, Frick, and Loney (2005)[f]	Clinical youth, nonclinical youth, juvenile offenders	Youth	Male and female	APSD[g]	MAXEIG, L-MODE		X
Edens, Marcus, Lilienfeld, and Poythress (2006)	Prison inmates	Adult	Male	PCL-R[h]	MAMBAC, MAXCOV, MAXEIG, L-MODE	X	

Note: MAXCOV ⬜ maximum covariance method; MAMBAC ⬜ mean above and below a cut; MAXEIG ⬜ maximum eigenvalue; L-MODE ⬜ latent mode factor analysis.
a. Psychopathy Checklist–Revised (Hare, 1991).
b. Levenson Self-Report Psychopathy Scale (see Levenson, Kiehl, & Fitzpatrick, 1995; Lynam, Whiteside, & Jones, 1999).
c. Intraclass Q correlation (see Block, 1957; Westen, Muderrisoglu, Shedler, Fowler, & Koren, 1997).
d. Childhood Psychopathy Scale (Lynam, 1997).
e. Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996).
f. Reported data taken from Study 2.
g. Antisocial Process Screening Device (Frick & Hare, 2001). Reported data taken from the three-factor solution.
h. Psychopathy Checklist–Revised, four-facet model (Hare, 2003).

and Lynam (2003) also found an association between the NEO-PI-R and the psychopathy profile and indicated that psychopathy can be understood as a dimensional entity consisting of a "constellation of personal- ity traits" (p. 176). Finally, Lynam et al. (2005) examined the structure of juvenile psychopathy as a dimensional entity by assessing its compatibility to the FFM. They determined that the Childhood Psychopathy Scale (Lynam, 1997), which was designed to capture the components of Factor 1 and Factor 2 of the PCL-R in adults, could be captured by the FFM, and they concluded that their findings support the dimensional nature of psychopathy.

Evidence of correlations between other personality disorders and psychopathy may also offer support for the dimensional structure of psychopathy. Blackburn (2000) has proposed that characteristics occurring frequently with other characteristics, such as the indicators of antisocial personality disorder, schizophrenia, and psychopathy, may suggest that the diagnoses are not distinctive. As such, a high overlap of characteristics, such as neuroticism and anxiety, although distinct, may reflect a common underlying dimension. There is evidence to support his claim. Blackburn and Coid (1998) assessed correlations between the PCL-R and other dimensional personality disorders. They found high correlations between PCL-R factors and personality dis- orders, such as paranoid, histrionic, narcissistic, antisocial, borderline, and passive- aggressive personality disorder categories, as defined by the *Diagnostic and Statistical Manual* (3rd ed.; American Psychiatric Association, 1980), and concluded that psychopathy reflected a dimensional personality disorder.

Lastly, studies that fail to find evidence of the taxonicity of psychopathy necessarily may provide support for the dimensional approach. For instance, Marcus, John, and Edens (2004) failed to find evidence of a taxon of psychopathy and suggested that the psychopathic personality may be best understood as existing on a continuum. Similarly, after finding no support for a taxon of psychopathy, Edens et al. (2006) contended that a dimensional model of psychopathy may be

more appropriate than a taxonic model. Studies that find subtypes of psychopaths may also provide evidence against a taxon of psychopathy because a taxon is by definition a class in and of itself, and identifying subtypes within this class should be impossible (Hicks, Markon, Patrick, Krueger, & Newman, 2004).

Weaknesses

Dimensional analyses assessing personality disorders are not without criticism. Some of the underlying assumptions of and methodologies used by dimensional analyses have been called into question by advocates of taxometrics. Specifically, dimensional analyses assume that disorders are abnormalities that fall at the extreme ends of a scale; critics argue that the dimensional approach blurs distinction between normal and abnormal because abnormality is seen as an extreme of normality (Haslam, 2003; Pickles & Angold, 2003). Furthermore, current support for dimensional analyses of personality disorders has not ruled out the possibility that latent categories underlie the dimensions (Haslam, 2003; Haslam & Kim, 2002; Pickles & Angold, 2003). Haslam (2003) contends that categories whose distributions overlap may yield the same results as if the distribution was scalar. Taxometric supporters also assert that imperfect diagnostic tools may inhibit accurate detection of disorders; this may lead to measurement error, which creates a "cloud" in a distribution that should be made of two or more distinct categories.

Certain methodologies employed in dimensional studies, such as the use of self- report surveys administered to general populations of participants, may also be a potential weakness of dimensional approaches (see, e.g., Miller & Lynam, 2003). Self-report surveys are generally criticized for underreporting crime-related activities, and they may underestimate relevant information by roughly 10% (Kroner, Mills, & Morgan, 2007). Furthermore, self-report surveys have been criticized for examining nonpsychopathic characteristics and failing to accurately capture the core personality features of psychopathy

(Hare, 1996); evidence corroborating this viewpoint demonstrates low to moderate correlations between self-report measures of psychopathy and validated assessment tools such as the PCL-R (Forth & Mailloux, 2000). This may also be one reason self-report surveys underestimate criminal behavior. In addition, psychopathy is present in about 1% of the general population (Hare, 1999a); underestimation of psychopathy through self-report surveys combined with the use of participants drawn from the general population may provide researchers with base rates that are too low to draw meaningful conclusions regarding the structure of psychopathy. Clearly, the assumptions, techniques, and methods used in dimensional assessments of psychopathy may present potential weaknesses of this approach.

Taxometric Approaches

Unlike dimensional analyses that focus more heavily on the personality characteristics of psychopathy, taxometric analyses follow a primarily behavior-based assessment of psychopathy and focus on the occurrence of past and observable antisocial behavior, such as cruelty to animals and unstable financial situations (Lilienfeld, 1998). Proponents of psychopathy as a taxonic entity assert that behaviors are best measured as dichotomies. They maintain that psychopathy is a taxon, or a class occur- ring in nature, rather than a class produced scientifically by specifying cutoff points on a continuous scale (Lilienfeld, 1998; Skilling et al., 2001), and claim that psychopaths differ from nonpsychopaths in that they constitute a discrete class of offenders. In other words, there may be two classes of offenders—those offenders who are in the psychopathy taxon and those who are not in the taxon (Hare, 1996).

There are several taxometric techniques that researchers employ when identifying the taxonicity of a construct. Such techniques include the maximum covariance method (MAXCOV; e.g., Meehl & Yonce, 1996), mean above and below a cut

(MAMBAC; e.g., Meehl & Yonce, 1994), maximum eigenvalue (MAXEIG; e.g., Waller & Meehl, 1998), latent mode factor analysis (L-MODE; e.g., Waller & Meehl, 1998), and maximum slope (e.g., Grove & Meehl, 1993), as well as cluster analysis, latent class analysis, and admixture analysis (Haslam & Kim, 2002). The statistical arguments of such methods are not the focus of this article; however, suffice it to say that taxometric analyses use graph plots whose distributions may provide evidence for measuring psychopathy and personality disorders as consisting of distinct classes or categories. For instance, a graph that depicts a bimodal distribution, where participants fall into primarily two discrete groups (Pickles & Angold, 2003), may indicate that a latent category exists. That is, with regard to psychopathy, a natural dichotomy as demonstrated by the graph consists of psychopaths and nonpsychopaths (Skilling et al., 2001). Also, skewed distributions may indicate a taxonic class, where psychopaths fall primarily at the extreme high end of an otherwise normal distribution (Pickles & Angold, 2003). In other words, most "normal" people fall along a normal distribution, and psychopaths skew that distribution because they fall on the extreme end of the scale, far away from normality.

Strengths

There is mounting evidence that taxometric analyses are useful for identifying and measuring personality disorders and psychopathy. Currently, four studies (Edens et al., 2006; Harris, Rice, & Quinsey, 1994; Marcus, John, & Edens, 2004; Vasey, Kotov, Frick, & Loney, 2005) have examined psychopathy specifically as a taxon. Table 1 demonstrates that half of these studies found support for a taxon underlying psychopathy. It should be noted that the assessment tool used to identify and measure psychopathy varied across studies, as did the sample characteristics and the taxometric methods that were used. The methodological inconsistencies among these studies most likely contribute to the variability of results; these problems will be discussed in greater detail in a subsequent section.

Although only half of the studies cited above found supportive evidence of a taxon of psychopathy, there is additional research that suggests that a taxon of psychopathy may exist. Research examining personality disorders similar to psychopathy, such as schizophrenia and antisocial personality disorders, indicates that these disorders may be taxonic. For instance, Haslam (2003) and Haslam and Kim (2002) reviewed more than 60 taxometric studies of personality and psychopathology disorders and found strong support for taxonic models of schizophrenia and antisocial personality disorder and mixed evidence for the taxonomy of borderline personality disorder. Thus, Haslam's and Haslam and Kim's analyses indicate that taxometric procedures for personality disorders similar to psychopathy may be appropriate.

Haslam and Kim (2002) also contend that taxometric research has made many contributions in the field of psychology, particularly with respect to classification. They note that taxometric research has the power to identify when clinical subcategories are incorrectly drawn and do not capture the true subtypes that exist. Haslam and Kim suggest that taxometric researchers have not yet exhausted the research possibilities of taxometric techniques. In line with their contention, there are also steps being taken to advance the procedures of taxometric analyses. For instance, in two separate analyses of psychopathy, Marcus et al. (2004) and Edens et al. (2006) used new multivariate taxometric techniques that they claimed to be more powerful for identifying taxonicity than previously used taxometric methods. Thus, not only have taxometric analyses advanced both research and practice, but they are continuing to evolve and will most likely be useful in future research and practice.

Weaknesses

In general, critics of taxometric approaches assert that limited empirical evidence and the atheoretical assumptions of taxonomies limit the usefulness of the approach when measuring

psychopathy. They contend that taxometric procedures lack advanced statistical methods and disagree with the taxometric notion that the structure of personality disorders is discrete and not continuous (Blackburn & Coid, 1998; Haslam, 2003; Lilienfeld, 1998). Lilienfeld (1998) suggests that the taxometric approach "has sacrificed reliability at the expense of validity" (p. 101).

Although theorists, researchers, and practitioners have assumed in the past that psychopaths were distinctly different from other people, there has been relatively little research assessing psychopathy explicitly as a taxon (Marcus et al., 2004); moreover, the few studies that do so may be limited by methodology and generalizability problems (Edens et al., 2006; Hare, 1996; Haslam, 2003; Skilling, et al., 2001). For instance, Harris et al. (1994) found evidence of a taxon in a sample of mentally disordered male offenders; however, it is possible that their findings suffer from participant selection bias (Edens et al., 2006; Marcus et al., 2004). In addition, Harris et al. found evidence of a taxon underlying the behavioral aspects of psychopathy, such as early and chronic antisocial behavior, but they found no evidence of the taxonicity of Factor 1 of psychopathy, which arguably may represent the core personality features of psychopathy (Blackburn & Coid, 1998; Lilienfeld, 1998).

Another potential weakness of taxometric analyses is the assumption that personality disorders are noncontinuous phenomena (Blackburn & Coid, 1998; Haslam, 2003; Lilienfeld, 1998). Taxonic assessments of psychopathy imply that there are clear distinctions between normality and abnormality, which may be a bold assumption according to some researchers (Blackburn, 2000). Taxonomies are criticized as being "black and white" in their assumptions that individuals, phenomena, or disorders simply fall into or out of a category, and they disregard the notion that phenomena such as psychopathy differ in degree among individuals (Haslam, 2003). These criticisms lead some researchers to claim that categorical diagnoses of personality disorders have not proven to be reliable assessments of

personality characteristics, and they assert that dimensional analyses have more well-developed measurement procedures such as factor analysis and the FFM (Blackburn, 2000, Blackburn & Coid, 1998; McCrae & Costa, 1995).

Methodological Inconsistencies of Taxometric Studies

Recall that there are several methodological inconsistencies among the studies depicted in Table 1. Despite their attempt to examine the same underlying structure of psychopathy, the samples, assessment tools, and statistical analyses used in each study vary widely. These differences may have affected the results of the taxometric studies. As demonstrated in Table 1, studies assessing psychopathy as a dimensional entity yielded similar results, with all four studies finding evidence in support of the dimensional nature of psychopathy. However, the taxometric studies yielded mixed results, with exactly half of the studies finding support for the dimensional nature of psychopathy, and the other half finding support for the taxonic nature of psychopathy.

When conclusions among studies differ, as they do among the taxometric studies, it is important to first look at how different methodologies across the studies may have affected the results—it may be that methodological differences among the taxometric studies, not the nature of psychopathy itself, contributed to the mixed results. This is not to imply that the dimensional studies of psychopathy did not suffer from differences in methodologies. Indeed they did; the sample characteristics and psychopathy assessment tools were variable across the dimensional studies. The potential problems associated with these differences (e.g., self-report measures and the use of participants from the general population) have already been discussed.

Although the dimensional studies in Table 1 do indeed suffer from some weak- nesses, the statistical analyses used across these studies were comparable and the results were

consistent. In contrast, the taxometric studies vary vastly in the samples, assessment tools, and statistical analyses that were used; perhaps not surprisingly, then, the results of the taxometric studies also vary widely. Because of the mixed results found in the taxometric studies of psychopathy, the methodological problems of the taxometric studies will only be presented. The remainder of this review, therefore, highlights the discrepancies between the taxometric analyses and discusses their potential effects on the findings for each study. The methodological critique that follows may be informative not only to future taxometric studies of psychopathy but to future dimensional analyses as well.

Sample Characteristics

None of the studies that conducted taxometric analyses used the same, or even similar, samples; very different types of participants, ranging from prisoners, psychiatric offenders, jail inmates, and juvenile offenders, were included in the these studies. Analyses were conducted on adults and children, males, and mixed gender samples. For instance, Harris et al. (1994), Marcus et al. (2004) and Vasey et al. (2005) used samples consisting of participants from two or more different settings, and these studies yielded inconsistent taxometric results. Marcus et al., who studied male and female inmates from jail and prison settings, failed to find evidence of the taxometric structure of psychopathy. Vasey et al., on the other hand, found evidence of a taxon of psychopathy in a sample composed of male and female children and adolescents selected from clinical and nonclinical settings and from a juvenile jus- tice diversion program. Harris et al. assessed psychopathy in a sample of serious and violent male offenders who were institutionalized in maximum-security psychiatric institutions or prison institutions; their analysis has subsequently been criticized for uncovering a taxon of schizotypy instead of psychopathy (Edens et al., 2006). Edens et al. have recently attempted to replicate Harris et al.'s study using a sample of non-mentally ill offenders. In contrast to Harris et al.'s findings, Edens

et al. did not find evidence that psychopathy is underpinned by a latent taxon.

Using participants drawn from different settings is especially dangerous when attempting to assess a latent taxon underlying a personality disorder. This is because various types of participants drawn from separate settings, such as clinical and non- clinical settings, can produce pseudo-taxa, which may represent the difference between the two groups but not necessarily the true underlying taxa (Beauchaine, 2003). Consequently, participants drawn from different settings may have con- tributed to inconsistent results across taxometric analyses of psychopathy.

Psychopathy Assessment Tools

The taxometric studies presented in Table 1 also used various assessment tools to identify and measure psychopathy; in fact, none of the taxometric studies used the same psychopathy assessment tool. Failing to measure psychopathy in exactly the same way across studies may contribute to inconsistent results. For instance, Vasey et al. (2005) measured psychopathy in youth with the Antisocial Process Screening Device (APSD; Frick & Hare, 2001). They used the three-factor solution of the APSD, which tapped impulsive conduct problems, narcissism, and callous-unemotional traits. Marcus et al. (2004) used the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996), which was designed to assess the personality features of psychopathy and which measures aspects of Machiavellian egocentricity, social potency, cold- heartedness, carefree nonplanfulness, fearlessness, blame externalization, impulsive nonconformity, and stress immunity. Although Vasey et al.'s findings support the taxonic structure of psychopathy, Marcus et al.'s findings do not.

The results of the Edens et al. (2006) and Harris et al. (1994) studies were also inconsistent. Edens et al. measured psychopathy with the new four-facet model of the PCL-R (Hare, 2003), whereas Harris et al. used the two-factor model of the

PCL-R (Hare, 1991). Importantly, Harris et al. subjected only eight items from the PCL-R to taxometric analysis. Of these eight items, six were derived from Factor 2 of the PCL-R, and only two were derived from Factor 1. Harris et al. found evidence of a taxon underlying psychopathy items from Factor 2 but not from Factor 1, whereas Edens et al. did not find evidence of a taxon of psychopathy.

Taken together, not only do the taxometric studies included in Table 1 not use the same measurement of psychopathy, but it seems that they analyze very different aspects of psychopathy as well. Thus, it may be that psychopathy assessment tools that were designed to assess primarily personality (e.g., Marcus et al., 2004) or primarily behavioral (e.g., Harris et al., 1994) aspects of psychopathy may inadvertently bias the results in favor of finding support for the dimensional or taxonic structure of psychopathy.

Taxometric Statistical Analyses

Finally, variation in the statistical analyses used in the taxometric studies of psychopathy may contribute to inconsistent findings. Some taxometric techniques are less sensitive than others to low base rates of psychopathy. For instance, Vasey et al. (2005) reported on two studies: The first consisted of clinically and nonclinically referred children, whereas the second study incorporated this sample with participants who were part of a juvenile justice diversion program. The taxometric analytic techniques used in the first study were MAXCOV and MAMBAC. Results from this study yielded evidence of a taxon underlying antisocial behavior or conduct-disordered behavior but not of psychopathy. Vasey et al. concluded that the base rate of psychopathy was too low among the clinical and nonclinical sample for the MAXCOV and MAMBAC techniques, so they added a sample of juvenile offenders for the second study to increase the base rate of psychopathy. They also used different taxometric analyses, MAXEIG and L-MODE, which are both thought to be more

sensitive to low base rates. Using the second sample and new analyses, these researchers found evidence of a taxon underlying psychopathy.

Clearly, low base rates of psychopathy may affect researchers' decisions regarding which statistical analyses to conduct; in addition, this problem reflects possible ways in which sample characteristics influence analytical techniques. The two studies that found evidence for a taxon underlying psychopathy used very different taxometric analyses. Harris et al. (1994) used MAXCOV-HITMAX as well as quartile and con- joint frequency iterative methods, whereas Vasey et al. (2005) used MAXEIG and L-MODE analyses, yet their samples were very different as were the psychopathy assessment tools they used. Marcus et al. (2004) and Edens et al. (2006) both failed to find support for the taxonic structure of psychopathy, and they used similar taxometric analyses, such as the MAMBAC, MAXEIG, and L-MODE methods. It is unclear from this review whether a single methodological problem is to blame for the mixed findings of taxometric analyses of psychopathy. What is apparent is that existing taxometric studies are very different from each other, perhaps too different to draw conclusions about the structure of psychopathy at this time.

Conclusion

Although there is agreement that various assessment tools are valid for identifying psychopathy, questions remain regarding the true structure of it. Of particular importance are the theoretical assumptions underlying dimensional and taxometric approaches—is a person either a "psychopath" or not, or is he or she more or less "psychopathic" than other people? These assumptions differentiate the techniques; dimensional analyses assume that psychopaths are extreme variants of "normal" people, whereas taxometric analyses assume that psychopaths are distinctly different from "normal" people. Understanding such issues is important, considering that the conceptualization and operationalization of psychopathy affect the procedures (i.e.,

factor analysis or taxometric techniques) used to measure psychopathy.

This review has presented the assumptions and reviewed the empirical evidence of each measurement technique. Four conclusions can be drawn from this review. First, there are relatively few studies (i.e., eight studies) that have assessed the structure of psychopathy specifically as taxonic or dimensional. At this time, there have been no other reviews comparing taxometric and dimensional analyses of psychopathy— this is most likely a result of the limited number of studies addressing this topic. Second, methodological inconsistencies of the taxometric studies conducted thus far have potentially contributed to mixed findings regarding the structure of psychopathy. Although dimensional analyses have reached similar conclusions regarding the nature of psychopathy, these studies are not without potential methodological problems, either. It is important to consider the potential problems arising from differences in sample characteristics, measurement instruments, and statistical techniques when evaluating the evidence regarding the dimensional or taxonic nature of psychopathy. Third, no study to date has conducted both dimensional and taxonic analyses with the same sample in order to compare the two approaches directly. Finally, although it appears that dimensional analyses have yielded more consistent results than taxometric analyses have, it would be premature to conclude that either approach has uncovered the true structure of psychopathy, given the few studies conducted to date and the differences among them.

In future analyses, the differences between taxometric and dimensional analyses should be examined empirically so that decisions regarding the measurement of psychopathy are guided by evidence and not by personal or professional preferences. Specifically, researchers should compare dimensional and taxometric techniques within the same samples to determine whether both techniques identify the same persons

as psychopaths. This will allow for partial control of the methodological inconsistencies outlined in this review, because sample characteristics, assessment tools, and statistical analyses will be comparable across techniques. Using participants drawn from two different settings or from the general population may bias studies in favor of finding evidence of a taxon or dimension, as could the use of different psychopathy assessment tools. These factors should also be taken into consideration in future research endeavors.

It appears that questions regarding whether psychopathy is a dimensional or taxonic entity or whether it can be conceptualized simultaneously as both have not yet been answered. The research conducted thus far has been extremely important in developing and informing this debate; however, there is still work to be done in this area, as clarification regarding the structure of psychopathy is clearly needed. If psychopathy is going to continue to be an important construct to examine in forensic settings, there needs to be consistent measurement of it; otherwise, conclusions about the importance of psychopathy may be mixed, inconclusive, or inconsistent, possibly leading to misuse of the construct.

Notes

1. The majority of clinical decisions are not based on assessment test scores alone (such as a Psychopathy Checklist–Revised score); knowledge of an offender's history and various ethical considerations are also considered.
2. Despite these precautions, this literature review may still be limited; for instance, additional articles may have eluded the search terms used in the Social Science Citation Index.

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