


Sadistic Offender or Sexual Sadism? Taxometric Evidence for a Dimensional Structure of Sexual Sadism

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Abstract Severe sexual sadism is a disorder of sexual preferences that focuses on humiliation and domination of the victim, sometimes causing grievous injury or death. Because offenders with high levels of sadism represent a risk to both reoffend and cause considerable harm should they reoffend, a diagnosis of sexual sadism has serious implications. The actual diagnosis of sexual sadism is fraught with problems (i.e., low reliability and validity) and exhibits poor consistency across assessments and studies (Levenson, 2004; Marshall, Kennedy, & Yates, 2002a). Various authors have proposed that sadism should be reconceptualized and have suggested that a dimensional approach may be more effective than a classificatory one for diagnosing sexual sadism (e.g., Marshall & Kennedy, 2003; Nietschke, Osterheider, & Mokros, 2009b). The *dimension* versus *taxon* question also impacts debates about the etiology and treatment of sadism. We assessed the taxonicity of sexual sadism by conducting a taxometric analysis of the scores of 474 sex offenders from penitentiary settings on the MTC Sexual Sadism Scale, using Meehl's taxometric methods (Meehl & Yonce, 1994; Waller & Meehl, 1998). Findings indicated that sexual sadism presents a clear underlying dimensional structure. These results are consistent with earlier research supporting a dimensional

assessment of sexual sadism and indicate that the diagnosis of sexual sadism should be reconceptualized. The theoretical and clinical implications of these findings are discussed.

Keywords Sexual sadism · Taxometrics · Dimensional approach · Latent structure · DSM-5

Introduction

In contrast to mutually consenting sadomasochists, sadistic offenders are usually described as a specific clinical entity that commit serious crimes involving coercion, suffer from pervasive sexuality disorder, and present a high risk of recidivism (Berner, Berger, & Hill, 2003; Kingston, Seto, Firestone, & Bradford, 2010; Proulx, Blais, & Beaugard, 2007). Sadistic offenders are therefore judged more harshly, evaluated as having a high risk of recidivism, and subjected to particular treatments (Marshall, Kennedy, & Yates, 2002a). The typical profile of sexual sadists is a Caucasian male who plans his crime and selects an unknown victim (Dietz, Hazelwood, & Warren, 1990; Hazelwood, Dietz, & Warren, 1992; Ressler, Burgess, & Douglas, 1988; Warren, Hazelwood, & Dietz, 1996).

History of Sexual Sadism

The concept of sadism originates in the writings of the Marquis de Sade (1740–1814). The diagnosis bears his name because of his literary works, which are imbued with eroticism, violence, and cruelty. “Sadism” did not appear in the medical literature, however, until the beginning of the nineteenth century in the work of the Hungarian psychiatrist Richard von Krafft-Ebing. His book, *Psychopathia Sexualis* (1886/1998), popularized the concepts of sadism and masochism. This work, which was

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intended as a reference manual for forensic pathologists, classified sadism among the perversions. von Krafft-Ebing (1998) defined sadism as the experience of pleasure caused by acts of cruelty and corporal punishment inflicted on humans or animals. This can also involve the desire to humiliate, hurt, hit, or even destroy others to experience sexual pleasure.

Sigmund Freud discussed sexual sadism in his book *Three Essays on the Theory of Sexuality* (1905/1987). Freud (1987) believed that sexual perversion was potentially present in everyone, and that it was important to find out why it becomes manifest in specific individuals. He considered sadism to be the most common and significant category of all the perversions, and he defined it as the manifestation, strongly tinged with eroticism, of the death instinct directed toward others. Adopting ideas from von Schrenck-Notzing (1956), Freud (1987) posited that sadism and masochism result from algolagnia, a sexual tendency to derive sexual pleasure from physical pain. According to von Schrenck-Notzing (1956), there are two forms of algolagnia, with sadism as the active form and masochism as the passive form.

Sexual sadism has been included in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; American Psychiatric Association, 1952, 2013) since the mid-twentieth century, and is defined as pleasure and sexual arousal that is rooted in fantasized or actual infliction of psychological (including humiliation) or physical suffering on a victim. Beginning with DSM-III (American Psychiatric Association, 1980), diagnosis required that fantasies or behaviors must be severe, recurrent, and last for a minimum period of 6 months. In addition, the behavior must be directed toward non-consenting partners, or the sexual urges or fantasies must cause marked distress or interpersonal difficulty. According to Yates, Hucker, and Kingston (2008), the DSM definition is the most widely used framework for assessing sexual sadism, as it separates consensual sexual behaviors involving sadistic role-play from non-consensual sexual sadism.

Problem with the Diagnosis of Sexual Sadism

A major problem in the study of sadism involves the criteria that are used to define it. According to the DSM, a certain number of criteria must be met to arrive at a diagnosis of sexual sadism. Agreement about the required behavior criteria and severity cutoffs has, however, proven a major stumbling block (Campbell, 2007; Levenson, 2004). Studies report few consistencies in the criteria used, particularly for identifying which criteria are deemed essential to the reliable assessment of sexual sadism (Marshall & Kennedy, 2003; Marshall et al., 2002a; Marshall, Kennedy, Yates, & Serran, 2002b; Proulx & Sauv tre, 2007). Definitions and essential criteria vary from one study to another. According to Marshall et al. (2002a, b), inconsistencies observed in official reports indicate that researchers have applied multiple definitions and lack specific rules.

These obstacles to standardizing the diagnosis of sexual sadism result in radically different estimates of its prevalence.

Depending on the study, between 5 and 50% of sexual offenders are considered sadists (Barbaree, Seto, Serin, Amos, & Preston, 1994; Groth & Birnbaum, 1979; Harenski, Thornton, Harenski, Decety, & Khiel, 2012; Proulx, St-Yves, Guay, & Ouimet, 1999). Moreover, the composition and sources of samples influence the reported prevalence of sadism. For example, Langevin et al. (1985) reported that 45% of their sample ($n = 20$) were sadists, whereas Groth and Birnbaum (1979) estimated that 5% of the cases referred to them in their clinical practice were sadists. According to Ressler et al. (1988), sexual sadism is more common among sexual murderers than rapists. In addition, there is a higher prevalence of sexual sadism in forensic psychiatric samples than in traditional prison samples (Nitschke, Blendl, Ottermann, Osterheider, & Mokros, 2009a; Nitschke, Osterheider, & Mokros, 2009b). These variations across studies have led some researchers to suggest that the prevalence of sadism is unknown (Fedoroff, 2008), whereas others have estimated that the true prevalence is probably between 5 and 20% (Groth & Birnbaum, 1979; Marshall et al., 2002a, b; Proulx & Sauv tre, 2007).

It is not surprising that some of the studies using the DSM criteria have yielded poor reliability and validity for sexual sadism. In fact, according to Marshall and Kennedy (2003), little consensus currently exists, even though the diagnosis was developed almost 125 years ago by von Krafft-Ebing (1886). In the past few years, however, a new school of thought has emerged that challenges the DSM diagnosis (e.g., Marshall & Kennedy, 2003; Marshall et al., 2002b; Nitschke et al., 2009b). Although the categorical model of sexual sadism still prevails, several authors have suggested that this disorder might be better conceptualized using a dimensional approach (Krueger, 2010; Marshall & Kennedy, 2003; Marshall et al., 2002a, b; Mokros, Schilling, Eher, & Nitschke, 2012; Nitschke et al., 2009a, b).

Dimensional Approach

The scrutiny of the latent structure of sadism and the paraphilias is part of an overarching debate about the nature of mental disorders (Haslam, Holland, & Kuppen, 2012). Several studies suggest that the majority of psychological disorders and personality disorders present as dimensional differences in the intensity of the disorder as opposed to categorical differences in kind (Widiger & Costa, 1994).

First used in 1926 by Adolf Bernhard Meyer, the term "taxon" can be defined as a unit (or a group of populations) which is usually inferred to be phylogenetically related and which has characteristics in common which differentiate the unit (or group) from other units. In other words, a taxon does not constitute an arbitrary class, exists in nature regardless of its conceptualization, and has a particular causal structure (Ruscio, Haslam, & Ruscio, 2006). The notion of taxonicity most widely accepted is that proposed by Meehl (1973). Taxonicity is the result of a conjunction between a pathology and a separate etiology (Meehl,

1973; Ruscio et al., 2006; Schmidt, Kotov, & Joiner, 2004) and refers to an observable disorder resulting from a latent trait (Guay, Ruscio, Knight, & Hare, 2007; Ruscio et al., 2006). A taxon also implies the presence of a non-arbitrary and quantifiable cutoff point.

Although this difference in nature occurs frequently in biology, such as the differences between various species, it occurs significantly less frequently in psychology (Ruscio et al., 2006). In fact, to date, very few studies have demonstrated that certain disorders are taxonic (e.g., Haslam et al., 2012; Korfine & Lenzenweger, 1995; Lenzenweger & Korfine, 1995). The rarity of identified psychiatric taxons contrasts starkly with the logic of categorical disorders, which sees individuals as either having or not having the disorder.

Toward a Dimensional Measure of Sexual Sadism

The debate about the structural nature of psychological disorders also extends to sexual sadism. Some of the problems related to the study of sadism are based on its conceptualization as a distinct nosological entity (Krueger, 2010; Marshall & Kennedy, 2003; Marshall et al., 2002a, b; Mokros et al., 2012; Nitschke et al., 2009b). Because sadism is treated as a disorder that one does or does not have, sadists have been conceptualized as fundamentally different from non-sadists, and research is directed at a very specific subgroup of offenders (Marshall & Kennedy, 2003).

Unfortunately, sadism is plagued by an absence of pathognomonic symptoms (from the Greek *pathos* [illness] and *gnome* [certitude]). A symptom is pathognomonic when it is characteristic of a single disease and helps to establish a definite diagnosis (Mosby, 2009). Symptoms supposedly identifying sadism, however, are also found among non-delinquent samples (Crépault & Couture, 1980; Leitenberg & Henning, 1995; Malamuth & Check, 1983; Ogas & Gaddam, 2011). For example, fantasies of humiliation (10–50%), the obtainment of sexual pleasure through the suffering of others (2–5%), or rape fantasies (30%) are commonly found among men in the general population (Arndt, Fochl, & Good, 1985; Crépault & Couture, 1980; Kinsey, Pomeroy, Martin, & Gebhard, 1953; Malamuth & Check, 1983). The depiction of several techniques involving violence and sexual pleasure are found in the Kamasutra (Vatsyayana, 2003). In fact, even bondage and BDSM clubs are not a modern invention. Flagellation clubs were reported in London in the nineteenth century (Ogas & Gaddam, 2011). Moreover, a large number of behaviors purportedly related to sexual sadism are found among non-sadistic criminals. For example, aggression, coercion, and humiliation are regular features of non-sadistic rapes (Groth & Birnbaum, 1979; Marshall & Hucker, 2006; McConaghy, 1993). Furthermore, aggression is frequently present in child sexual abuse, whether intra-familial (Williams & Finkelhor,

1990) or extra-familial (Lang & Langevin, 1991). In sum, it appears that many of the behaviors attributed to sadistic offenders (e.g., power and control, aggression, and violence), the underlying motivations characteristic of sadistic offenders (e.g., coercive or aggressive fantasies), and the consequences on victims of sadistic behaviors (e.g., pain and suffering, humiliation) are not exclusive to sexual sadism (Marshall & Kennedy, 2003). In absence of pathognomonic symptoms, and in light of the presence of sexual sadism-related behaviors in the non-criminal population, the identification of discriminant behaviors related to sexual sadism is sometimes difficult.

Some authors have argued that sadism would be better defined if it was evaluated as a dimensional construct (Knight, Sims-Knight, & Guay, 2013; Marshall & Hucker, 2006; Mokros et al., 2012; Mokros, Schiling, Weiss, Nitschke, & Eher, 2014; Nitschke et al., 2009b). Although thoroughly discussed from a theoretical point of view, the idea of a dimensional measurement of sexual sadism has been little investigated from an empirical standpoint. Knight et al. (2013) conducted taxometric analyses on a sexual sadism subscale (i.e., killing, beating, and bondage) from a sample of 486 sexual offenders. The mean comparison curve fit index (CCFIs) produced with a base rate of 10% range from .41 to .46, while the mean CCFIs produced with a base rate of 15% range from .31 to .44. Based on their analyses, they concluded that sexual sadism presents a dimensional structure. Mokros et al. (2014) conducted taxometric and latent class analyses from a national sample of 1020 sexual offenders. They used the Severe Sexual Sadism Scale (SeSaS; Nitschke et al., 2009b) to assess sadism. The SeSaS is currently the gold standard for the dimensional assessment of sadism. The mean CCFIs obtained in their study was .44 and was therefore within the range of a dimensional structure. However, one of their three CCFIs values was within the range that renders the latent structure inconclusive (above .45 but below .50). Drawing from their analysis, they concluded that it seems unlikely that sexual sadism would represent a taxon and is likely a dimensional construct.

Knight (2010, 2014; Knight et al., 2013; Sims-Knight & Guay, 2011) proposed that sexual sadism is the end point of an agonistic continuum, ranging from no coercive fantasies to non-sadistic sexual coercion (what is now termed Paraphilic Coercive Disorder) to consenting BDSM to severe sexual sadism. They found convincing evidence to support the existence of an agonistic continuum (Knight et al., 2013; Sims-Knight & Guay, 2011). A dimensional conceptualization of sexual sadism offers several advantages over the current model (Nitschke et al., 2009b). This new dimensional conceptualization captures the different degrees of severity in sadism and maps nicely onto the rationale for sadism scales (e.g., Knight & Prentky, 1990; Marshall & Hucker, 2006; Mokros et al., 2012; Nitschke et al., 2009b).

Aim of the Study

Only recently has sadism been scrutinized with taxometric analyses (e.g., Knight et al., 2013; Mokros et al., 2014). Taxometric analyses permit the discrimination of differences in kind from differences in the intensity of a construct (Ruscio et al., 2006) and permit the determination of whether sexual sadism is distributed dimensionally or categorically. Determination of the latent structure of sadism is important for multiple reasons.

First, it provides guidelines for generating the most appropriate assessments of sadism and will ultimately inform optimal diagnostic decisions. The latent structure dictates whether the placement of that individual along a dimensional trait or classification of an individual into a sadistic category would be optimal (Ruscio et al., 2006). Dimensionality requires a balanced assessment strategy that aims at equivalent discrimination across the entire continuum, whereas taxonicity would indicate that one must focus on categorical boundaries to establish an optimal cut point.

Second, whereas categorical latent structure identifies a natural cutoff and thus provides the base rate of the category, dimensionality requires more detailed exploration of the placement of cutoffs along a continuum to maximize decision-making and minimize errors for specific purposes, such as determining the point at which clinically significant distress becomes apparent and should be addressed or determining when a person is dangerous (Ruscio et al., 2006).

Third, latent structure guides the strategies that should be used to study a construct (Ruscio et al., 2006). Research on constructs with a categorical structure benefits most from strategies that use extreme group designs (EGD), as EGD is based on the assumption of a latent categorical structure (Preacher, Rucker, MacCallum, & Nicewander, 2005). In contrast, dimensional structure is more amenable to latent trait model-based approaches. Significant measurement problems are encountered when one uses EGD in instances where there is an underlying dimensional structure.

Fourth, latent structure suggests potential etiological causal paths (Meehl, 1992, 2004). Dimensional structure suggests multiple antecedents, whereas categorical latent structure indicates more specific etiological causes (e.g., specific genes or environmental stressors; Meehl, 1992).

The present study applies taxometric analyses to a preliminary version of the MTC Sadism Scale (MTCSS) to evaluate the latent structure of sexual sadism. It introduces a different metric that can be compared to the measures obtained by Knight et al. (2013) and Mokros et al. (2014) and tests a purportedly more severe sample of offenders who were evaluated for civil commitment. Three taxometric analysis procedures were used—Mean Above Minus Below a Cut (MAMBAC; Meehl & Yonce, 1994), MAXimum EIGenvalue (MAXEIG; Meehl & Yonce, 1996), and Latent Mode Factor Analysis (L-mode; Waller & Meehl, 1998).

Method

Participants

The initial sample consisted of 518 adult male sexual offenders who had been assessed at the Massachusetts Treatment Center for Sexually Dangerous Persons (MTC) between 1959 and 1984 and were determined to be sexually dangerous and civilly committed. An extensive database had been gathered on these offenders, coding numerous variables using their extensive archival records that included clinical interviews, diagnostic and psychometric assessments, information about offenders' criminal records and police records, court testimony, parole summaries, probation records, institutionalization records, and school and employment reports. For the vast majority of the MTC sample, post-commitment information—including treatment reports, behavioral reports, work reports, and summaries of program participation—was also available.

The database used in this study was provided by the third author for second-hand analyses. The MTC database was used in several past studies, including the development of two typologies: one for rapists (MTC: R; Knight & Prentky, 1990) and one for child molesters (MTC: CM; Knight & Prentky, 1990).

During the initial creation of the MTC database, two trained research assistants coded and rated each file independently. Interrater reliabilities were calculated on the independent, pre-consensus rating. Because they used consensus ratings in their subsequent analyses, the reliability estimates are the Spearman-Brown transformations of the preconsensus rating. Reliabilities ranged from .80 to .98 depending on the scales.

From the initial 518 participants, 474 participants were retained in the current study. Forty-five participants were withdrawn in the development of the Sadism Scale on the basis of preliminary Rasch analyses (i.e., inadequate infit or outfit mean square). The final sample consisted of 213 rapists (all victims 16 years old or older), 174 child molesters (all victims under the age of 16), and 87 mixed offenders (victims both above and below 16 years old). At the time of the assessments, the average age of offenders was 29 years (SD 10.5). Most participants were Caucasian (88.2%) and, at the time of their arrest, were usually or steadily employed (67.2%), had not completed their secondary school (61.4%), and had never been married (52.5%).

Measure

A review of the literature (Longpré, Guay, & Knight, 2017) reveals that sexual sadism features can be grouped in at least six major dimensions: the use of restraints; the presence of aggression and gratuitous violence; the presence of humiliation; the presence of cruelty without sexuality in the developmental history of the offender; the presence of torture; and the insertion of objects (anally and/or vaginally). For the purpose of the study, we

used a preliminary version of the MTC Sadism Scale (MTCSS; Longpré et al., 2017). The MTCSS is a research scale which comprised of 25 items (Table 1) collapsed into the six dimensions presented above. They were selected on the basis of their theoretical relevance and their presence in the MTC database. The indicators' selection was based on consensus ratings.

Every item of the MTCSS was coded from the MTC database as either absent (0) or present (1). The scale was developed using a combination of classical test theory (Cronbach's alpha and inter-item correlation), Rasch analyses (logit; infit, and outfit mean square standardized), factor analysis (exploratory and confirmatory), and two-parameter IRT (difficulty parameter [*b*]; discrimination parameter [*a*]). The data were analyzed with SPSS version 21 (SPSS, Chicago, IL.), Winsteps version 3.80.1 (Winsteps, Chicago, IL), and Mplus version 6.12 (Muthén & Muthén, 1998–2010).

Analyses

Taxometric analyses are procedures used to assess the latent structure of psychological constructs (Ruscio et al., 2006). They provide non-redundant evidence of latent structure that allows for the verification of the consistency of the results across a range of theoretical understandings of latent structure. The idea behind taxometric analysis is to determine whether divergent methods yield consistent results about the latent structure of a construct (Ruscio, Walters, Markus, & Kaczetow, 2010). Three conceptually different procedures were employed in this study: MAMBAC (Meehl & Yonce, 1994), MAXEIG (Waller & Meehl, 1998), and L-mode (Waller & Meehl, 1998).

The first taxometric procedure employed was MAMBAC (Meehl & Yonce, 1994). MAMBAC is based on the premise that if two groups exist, there must be an optimal cutoff score (or taxonic boundary) between the groups. Input indicators are

Table 1 Distribution of dimensions and indicators of the MTCSS (25 indicator version)

Dimensions	Indicators	Frequency (%)
Control and domination	Presence of weapon	41.4
	Use of weapon	40.5
	Victim tied	11.3
Aggression	Violence used resulting in pain/injury	10.1
	Instrumental aggression: brutal or damaging beating	10.3
	Expressive aggression: brutal or damaging beating before the sexual assault	20.8
	Expressive aggression: brutal or damaging beating after the sexual assault	6.4
	Biting	2.9
	Kicking	2.1
	Cuts, bruises and abrasions	49.2
	Broken bones	3.7
	Burns	1.4
	Medical problems requiring physician	25.7
Humiliation	Humiliation 1: instrumental aggression, aggressive verbalization during the offense	10.7
	Humiliation 2: expressive aggression, aggressive verbalization during the offense	11.5
Cruelty without sexuality	Animal cruelty (0–16 y.o.)	4.3
	Tortured or beat animals to take out frustration	3.7
	Animal cruelty (+16 y.o.)	.4
	Cruel with people	10.9
Torture	Sadistic assault on victim's genitals/breasts	5.3
	Instrumental aggression: torture	.2
	Expressive aggression: uncontrollable rage and anger leading to mutilation before the sexual assault	2.3
	Expressive aggression: uncontrollable rage and anger leading to mutilation after the sexual assault	1.4
Insertion of foreign objects into orifices	Anal insertion	1.0
	Vaginal insertion	1.4

graphed on the x -axis and output indicators on the y -axis. Participants are first sorted by their summed indicator scores. In accordance with the recommendation of Ruscio et al. (2006), 50 equally spaced cuts are then made along the input indicator. These cuts divide participants into those above and those below an indicator cut. Output indicator values are then calculated by taking the difference between mean values above and below each cut, and these difference values are connected to form a curve. Taxonic constructs, in general, display a peak on this curve. Such a peak would denote that scores above and below the cut are more divergent than surrounding cuts, identifying a discontinuity in the distribution (Walters, Knight, & Thornton, 2009). On the other hand, dimensional constructs generally peak at the upper and lower tails of the curve, where the most extreme scores can be found on the normal curve. In this study, the MAMBAC procedure was performed with 10 replications designed to stabilize the curves.

The second taxometric procedure used in this study was MAXEIG (Waller & Meehl, 1998). MAXEIG is a multivariate extension of the *MAXimum COVariance* (MAXCOV) procedure (Meehl & Yonce, 1996). According to Ruscio et al. (2006), both procedures are mathematically and conceptually similar and measure the covariance of indicators across multiple, equal-sized subsamples. Whereas MAXCOV computes the covariance between two output indicators, MAXEIG estimates the relations among indicators in the first eigenvalue of the indicator covariance matrix (Waller & Meehl, 1998). Although MAXCOV was the most frequent procedure in taxometric analysis, recent studies tend to rely on MAXEIG (Ruscio et al., 2006). The output covariation is graphed on the y -axis and the input indicator is graphed on the x -axis. The function of MAXEIG is to assess the association between two or more output indicators at different levels of an input indicator (Walters et al., 2009). If the construct is taxonic, the curve will peak in the subsample containing a roughly equal number of taxon and complement members. It should be noted, however, that a skew in the indicator can influence where a curve peaks (Ruscio et al., 2006). Dimensional constructs display a non-peaked curve, because indicators remain fairly stable across subsamples in a dimensional construct. Ten replications were calculated to minimize the effect of tied scores.

The third procedure employed was L-mode (Waller & Meehl, 1998). This procedure calculates the largest principal factor of the indicator and plots the distribution of participants' scores on this single latent factor. Dimensional constructs commonly form a single group and give rise to a curve that has a unimodal form. Taxonic constructs, in contrast, generally split into two groups, giving the curve a bimodal form.

Analyses were completed using Ruscio and Kaczetow (2008) taxometric software for the R statistical program, which is free software providing an environment for statistical computing and graphics. Comparison curves were generated to compare the relative fit of the obtained data generated by each taxometric

procedure to expect categorical or dimensional curves (Ruscio, Ruscio, & Meron, 2007). These comparison curves were created from the generation of 100 simulated datasets. Relative fit between comparison curves and obtained data was measured by the comparison curve fit index (CCFI). Root-mean-squares residual (RMSR) values used to calculate the CCFIs were computed by measuring the smallest Euclidean distance between each point on the data plot to corresponding points on the simulated taxonic and dimensional comparison curves (Walters et al., 2009). Because calculating a taxon base rate with L-mode can be problematic (Ruscio et al., 2006; Walters, Ermer, Knight, & Kiehl, 2015; Walters, McGrath, & Knight, 2010), it is recommended to select a meaningful range of taxon base rate estimates, inputting these values directly into L-mode, and take the mean CCFI value as an indicator of the latent structure (Ruscio & Walters, 2009). Therefore, as recommended by Ruscio and Walters, the mean CCFI of MAMBAC and MAXEIG procedures was used for the L-mode CCFI.

For each procedure (MAMBAC, MAXEIG, and L-mode), CCFIs were calculated. The CCFI is the ratio of the RMSR of fit between the averaged curve and the simulated dimensional curve, on the one hand, to the sum of the RMSR of fit between the averaged curve and simulated dimensional curve, and, on the other hand, the RMSR of fit between the averaged curve and simulated taxonic curve (Walters et al., 2009). A CCFI of .50 denotes equally good fit between the data and the simulated taxonic and dimensional curves (Waller & Meehl, 1998). The farther the CCFI falls below .50, the greater the support is for a dimensional structure (Ruscio et al., 2006). The farther the CCFI is above .50, the greater the support is for a taxonic structure (Ruscio et al., 2006). For the purpose of this study, a threshold of .45/.55 was used for the CCFI. In a recent meta-analysis, the accuracy rate and the percentage of interpretable results for each taxometric analysis were calculated (Ruscio et al., 2010). The .45/.55 threshold was reported to offer an accuracy rate of 98.2% (94.5% of interpretable results) for MAMBAC analysis, 95.8% (89.5% of interpretable results) for MAXEIG/MAXCOV analysis, and 97.3% with L-mode analysis (92% of interpretable results). Moreover, with this threshold, the mean CCFI yields an accuracy rate of 99.4% (94.8% of interpretable results).

Results

Pre-Taxometric Analyses

Before conducting taxometric analyses, the sample must be divided to make sure the indicators are capable of distinguishing between the putative taxon and the complement groups (Walters, 2014). The boundary between the putative taxon and complement is usually the base rate of the diagnosis under investigation (Walters, Knight, & Långström, 2011). Because the prevalence of sexual sadism varies greatly across studies and because our

sample is composed of both rapists and child molesters, we used a more conservative prevalence of 5%. Following the procedures described in Walters et al. (2011), the putative taxon and complement groups were formed by converting scores on each indicator to z -scores, summing these scores to form a composite, and assigning the top 5% of composite z -scores to the putative taxon and the bottom 95% of composite z -scores to the complement.

Minimal requirements for performing taxometric analyses were first tested in pre-taxometric analyses (Walters, 2014). First, a minimum of 300 participants, and probably closer to 500, should be used (Meehl, 1995). In the current study, a total of 474 adult male sexual offenders were used. Second, indicators must be continuous or quasi-continuous (Walters & Ruscio, 2009). As mentioned above, the MTCSS is composed of dichotomous indicators. Monte Carlo simulations indicated that dichotomous indicators can provide reliable results with the MAXCOV/MAXEIG procedure, which is the most widely used procedure within taxometric analyses (Ruscio, 2000). Moreover, Lenzenweger (1999; Lenzenweger & Korfine, 1992; see also Korfine & Lenzenweger, 1995) uncovered a similar taxonic solution using dichotomous and continuous indicators. Nonetheless, curves obtained by dichotomous indicators should be interpreted with great care and be supported by additional results (Ruscio, 2000). Therefore, we followed Ruscio's recommendation and created composite indices by summing dichotomous indicators. This procedure was previously used in a taxometric study by Mokros et al. (2014) and provided stable results. *Control and Domination* was composed of 3 dichotomous items, *Aggression* is composed of 10 dichotomous items, *Humiliation* is composed of 2 dichotomous items, *Cruelty without Sexuality* was composed of 4 dichotomous items, *Torture* is composed of 4 dichotomous items, and *Insertion of Objects* was composed of 2 dichotomous items. Third, each indicator should differentiate between the putative taxon and complement groups at $d > 1.25$. With the exception of *Humiliation* and *Insertion*, all Cohen's d were over 1.25 (Table 2). Fourth, the mean inter-indicator correlation should exceed .30, and the mean inter-indicator correlations for the putative taxon and complement groups should not exceed .30 (Meehl, 1995). Polychoric correlation coefficients (rPC) and Pearson product-moment correlation coefficients (r) between

Table 2 Cohen's d , skewness, and kurtosis

	Threshold 5% Cohen's d	Skewness	Kurtosis
Constraint	1.70	.47	-1.41
Aggression	1.38	1.06	.14
Humiliation	.86	2.05	3.45
Cruelty	1.78	3.35	12.71
Torture	1.60	4.21	20.59
Insertion	.92	6.06	34.91

the MTCSS dimensions for the whole sample appear in Table 3. Results provided indicate that these conditions were partly met in the present study, and implications will be discussed in the discussion.

Taxometric Analyses

The CCFIs results for MAMBAC, MAXEIG, and L-mode analyses of sexual sadism assessed by the MTC Sadism Scale are shown in Fig. 1. These analyses yielded four quite clear and consistent results. All curve shapes are consistent with a dimensional structure and were similar to the curves generated for simulated dimensional comparison data. Moreover, no taxonic peaks emerged and CCFIs value supported dimensional rather than taxonic structure.

Mean Above Minus Below a Cut (MAMBAC)

As can be seen from Table 4 and Fig. 1, MAMBAC analysis indicates a clear dimensional structure for both curves and CCFI. The resulting CCFI of .203, which is below the threshold of .45, indicates a clear dimensional structure. Moreover, the overlap of the curves has a better fit with the simulated data generated to follow a dimensional distribution (Fig. 1, left side) than with the data generated to follow a taxonic distribution (Fig. 1, right side).

Maximum Eigenvalue (MAXEIG)

As was the case with the MAMBAC analysis, the MAXEIG analysis indicates an unambiguous dimensional structure (Table 4). The MAXEIG's CCFI value was .225. Moreover, the fit of the overlap of the MAXEIG curves was higher with the simulated data generated to follow a dimensional structure (Fig. 2, left side) rather than a taxonic structure (Fig. 2, right side).

Latent Mode Factor Analysis (L-Mode)

In contrast to the previous analyses, the L-mode analysis yield more ambiguous results and must be interpreted with caution (Table 4). The L-mode's CCFI value of .448, which is barely below the threshold of .45, indicates a probable dimensional structure. Moreover, the overlap of the curves has a slightly better fit with the simulated data generated to follow a dimensional distribution (Fig. 3, left side) than with the data generated to follow a taxonic distribution (Fig. 3, right side).

Mean CCFI

The mean CCFI (Table 4) is the mean of all the CCFIs (i.e., MAMBAC, MAXEIG, and L-mode). Once again, this indicator (mean CCFI = .292) yielded an unambiguous dimensional structure.

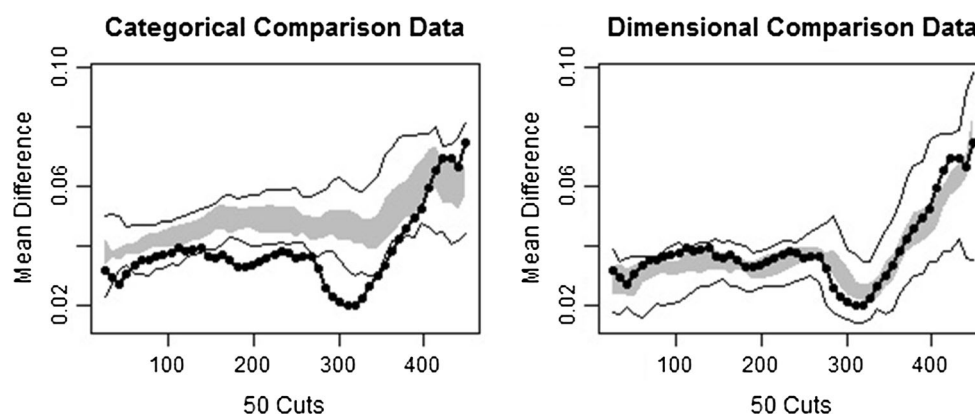
Table 3 Correlation between MTCSS dimensions

	1	2	3	4	5	6
Polychoric correlation coefficients (r _{PC})						
Constrain (1)	–	.43**	.21*	.37**	.33**	.28**
Aggression (2)		–	.04	.41**	.31**	.34**
Humiliation (3)			–	.01	.03	.07
Cruelty (4)				–	.46**	.31**
Torture (5)					–	.23**
Insertion (6)						–
Pearson product-moment correlation coefficients (r)						
Constrain (1)	–	.38***	.10*	.22***	.23***	.19***
Aggression (2)		–	.03	.14**	.32***	.08
Humiliation (3)			–	.35	.28	.04
Cruelty (4)				–	.13**	.11*
Torture (5)					–	.15**
Insertion (6)						–

Ruscio's taxometric analyses rely on Pearson product-moment correlation coefficients

* $p < .05$; ** $p < .01$; *** $p < .001$

Fig. 1 MAMBAC (CCFI = .203). *Note* The *fine solid lines* represent the minimum and maximum from 1000 samples of comparison data, the *bold dotted lines* represent the empirical data, and the *gray shading* represent ± 1 SD around the means of the comparison data

**Table 4** Taxometric analyses

	Taxon base rate estimate			Comparison Curve Fit Index (CCFI)			
	MAMBAC	MAXEIG	Mean	MAMBAC	MAXEIG	L-mode	Mean
6 dimensions (0–1)	.295	.128	.212	.203	.225	.448	.292

MAMBAC = mean above minus below a cut; MAXEIG = maximum eigenvalue; L-Mode = latent mode factor analysis; Mean (under taxon base rate estimate) = mean of the MAMBAC and MAXEIG base rate estimates; Mean (under CCFI) = mean of MAMBAC, MAXEIG and L-Mode CCFI values

Discussion

Although it has been discussed from a theoretical point of view, few empirical studies have directly addressed the idea of a dimensional measurement of sexual sadism (e.g., Knight et al., 2013; Mokros et al., 2014). Therefore, the present study aimed to conduct taxometric analyses on the MTC Sadism Scale to evaluate the latent structure of sexual sadism. Consistent with recent studies and reviews that have made it increasingly evident that a dimensional

measure represents the future of research on sexual sadism (Knight et al., 2013; Krueger, 2010; Marshall & Kennedy, 2003; Marshall et al., 2002a; b; Mokros et al., 2012, 2014; Nitschke et al., 2009b), the results of this study clearly indicate that sexual sadism is distributed as a dimension. These results are in stark contrast to the categorical orientation that the DSM continues to support and provides further empirical evidence for the importance of reformulating the basis of the existing sadism diagnosis.

Fig. 2 MAXEIG (CCFI = .225). Note The *fine solid lines* represent the minimum and maximum from 1000 samples of comparison data, the *bold dotted lines* represent the empirical data, and the *gray shading* represent ± 1 SD around the means of the comparison data

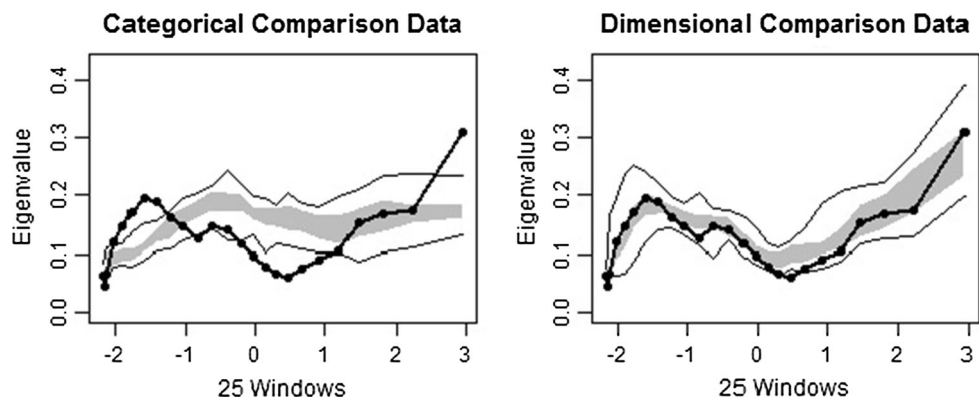
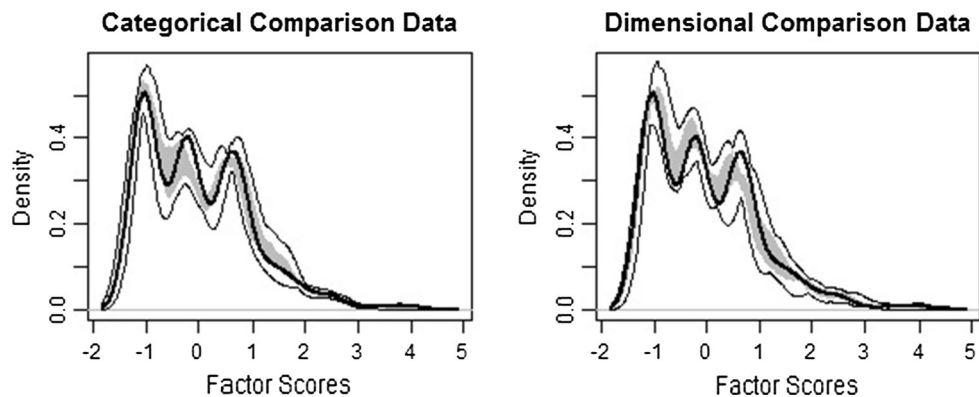


Fig. 3 L-mode (CCFI = .448). Note The *fine solid lines* represent the minimum and maximum from 1000 samples of comparison data, the *bold dotted lines* represent the empirical data, and the *gray shading* represent ± 1 SD around the means of the comparison data



Taxometric analysis was developed by Meehl (1973) to test the latent structure of theoretical constructs. Using taxometrics without a clear theoretical model in mind has consequently been discouraged (Lenzenweger, 2004). The prevalent consideration of sadism as a diagnostic entity alone constitutes sufficient reason to test this structural assumption. The observed results provide support for a dimensional structure of sexual sadism and its components, as measured by the MTC Sadism Scale. The primary analyses, performed with the three theoretically based composite indicators, yield unambiguously dimensional results.

First, none of the curves generated peaks supportive of a taxonic structure. Second, taxon base rate estimates were inconsistent across analyses, and the means and standard deviations of these estimates were better reproduced by the dimensional than by the taxonic comparison data. Third, regardless of how the sample was divided, the same types of patterns were found. In sum, the presence of a dimensional structure emerges throughout the analyses, regardless of the variant taxometric analysis used (MAMBAC, MAXEIG, L-mode, and Mean CCFIs).

These results are consistent with previous studies examining sexual aggression (e.g., Knight, 2010; Walters et al., 2009) and sexual sadism (e.g., Knight et al., 2013; Mokros et al., 2014). Moreover, similar CCFIs and curve patterns have been reported in studies using different types of samples and dimensional scales (e.g., Knight et al., 2013; Mokros et al., 2014). Presently, empirical studies provide more support for the presence of a

dimensional structure than a taxonic structure for both rapists and child molesters (Knight, 2010). These results have important implications for the assessment of sadism and for treatment and dispositional decisions that are made about individuals who score highly on this dimension.

Implications of the Dimensional Results

In light of the results of the taxometric analyses, we conclude that both the latent structure of sexual sadism and its components may be best interpreted as dimensionally distributed. The clear indications of the dimensionality of sexual sadism can be interpreted in several ways and have various implications. These implications range from the acceptance of sexual sadism as a dimensional construct and possibly an extreme of one or more normative personality traits, to the determination of proper cutoffs.

Assessment

As mentioned by Knight (2014), knowing the structure of a construct should provide the best assessment of population under the judicial system and the best identification of their criminogenic needs. If sadism is indeed dimensional, it can theoretically be assessed throughout the entire continuum of severity. As noted above, Knight (2010, 2014; Knight et al.,

2013; Sims-Knight & Guay, 2011) found convincing evidence to support the existence of an agonistic continuum ranging from non-sadistic sexual coercion to severe sadism. Several analyses revealed that there seems to be a single sexual aggression construct where coercive fantasies and behaviors are present at the lower end of the spectrum, while sadistic fantasies and behaviors are present at the upper end of the spectrum. When we look at the full range of behaviors in the agonistic construct, only dimensionality is evident (Knight, 2014).

Our analyses revealed that the MTCSS adequately covers the agonistic continuum from its moderate form to its most extreme form. This variance indicates the ability to capture a broad part of the agonistic continuum, ranging from verbal attacks to significant violent acts. However, items composing the MTCSS do not cover the lower part of the agonistic continuum. Therefore, adding items that measure the lower part of the agonistic continuum (coercive fantasies) should be considered. This type of scale would allow for a broader spectrum of investigation into sexual sadism. As reported by Longpré, Proulx, and Brouillette-Alarie (2016), current sadism scales have difficulties assessing the entire agonistic continuum and future research should focus on this issue. Recent studies (e.g., Guay, McPhail, & Knight, 2015; Knight, 2014) provide good insight on which items could be added in the MTCSS to assess the entire continuum.

Cutoffs

A dimensional measurement partially confronts the idea that a specific subgroup of offenders presents a higher risk than another because they present criteria that renders them different. In contrast to a taxon, a dimension does not imply a clearly defined cutoff point. Ruscio et al. (2006) call this natural cutoff point a taxonic boundary or natural class. Therefore, a shift to a dimensional measurement of sadism involves a possible arbitrary cutoff point. However, as pointed out by Ruscio et al., a dimensional measurement is in no way an arbitrary measurement. As they emphasize, the cutoff point for a dimensional measurement must be determined empirically and clinically, and must be consistent with the objectives of the assessment. By “empirically,” Ruscio et al. mean that the cutoff point should be determined by statistical analysis to identify cutoffs that are significantly associated with an increased of danger. In addition, the criteria identified as essential by clinicians must also be respected. Therefore, the core of sadism as determined by years of research and clinical assessment must be integrated into these instruments. A dimensional measurement is not arbitrary—it must be the best possible reflection of its constructs’ latent nature. Once again, the MTCSS offers several advantages. In particular, it reflects clinical considerations and statistical analyses, respecting the two fundamental considerations in determining cutoff points.

The dimensionality of sadism should also lead to a reflection on the use of diagnoses to assist the determination of prison sentences

or correctional measures. Such a conceptualization compels reflection on diagnoses that are invoked to justify harsher sentences. Studies indicate that a diagnosis of sadism is often accompanied by a more severe penalty, such as civil commitment (U.S.) or dangerous offender status (Canada). However, centering a decision on the sole presence or absence of sexual sadism appears counterintuitive, considering all the concerns with the current diagnosis of sadism that affect both the validity and reliability of the assessment (Longpré et al., 2016). In contrast, the use of dimensional scales results in a diagnosis that is more accurate and reliable than those associated with current diagnostic tools (Marshall & Hucker, 2006; Mokros et al., 2014). Recent studies reveal that the level of sadism is in no way associated with a higher risk of reoffending among sexual offenders (Brouillette-Alarie, Proulx, & Hanson, 2017; Eher et al., 2016). Once again, studies should determine whether there is a particular threshold along the agonistic continuum that could justify harsher sentences or correctional measures before inferring so.

How to Conceptualize and Study Sexual Sadism

Certainly, the strong evidence for the dimensional latent structure of sexual sadism should affect how this construct is conceptualized and studied. The present research suggests that the language and conceptualization of sexual sadism should also be modified. With a dimensional design, it is more appropriate to think about the degree of sexual sadism (e.g., low, moderate, high) rather than sadistic or non-sadistic individuals. Although this appears to be a subtle difference, it may have important consequences in reducing perception that some offenders are different in kind rather than in degree. Furthermore, this conceptualization not only permits the integration of dimensional structure within measurement instruments, but also links non-sadistic sexual coercion to severe sexual sadism.

In addition, the dimensional latent structure of sexual sadism should also reorient the way we conduct research with so-called sadistic offenders. Studies of sexual sadism are generally conducted on a very specific group of sexual offenders (Marshall & Kennedy, 2003). However, using specific groups of sexual offenders to assess a dimensional construct is clearly suboptimal and engenders measurement error. Our results indicate that a group of sexual offenders that adequately cover the agonistic continuum should be sufficient to study sexual sadism.

Etiological Model

Knowing the structure of a construct is also essential for studying its etiology (Knight, 2014). Therefore, a shift to a dimensional conceptualization of sexual sadism would also impact how its etiology is studied. Although certain etiological models of sexual offending or sexual coercion have been proposed (e.g., Knight & Sims-Knight, 2003, 2004; Malamuth, Sockloskie, Ross & Tanaka, 1991), very few studies have specifically examined the causal

factors of sexual sadism and even less research has validated these theories (Proulx et al., 2007). The practical implementation of a primary prevention perspective requires well-founded models of etiology to guide policies and intervention programs (Sims-Knight & Knight, 2011). A few hypotheses about important etiological factors contributing to sexual sadism have been proposed (e.g., severe childhood victimization); however, they have not been empirically tested. Fortunately, data from multiple sources indicate that there are empirically validated guidelines available to help us understand the etiology of sexual sadism (e.g., Longpré, Guay, & Knight, in press; Robertson, 2014).

A dimensional concept, in contrast to a taxonic concept, does not imply the presence of a distinct etiology. If sadism is a matter of dose, and not of nature (i.e., taxon), it should be possible to find developmental pathways among sexual offenders that provide explanations of the emergence of this severe sexual disorder. The question of etiology remains central to the comprehension and treatment of a disorder. Until now, the etiology of sexual sadism has not been well understood. However, providing a dimensional measurement would greatly enhance our understanding of this disorder which would ultimately lead to a better ability to treat individuals that possess high doses of sexual sadism and are considered harmful.

Limitations

Our study is not without its limitations. As previously discussed, pre-taxometric analyses requirements were partly met in the present study. Given the fact that the MTCSS is composed of dichotomous indicators, we followed Ruscio's (2000) procedure and summed the indicators to form composite indices. However, this procedure can lead to the creation of redundant variables. Our composite indices correlate moderately with one another and are theoretically different. Therefore, we believe that this problem is not relevant to our analyses. Furthermore, four of the six indicators have Cohen's *d* greater than 1.25. Only *Humiliation* and *Insertion* did not meet this rule. These two items were also problematic in Mokros et al. (2014) taxometric study. Humiliation, a core criterion of sadism, is commonly found in the general population and non-sadistic sexual offenders. Furthermore, in a recent study, Longpré et al. (2017) reported that it was difficult to create a measure of humiliation with acceptable psychometric properties. This may explain why *Humiliation* does not meet the requirement for Cohen's *d*. As for *Insertion of Objects*, this dimension is found to have a low occurrence (Nitschke et al. 2009a, b). However, this dimension is still a good marker of sexual sadism (Longpré et al., 2017; Nitschke et al. 2009a, b). This may explain why *Insertion of Objects* did not meet the requirement for Cohen's *d*. This indicates that our results must be interpreted with some caution. However, all taxometric analyses produced results that were stable and consistent with what one would expect for dimensional structure. Besides, no taxonic peaks emerged and CCFIs values supported a dimensional

structure. As a precaution, we performed supplemental taxometric analyses without *Humiliation*, without *Insertion of Objects*, and without both dimensions. The mean CCFIs for supplemental analyses were below the .45 threshold and still warrant for a dimensional interpretation of sadism. Our results are also consistent with previous studies that yield for a dimensional structure of sexual sadism (e.g., Knight et al., 2013; Mokros et al., 2014). Therefore, with the stability of our findings and the convergence of our results with other studies, it seems unlikely that our results are biased because of these partly met requirements. However, future taxometric research on sexual sadism should meet all requirements before concluding that sexual sadism is univocally dimensional.

As previously discussed, the results of the L-mode analysis were somewhat ambiguous. Even though the CCFI was in the range of dimensional structures, it was barely below the threshold and must be interpreted with caution. This may be explained by the positively skewed distribution of the data. It is well known that extreme, sexually sadistic behavior has a low prevalence, and this clearly affected how the data were distributed along the axis. The highly positively skewed distribution may have influenced the L-mode analysis and results. Moreover, Schmidt et al. (2004) suggest that L-mode analysis is prone to false-negative results, which creates a false impression of taxonicity. All this may also explain why the same pattern was found in Knight et al.'s (2013) study and in Mokros et al.'s (2014) study.

According to Ruscio et al. (2006), a CCFI between .45 and .55 must be interpreted with caution and in light of other indicators. More specifically, it is the convergence and consistency of multiple indicators that indicate whether a construct presents a taxonic or a dimensional latent structure (Ruscio et al., 2006; Schmidt et al., 2004). Among all analyses, only one analysis (L-mode) yielded ambiguous results. However, even these ambiguous results were not inconsistent with a dimensional structure, and can be explained by the distribution of the data. Consequently, it seems unlikely that sexual sadism presents a taxonic latent structure.

Moreover, the MTC Sadism Scale is not without limitations. The items on this scale, although highly related to sexual sadism, basically reflect observable behaviors (easily accessible in offender files) and consequently underrepresent fantasies. However, sadistic fantasies are an important component of the disorder. Assessing the presence of sadistic fantasies is often a difficult task since offenders are reluctant to reveal this aspect during their evaluation. Therefore, clinicians must infer the presence of sadistic fantasies from behavioral measures, such as the presence of humiliation or domination; this has proven to be a daunting task (Knight, 2010). Thus, although limited in the assessment of sadistic fantasies, this scale avoids inference and focuses on a parsimonious assessment of sexual sadism.

Conclusion

In summary, the analyses presented here clearly indicate that sexual sadism presents a dimensional latent structure rather

than a taxonomic structure. Therefore, we consider that a shift to a dimensional conceptualization of sadism is essential. According to Schmidt et al. (2004), the DSM nosological classification has gone as far as it can go. This view is in accordance with the literature—and the current DSM itself, whose most recent version emphasizes the movement from nosological diagnoses toward dimensional interpretation of severity levels and the differentiation between paraphilias and paraphilic disorders (American Psychiatric Association, 2013). Such results strongly disconfirm the hypothesis that the distribution of sexual sadism can be accounted for by a latent taxon. However, there is a possibility that the manifest behavior of sexual sadism results from an interaction of multiple independent neurobiological and psychological systems, leaving open the possibility that other measures might yet uncover a taxon (for more details, see Mokros, 2017).

Although our analyses indicate that sexual sadism presents a clear dimensional structure, more research is required on the implications of these findings. This study represents only one set of results and these results should be replicated on different types of offenders. If sexual sadism is a dimensional construct, the same type of pattern would not only be found in different populations, but with a lower range of responses to the MTC Sadism Scale. Moreover, taxometric analyses are needed with other instruments to be sure that our results are not biased by the instrument itself.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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