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Abstract

The present study investigated the quality of sexual life as well as aspects of sexual self-concept and their association to Dark Triad traits by conceptually replicating a recent study on the subject matter. Furthermore, the present study also examined the factorial structure of the Dark Triad and Dark Tetrad by comparing different conceptualizations utilizing structural equation modeling. Therefore, a large, community-based, German-speaking sample completed online self-report measures of the Dark Triad, Sadism, and sexual self-concept ($N = 1033$, 69% women, mean age = 27.9 years). For the replicatory analyses only, 137 individuals had to be excluded based on criteria stated prior to the collection of data. Results of the replicatory analyses allowed a distinction of two groups of dark traits. The first one, being comprised of Narcissism and Psychopathy, positively predicted variables indicating a higher quality of their sexual experience, while they simultaneously inversely predicted variables indicating a lower quality of sexual life. In turn, individuals higher in Machiavellianism exhibited the opposite associations, thereby hinting at a lower quality of their sexual experience. However, all Dark Triad traits, especially Narcissism and Psychopathy, seem to predispose individuals scoring high on them to think excessively about their sex lives. Regarding the factorial structure of dark personality traits, the best fitting models hinted at either a hierarchical Dark Triad model or a single latent Dark Core of personality, whose variance was to a large extent accounted for by the Primary Psychopathy facets callousness and manipulation. Extending the Dark Triad into a Dark Tetrad by adding Sadism did not increase the explanatory value of the computed models. However, as none of the models exhibited an adequate fit, being indicated by fit measures recommended in the contemporary literature, a sufficiently conclusive solution could not be obtained. The present findings suggest that previously observed effects of the Dark Triad traits on various variables regarding the quality of one's sexual life can be considered stable and replicable across samples.

Keywords: Dark Triad, Dark Tetrad, Narcissism, Machiavellianism, Psychopathy, Sadism, Quality of sexual life, Sexual self-concept, Structural equation modelling.

Theoretical Background

Aversive Personality Traits: the “Dark Personality”

In 2002, Paulhus and Williams were driven by the question if the personality traits of Narcissism, Machiavellianism, and Psychopathy were equivalent in normal populations. Research up to this point had not explicitly linked the three traits but had already hinted at a potential overlap between the three individual constructs. To unthread the traits that they collectively referred to as the Dark Triad, they examined their correlational patterns across the Big Five domains, indicators of cognitive ability, and two measures of self-enhancement, a feature whose high manifestations primarily are associated with narcissists. Arriving at the conclusion that although the three traits were substantially intercorrelated, they could not be considered equivalent when correlational patterns with target variables were taken into account (Paulhus & Williams, 2002). Based on this this idea of the Dark Triad as three overlapping, yet distinct personality traits, an impressive amount of research has been conducted to identify the manifold relationships each trait has with particular outcome variables of interest. To put this into perspective, a basic Google Scholar search of “the Dark Triad” yields an impressive 153,000 results, and the article mentioned above has been cited over 3700 times as of this writing.

Additionally, the extension of the concept of the Dark Triad to encompass more than three constituting personality traits has been discussed, motivated by the yearning to maximize the explanatory power or incremental validity of the malevolent side of personality (Buckels et al., 2013; Chabrol et al., 2009). For example, studying the relationships between Dark Triad traits, Sadism, and juvenile delinquency, the inclusion of trait Sadism into the framework of dark traits was proposed, and the resulting cluster of four traits was labeled as the Dark Tetrad of personality (Chabrol et al., 2009). Analogous to Paulhus and Williams (2002), the authors expressed the assumption that these four traits were overlapping yet sufficiently distinct from one another, based on the observation of moderate correlations between the Dark Triad traits and Sadism. Supporting the notion of such a Dark Tetrad, Sadism has been shown to independently predict cruel behavior in laboratory settings (Buckels et al., 2013). Additionally, using exploratory factor analysis, it was found that all Dark Tetrad traits loaded onto the same factor, with the exception of Narcissism, which loaded onto another (Međedović & Petrović, 2015).

Narcissism. Narcissism stems from Greek mythology, where a young man named Narcissus was so consumed with his own beauty that he fell deeply in love with his own reflection, while disdaining everyone else who loved him. After being introduced into psychological literature by Havelock Ellis in 1898 and after gaining its central role in Sigmund Freud's theories – in a metapsychological as well as clinical manner – the concept of Narcissism subsequently stimulated years of clinical research until decades later it was included into the Diagnostic and Statistical Manual of Mental Disorders-III (DSM-III) in 1980 (Raskin & Terry, 1988). According to the DSM-III, the narcissistic personality comprises

a grandiose sense of self-importance or uniqueness; preoccupation with fantasies of unlimited success; exhibitionistic need for constant attention and admiration; characteristic responses to threats to self-esteem; and characteristic disturbances in interpersonal relationships, such as feelings of entitlement, interpersonal exploitativeness, relationships that alternate between the extremes of over-idealization and devaluation, and lack of empathy. (American Psychiatric Association, 1980, p. 315)

The subclinical conceptualization of Narcissism in turn stems from the work of Raskin and Hall (1979, 1981) in which they – based on the assumption that “abnormality is continuous with normality” (Raskin & Hall, 1981, p. 159) – used basic components of the Narcissistic Personality Disorder introduced in the DSM-III to postulate a subclinical construct (Paulhus & Williams, 2002). In short, key features of contemporary conceptualizations of Narcissism include seeking fulfillment out of vanity as well as an exaggerated admiration of oneself (Muris et al., 2017). In order to measure Narcissism as a normal personality trait, the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) was introduced, which has since become the scale dominating the broad literature on Narcissism in empirical research (Muris et al., 2017).

Yet, despite its widespread use in research, the question regarding the dimensionality of the NPI still is a controversial one. While Raskin and Terry (1988) were able to extract 7 factors, others proposed solutions from 4 (Emmons, 1984) to 2 factors (Corry et al., 2008). While the NPI does claim to capture maladaptive facets of Narcissism, positive relationships between NPI scores and positive outcomes, such as low depressiveness or pronounced subjective well-being, are also evident (Sedikides et al., 2004). Especially noteworthy seems to be the fact that, although differing numbers of factors were extracted from the NPI, there

tended to be a stable first factor measuring leadership or authority, which in turn appeared to predominantly measure an adaptive aspect of the construct (Spangenberg et al., 2013).

Machiavellianism. In stark contrast to Narcissism, and Psychopathy as well (see below), Machiavellianism did not emerge from clinical observations or pathological disorders. Instead, it was derived from the works of Niccolo Machiavelli in order to describe a personality trait of a certain utilitarian attitude for (social) psychological research (Jonason & Middleton, 2015; Muris et al., 2017). Specifically, it is characterized by a view and manipulation of others for one's own purposes, a lack of affect in interpersonal relationships (i.e. a lack of empathy), low ideological commitment, and a lack of concern with conventional morality (i.e. social interactions are treated utilitarian rather than morally; Christie & Geis, 1970). To measure this personality trait, a measure widely known as the Machiavellianism Inventory (MACH) was developed (Christie & Geis, 1970). Its self-report Version, the MACH-IV (Christie & Geis, 1970), is – and has been for over 40 years – the most widely used measure for the Machiavellian personality trait (Jones, 2016).

Not unlike the NPI, the factorial structure of Machiavellianism as measured by the MACH-IV is disputed. Whereas three underlying facets were originally postulated (Views, Tactics, Morality; Christie & Geis, 1970), others found any number of factorial solutions from one up to five (Rauthmann, 2012). Furthermore, various other potentially problematic shortcomings of the MACH-IV have been pointed out since then, like tendentially low reliabilities, differing factorial structures, items and labels (Rauthmann, 2012). Considering the controversy surrounding the psychometric properties of the MACH-IV, it should be noted that there are indeed alternative measures for the Machiavellianism personality trait, although by far not as broadly used in research (Rauthmann, 2012). Examples include the Machiavellian Behavior Scale (see Aziz et al., 2002, for a description), the German Machiavellianism Scale (Henning & Six, 2008), or adaptations of the original MACH-IV-like the trimmed MACH* originating from research on the MACH-IV using item response theory (Rauthmann, 2013).

Psychopathy. The empirical research on Psychopathy, an originally clinical construct, was strongly influenced by Harvey Cleckley's (1941, 1976) observational case studies on psychiatric patients, on which he generated a clinical profile with various characteristics, such as a lack of remorse, antisocial behavior, insincerity, and unreliability, among others. Highly influenced by this conceptualization, an observer rating scale called the Hare Psychopathy

Checklist (PCL; Hare, 1980) and later its revision, the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 1991), were devised, which since has become the most widely used measure of Psychopathy in clinical settings (Hare & Neumann, 2008). To determine a subjects rating on the PCL-R, the measure combines information from 20 items, semi-structured interviews, and case histories. However, its broad usability in empirical research using community samples is severely limited due to its comparatively long administration time and low prevalence of community psychopaths (Mahmut et al., 2011).

Contemporary conceptualizations of subclinical Psychopathy usually contain a lack of empathy or remorse, as well as behavior characterized by antisociality, disinhibition, or boldness (Muris et al., 2017). To measure Psychopathy in the noncriminal general population (i.e., subclinical Psychopathy), researchers can rely on several self-report measures, like the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996), Levenson's Primary and Secondary Psychopathy scales (LPSP; Levenson, Kiehl, & Fitzpatrick, 1995), and the Triarchic Psychopathy Measure (Patrick, 2010). However, the most widely used instrument was introduced with the Self-Report Psychopathy Scale (SRP; Hare, 1985), with the SRP-III (Paulhus, Neumann, & Hare, in press) being the most current version. The measure contains four facets of the construct: interpersonal manipulation (e.g. "I find it easy to manipulate people"), callousness (e.g. "I'm not afraid to step on others to get what I want"), erratic lifestyle (e.g. "I've often done something dangerous just for the thrill of it"), and antisocial behavior (e.g. "I avoided paying for things, such as movies, bus or train rides and food"), where the first two correspond to the conceptualization of Primary Psychopathy, while the latter two reflect Secondary Psychopathy (Jakobwitz & Egan, 2006). Apart from this widely used two-factorial conceptualization, however, there are other models of Psychopathy, which conceptualize the construct to comprise three facets. While a superordinate factor of Psychopathy, consisting of an arrogant and deceitful interpersonal style, a deficient affective experience, and an impulsive and irresponsible behavioral style has been proposed (Cooke & Michie, 2001), another contemporary model, based on efforts to integrate alternative conceptualizations with empirical findings, is comprised by the facets disinhibition, boldness, and meanness (Patrick et al., 2009). It is important to note, however, that this triarchic model of Psychopathy not only encompasses maladaptive aspects of the construct, but adaptive features as well (Patrick et al., 2009; Pilch & Smolorz, 2019).

Sadism. Like some of the personality traits described above, Sadism was not always regarded as a personality trait occurring in everyday life in the general population. In the

general population often associated with “sadistic” serial killers, torture by military and police forces, and particularly sexual deviance, Sadism in its more extreme form was included as a personality disorder in the revised version of the Diagnostic and Statistical Manual of Mental Disorders-III revised (DSM-III-R; American Psychiatric Association, 1987), only to be dropped from the subsequent edition (Paulhus & Dutton, 2016). Interestingly, there seems to be no consensus about the origins of the clinical construct or its inclusion in the DSM-III-R, with possible explanations ranging from observations of forensic psychiatrists, down to political considerations (Bradley et al., 2006). Particularly noteworthy seems to be the fact that many conceptions of (subclinical and clinical) Sadism do not rely on the publicly dominant association with sexuality, but instead with a particular focus on domination and power over others, and furthermore, that the idea of Sadism being a natural part of the human condition can already be found a decade before the inclusion of the Sadistic Personality Disorder into the DSM-III-R (Paulhus & Dutton, 2016). In the literature regarding subclinical or everyday Sadism, it is characterized by “a tendency to engage in or think about engaging in cruel, demeaning, or aggressive behaviors for pleasure or subjugation” (Plouffe et al., 2017, p. 167). At this point, it should be emphasized that the definition given by Plouffe et al. (2017) does not rely on sexual connotations, and indeed, sexual deviance appears to be no major factor in assessing everyday Sadism.

Like the other traits of dark personalities described above, various self-report measures are available for subclinical or everyday Sadism, like the 10-item Short Sadistic Impulse Scale (SSIS; O’Meara et al., 2011). Other well-known examples include the Comprehensive Assessment of Sadistic Tendencies (CAST; Buckels & Paulhus, 2013), or the Varieties of Sadistic Tendencies (VAST; Paulhus & Jones, 2015), assessing Sadism with 18 and 16 items, respectively. However, while the SSIS mainly focuses on “hurting” aspects of Sadism, the CAST and VAST to a large extent neglect the subjugating nature of Sadism, potentially limiting the descriptive power of said instruments (Plouffe et al., 2017). In order to overcome these presumed shortcomings, the Assessment of Sadistic Personality (ASP; Plouffe et al., 2017) was developed, footed on the theoretical origins of the subjugating, pleasure-seeking, and unempathic nature of sadists.

Factorial Structure of the Dark Personality

Paulhus and Williams (2002) concluded that the Dark Triad traits of Narcissism, Machiavellianism, and Psychopathy – although they may exhibit certain overlap – are three sufficiently distinct traits. Various authors support the notion of such a view, which can be

appropriately termed “separationist” (Jonason & Middleton, 2015). In their inquiries, researchers adhering to that view argue that although the Dark Triad traits share a certain communality, they also exhibit unique relationships with diverse outcome variables. For example, it has been previously stated that although all Dark Triad traits were substantially negatively associated with the HEXACO factor Honesty-Humility, the strong relationship between Extraversion and Narcissism by far exceeded the magnitude of correlation between Extraversion and the remaining Dark Triad traits (Lee & Ashton, 2005). It has also been stated in recent literature that the unique contribution in predicting outcomes of interest can or should for example be explored when applying multiple regression analysis (Furnham et al., 2013; Jonason & Middleton, 2015). Doing so, it has been discovered that narcissists tend to aggress after an ego threat, while Psychopathy uniquely predicted aggression after physical provocation (Jones & Paulhus, 2010). Additionally, controlling for the other Dark Triad traits, Machiavellianism predicted various sexual motivations (for example to experience their own or their partner’s power), while Narcissism, in turn, did not emerge as an informative predictor of any of the motivations included in that study. Furthermore, Psychopathy negatively predicted compassionate goals as a sexual motivation, an association not found with any other dark trait (Smith et al., 2019). Another finding in tune with the view of the Dark Triad traits as distinct, yet overlapping traits was reported when principal component analysis was conducted on a composite measure of the Dark Triad, the Dark Triad Dirty Dozen. In that study, three factors were extracted (reflecting the three constituting constructs), with modest correlations between the factors (Jonason & Webster, 2010).

Conversely, however, another branch of recent works on the Dark Triad did not focus on the various relationships each dark trait exhibits with certain outcome variables, but instead concentrated on what causes the at times substantial overlap the individual traits share with each other, hereby questioning the incremental validity of the Dark Triad, and by that take a stance which could be somewhat labeled “unificationism” (Jonason & Middleton, 2015). A few years before the Dark Triad was established as a topic of interest in academia, the differentiability of the Psychopathy and Machiavellianism constructs had already been questioned (McHoskey et al., 1998). It was posited that Machiavellianism describes little more than a form of Psychopathy in non-institutionalized individuals, attributable not so much to conceptualization but rather to the different origins of the two constructs, a sentiment that has been echoed – although with a differential focus on conceptualization – in recent research that argues “that Machiavellianism is an essential feature in descriptions of Psychopathy, but that Psychopathy is a broader construct, involving additional features such as impulsivity and

risk-taking” (Glenn & Sellbom, 2015, p. 363). When studied in relation to extant personality theories, Psychopathy and Machiavellianism indeed showed an almost suspiciously similar correlational pattern with Big Five Inventory variables as well as HEXACO Personality Inventory domains, whereas Narcissism every so often deviated from said pattern (Lee & Ashton, 2005). Based on meta-analytic evidence, Narcissism indeed appeared to be a more unique trait than the other Dark Triad traits, because the magnitude of the intercorrelation between Machiavellianism and Psychopathy by far exceeded those between Narcissism and the other traits (Muris et al., 2017). However, one of the key findings of that study was the fact that in most instances, neither Narcissism nor Machiavellianism meaningfully predicted malevolent behavior once Psychopathy was controlled for (Muris et al., 2017). These meta-analytic findings of substantial overlap in association with the apparent superordinate position of the Psychopathy construct are central, as they hint at a possible phenomenon which causes the dark traits to overlap. Indeed, as early as 2006, it was found that the Dark Triad could be broken down to one single factor, on which Narcissism, Primary Psychopathy and Machiavellianism loaded positively, while the Big 5 facet Agreeableness exhibited a negative loading on said factor (Jakobwitz & Egan, 2006). This factor underlying the Dark Triad traits was eventually coined the Dark Core, as it “seems to be a common element among all antagonistic variables” (Jones & Figueredo, 2013, p. 528). This does however raise the question of what constitutes this core of the Dark Triad, meaning what it is exactly that leads these aversive traits to overlap. Utilizing latent variable procedures, it was found that callousness and manipulation (i.e. Primary Psychopathy) were able to account for all the interrelations of the Dark Triad traits (Jones & Figueredo, 2013). In a similar approach, when inspecting the content of the Dark Core, it was demonstrated that Primary Psychopathy accounted for 66% of the variance in the common core (Bertl et al., 2017). However, alternative candidates for the primary content of the Dark Core have been proposed. Using the SD3 as a Dark Triad measure, low Honesty-Humility was found to be the construct common to all dark traits (Lee et al., 2013), consistent with findings of some other studies (for example Book et al., 2015). Conversely, others suggested low Agreeableness as a communality among the Dark Triad traits (Paulhus & Williams, 2002). Based on prior findings regarding Primary Psychopathy as the dominant factor of the Dark Core, it has been remarked that one limiting factor of this candidate for the core is the lack of self-importance and grandiosity facets inherent to the Narcissism construct (Maharana, 2019). Citing previous works, which already theoretically discussed the potential explanatory power of the Antagonism construct (e.g. Lynam & Miller, 2019), Antagonism was proposed as a potential contender for the Dark Core

(Maharana, 2019). The Diagnostic and Statistical Manual of Mental Disorders defines Antagonism as “behaviors that put the individual at odds with other people, including an exaggerated sense of self-importance and a concomitant expectation of special treatment, as well as a callous antipathy toward others, encompassing both an unawareness of others' needs and feelings and a readiness to use others in the service of self-enhancement“ (American Psychiatric Association, 2013, p. 780), a definition in which the constituting facets of callousness and manipulation (which correspond to Primary Psychopathy) and grandiosity (which corresponds to facets of Narcissism) are recognizable at first glance. Using multiple hierarchical regression, Antagonism was indeed established as a superior predictor of the Dark Core of personality (Maharana, 2019). However, even though it seems entirely plausible to assume one single latent Dark Core common to all dark traits, they still seem to possess attributes unique to each trait, in a sense that although the traits are linked by their common core, there could be a behavioral distinction caused by their individual identity focus or the strategies they employ (Jones & Olderbak, 2014). Furthermore, it has been argued that Machiavellian behavior is characterized by strategic planning, while that of psychopaths is denoted by limited impulse control and short-term gratification, and Narcissism, in turn, is primarily – and more so than the others – marked by an egotistical style. (Jones & Figueredo, 2013).

To summarize the points presented above, the factorial structure of the Dark Triad, Dark Tetrad, and the Dark Core of personality has been disputed in the past. It remains open which theoretical factorial structure best describes the dark personality empirically, as results of previous studies are rather inconclusive.

The Dark Personality and Sexuality

The main focus of research on the connection of dark personality traits and sexuality in most cases so far was on topics like reproductive strategies and, interconnected with that, yet in an extreme form, sexual phenomena which can be regarded as problematic. These studies oftentimes adopted an evolutionary perspective and embedded the Dark Triad traits into a theoretical framework called Life History Theory (LHT). LHT, in general, “provides a framework that addresses how, in the face of trade-offs, organisms should allocate time and energy to tasks and traits in a way that maximizes their fitness” (Kaplan & Gangestad, 2005, p. 69). Within LHT, individuals can be divided into those characterized by *fast* life strategies, and those characterized by *slow* life strategies. While fast life history strategies are characterized by maturing early, production of more offspring with simultaneous less

investment in said offspring, slow life history strategies are evident in later maturing and reproduction, and heavier investment in fewer offspring. (McDonald et al., 2012). McDonald et al. (2012) also note that although variables or behaviors related to a fast life strategy are oftentimes seen as undesirable, in the context of LHT they can be considered as relatively adaptive for the individual in the sense that they can improve one's individual fitness – even if they are related to sometimes immense costs for others or society at large. A key point in this regard is that by adopting that view, conceptualizing the Dark Triad traits as inherently maladaptive is erroneous, because these traits can indeed lead to certain evolutionary benefits for the individual (Jonason et al., 2012). Various researchers are convinced of the Dark Triad being indicative of a fast life history strategy, correlating the individual traits or its composite with outcomes associated with such an accelerated strategy. For example, it has been found that a Dark Triad composite significantly predicted overall short-term mating, as well as number of sexual partners being positively correlated with all Dark Triad traits and their composite (Jonason et al., 2009). In a sample of young adults in Finland, Narcissism as well as Psychopathy – but not Machiavellianism – positively predicted the number of sexual partners when unique effects of the Dark Triad traits were analyzed (Borráz-León & Rantala, 2021). Additionally, romantic relationships tend to be of lesser quality for those scoring high on the Dark Triad traits (Jonason et al., 2013).

These fast life history strategies can also be manifested in more extreme forms, which are associated with considerable costs for those who come into contact with them. For example, studying the relationships between the Dark Triad and sexual tactics across varying scenarios, it has been reported that all Dark Triad traits were consistently and positively correlated with coercion, while Psychopathy was positively associated with coaxing as well (Jones & Olderbak, 2014). In another study, the association between Dark Triad traits and rape-enabling attitudes was examined. It was found that the Dark Triad traits were linked to rape myth acceptance, rape perpetrator empathy, and inversely linked to rape survivor empathy. However, when controlling for the shared variance between the traits using multiple regression analysis, only Psychopathy emerged as a significant predictor of the aforementioned attitudes (Jonason et al., 2017). Similarly, it was reported that Primary Psychopathy predicted victim blame and absence of blame when other Dark Triad traits are controlled for, while it was negatively linked to perpetrator blame (Brewer et al., 2019). Furthermore, all Dark Triad traits uniquely predicted sexual harassment proclivity in Israeli community members, whereby Psychopathy once again emerged as the strongest predictor (Zeigler-Hill et al., 2016).

It seems noteworthy, however, that recent research contested the claim that all Dark Triad traits were indicative of a fast life strategy and tried to gain a more differentiated view of the relationship between life history speed and dark personality traits. On the one hand, Psychopathy has been predominantly discussed as being indicative of a rather fast life history speed (Del Giudice, 2014; Jonason et al., 2015). Conversely, it has been countered that, if the facets of the construct are examined, a more differentiated pattern emerges: while the impulsive antisociality elements of Psychopathy indeed indicated a fast life strategy, the fearless dominance element tended to be characteristic of a slower life history speed (McDonald et al., 2012). Similarly, also Machiavellianism and Narcissism have in some instances been associated with a slower approach to life (Jonason et al., 2015).

Dissatisfied with the dominance of research regarding dark personality traits and “problematic” sexuality as described above, Pilch and Smolorz (2019) instead focused on the links between Dark Triad traits and sexual functioning, as expressed in components of sexual self-concept and sexual satisfaction. They found that although all Dark Triad traits seem to share a tendency to focus on sexual aspects of their lives (i.e. think about sex to an excessive degree), the relationship between dark personality traits and cognitive and emotional components of sexual self-concept seemed to differ in regards to the individual traits. More precisely, Pilch and Smolorz (2019) were able to identify two groups of individuals which differed in relation to certain aspects of their sexual well-being.

The first group included of Narcissism and boldness, the latter being one facet of the triarchic model of Psychopathy (Patrick et al., 2009) used in the study. This group showed higher sexual self-esteem and assertiveness, paired with less negative emotions, like anxiety or fear, regarding their sexuality and sexual life. Pilch and Smolorz (2019) concluded that for these individuals, sexual activity seemed to coincide with positive feelings, like feeling comfort and security in sexual contexts. Furthermore, individuals scoring higher in boldness also reported higher levels of satisfaction with their sexual life. The same held for narcissistic individuals, although the reported effects did not reach statistical significance.

The second group in turn included Machiavellianism and disinhibition, the latter being another component of the triarchic model of Psychopathy. People with higher scores in these traits reported lower sexual well-being, as indicated by higher levels of sexual fear and sexual anxiety. They also tended to feel less assertive and reported lower values of sexual self-esteem, although these effects did not always reach statistical significance. Additionally, individuals scoring higher on Machiavellianism reported lower satisfaction with their sexual life, as did female participants that scored higher on disinhibition. Interestingly, individuals

from that group reported relatively high levels of sexual preoccupation, even though sexual aspects of their lives could potentially be regarded as stressors instead of sources of satisfaction for them (Pilch & Smolorz, 2019).

The present study

The present study had two main objectives. Firstly, the investigation of the relationships between Dark Triad traits and dimensions of sexual self-concept as well as generalized quality of sexual life, a conceptually replicatory approach based on the study by Pilch and Smolorz (2019), and secondly, the examination of the factorial structure of the dark personality by means of a comparison of rivaling models found in the extant literature, an exploratory approach.

As previously outlined, the main body of research regarding the Dark Triad and sexuality-related variables has so far been dominated by studies on mating strategies and its more extreme consequences, like for example coaxing, coercion, and harassment. To the authors knowledge, studies which focus on the implications of dark traits on the quality of sexual life and sexual functioning have not been yet conducted, with one exception, namely the study by Pilch and Smolorz (2019). It should be noted, however, that said study had a few limitations. The authors themselves point out, for example, that the study was conducted on a culturally and ethnically homogenous sample of Polish people, which could have influenced the results by means of pronounced religious beliefs and traditional values, among other factors (Pilch & Smolorz, 2019). To test whether the reported effects are stable across samples, replicating that study should contribute to the desired generalizability of the results. Additionally, the use of the triarchic model of Psychopathy (Patrick, 2010; Patrick et al., 2009) poses the issue of difficult comparability with existing research on the Dark Triad, which predominantly relies on a model of Psychopathy as operationalized by the Self-Report Psychopathy Scale (Muris et al., 2017). Furthermore, it should be noted that although said triarchic conceptualization received considerable attention, the contemporarily used measures to assess Psychopathy in that manner tend to be faced with some psychometric problems, like the difficulty of reliably distinguishing the facets of meanness and disinhibition, as well as a differing number of obtained factors when factor analysis is applied, thereby questioning if the model is indeed best described as being triarchic (Collison et al., 2020). Additionally, it has also been noted elsewhere that findings on the Dark Triad have in many cases not been adequately supported by replications of originally obtained results (Lyons et al., 2020).

Based on these limitations and considerations, conceptually replicating the study by Pilch and Smolorz (2019) regarding the associations between Dark Triad traits sexual self-concept as well as generalized sexual satisfaction, utilizing the widely used Self-Report Psychopathy Scale-III (SRP-III; Paulhus et al., in press) as a measure of Psychopathy in a big sample of German-speaking volunteers was the first aim of this study. Specifically, the hypotheses to be tested are as follows:

1. Sexual preoccupation will be associated with Narcissism, Psychopathy, and Machiavellianism.
2. Sexual motivation will be associated with Narcissism, as well as with Psychopathy.
3. Sexual self-esteem will be associated with Narcissism, Psychopathy, and Machiavellianism.
4. Sexual assertiveness will be associated with Narcissism, Psychopathy, and Machiavellianism.
5. Sexual anxiety will be associated with Machiavellianism, Narcissism, and Psychopathy.
6. Sexual fear will be associated with Machiavellianism, Narcissism, and Psychopathy.
7. The number of lifetime sexual partners will be associated with Machiavellianism, as well as Narcissism and Psychopathy.
8. Sexual satisfaction will be associated with Machiavellianism as well as Psychopathy.

The exploratory examination of the factorial structure of the dark personality represented the second main objective of the present study. Based on the inconsistencies in existing literature regarding that topic, various structural equation models representing differing conceptualizations of the Dark Triad, Dark Tetrad, and the Dark Core of personality were calculated and subsequently compared in order to ascertain which latent structure of the construct is most consistent with empirical data from a large community-based sample.

Method

The present study was preregistered prior to the collection of data. The preregistration report can be obtained from <https://osf.io/yzba6>. Unless otherwise stated, all statistical analyses were performed as preregistered.

Participants and procedure

A sample of 1047 German-speaking individuals was recruited from the general population and participated in an online survey. Recruitment took place online via distribution of the link to the survey in online forums and Facebook groups. After clicking the link to the online survey, participants were required to give their informed consent, after which they completed the questionnaires in the order presented below. Participation in the study was voluntary, not linked to any financial compensation, and participants were thanked after reaching the last page of the questionnaire. Initially, 14 people needed to be excluded as they were under the age of 18 or did not state their age, which was a preregistered prerequisite for participating in the study. The resulting sample consisted of 1033 participants (age range 18 – 99 years, $M = 27.9$ years, $SD = 8.7$ years) recruited from the general population by means of a convenience sample. 69 % of the participants described themselves as female, 30 % as male, and 1 % as diverse. 47 % of participants were from Austria, 48 % from Germany, and 5 % from other countries. A more detailed description of the sample used in the present study can be obtained from Table B1.

Following the approach of Pilch and Smolorz (2019), the following individuals were excluded for all analyses regarding the association between Dark Triad traits and sexuality-related outcomes: individuals who defined themselves as homosexual ($n = 65$), asexual ($n = 5$), or did not state their sexual orientation ($n = 2$). Furthermore, individuals that indicated that they had not had any sexual partners ($n = 39$) or did not state their number of sexual partners at all ($n = 17$) also had to be excluded. Lastly, individuals who defined their gender as “diverse” ($n = 9$) were excluded. The final sample therefore consisted of 896 participants (age range 18 – 66 years, $M = 28.1$ years, $SD = 8.7$ years), with 72 % of the participants describing themselves as female and 28 % as male.

For analyses regarding the factorial structure of the dark personality no participants needed to be excluded ($n = 1033$).

Materials

Narcissistic Personality Inventory (NPI-15; Schütz et al., 2004). Narcissism was measured with the German version of the 15-item Narcissistic Personality Inventory (NPI-15), a measure derived from the original NPI introduced by Raskin and Hall (1979). The 15 items of the NPI-15 measure two facets of the construct, namely leadership and grandiosity (Spangenberg et al., 2013), whereby higher scores indicate higher Narcissism. Participants gradually chose between two contrasting statements on 6-point Likert-scales, a procedure recommended by prior research that pointed out problems regarding the use of the dichotomous forced-choice format (present in the NPI-15) in correlation-based methods (Kubarych et al., 2004). Items reflecting the two facets of the construct were averaged to create subscores. Following contemporary recommendations (George & Mallery, 2003), Cronbach α in the sample used for analyzing the relationships between Dark Triad traits and sexuality-related outcomes could be characterized as questionable to good (0.83, 0.63, and 0.84 for the leadership, grandiosity, and total scores, respectively). Cronbach α in the sample used for the structural equation models can be obtained from Tables 3 and 4.

Machiavellianism Inventory – Version IV (MACH-IV; Christie & Geis, 1970). Machiavellianism was measured with a German translation of the 20-item MACH-IV (previously translated by Bertl et al., 2017). The questionnaire can further be divided into three subscales: views, tactics, and morality. The 2 items regarding morality were only used in computing the total score. Answers were given on 6-point Likert-scales (1 “strongly disagree”, 6 “strongly agree”). Higher scores indicated higher Machiavellianism. Items reflecting the views and tactics facets of the construct were averaged to create subscores. Cronbach α in the sample used for analyzing the relationships between Dark Triad traits and sexuality-related outcomes were questionable to acceptable (0.66, 0.68, and 0.78 for the views, tactics, and total scores, respectively). Cronbach α in the sample used for the structural equation models can be obtained from Tables 3 and 4.

Self-Report Psychopathy Scale-III (SRP-III; Paulhus et al., in press). Subclinical Psychopathy was measured with a German translation of the SRP-III (previously translated by Bertl et al., 2017). The 31 items measure 4 facets of the construct, namely manipulation, callousness, erratic lifestyle, and antisocial behavior. Answers were given on 5-point Likert-scales (1 “strongly disagree”, 5 “strongly agree”), and higher scores indicated higher Psychopathy. Items reflecting the 4 facets of the construct were averaged to create subscores. Cronbach α in the sample used for analyzing the relationships between Dark Triad traits and sexuality-related outcomes was 0.77 (erratic lifestyle), 0.70 (antisocial behavior), 0.08

(callousness), 0.66 (manipulation), and 0.83 (total Psychopathy score), indicating unacceptable to good internal consistency. Cronbach α in the sample used for the structural equation models can be obtained from Tables 3 and 4.

Short Sadistic Impulse Scale (SSIS; O'Meara et al., 2011). Sadism was measured using items from a German translation of the Short Sadistic Impulse Scale (previously translated by Bertl et al., 2017). This scale measures sadistic tendencies with 10 items on 6-point Likert-scales (1 “strongly disagree”, 6 “strongly agree”). Higher scores indicate higher Sadism. All items were averaged to create a total score. Sample Cronbach α was acceptable (0.77).

Assessment of Sadistic Personality (ASP; Plouffe et al., 2017). Since the SSIS may only have a limited view on the contents comprising the trait of interest (i.e. focusing on the “hurting” aspect of Sadism while neglecting others; Plouffe et al., 2017; Zeigler-Hill & Vonk, 2015), Sadism was also measured with the ASP. This measure consists of 9 items, where higher scores indicate higher Sadism. Responses were given on 5-point Likert-scales (1 “strongly disagree”, 5 “strongly agree”). All items were averaged to create a total score. Sample Cronbach α was acceptable (0.77). The ASP was translated into German utilizing the parallel blind technique (Behling & Law, 2000). Therefore, the questionnaire was translated by the author and an independent individual, after which the two resulting translations were compared, discussed, and synthesized into a common solution by the same two individuals. This procedure was also applied in translating the MSSCQ and the item regarding general satisfaction with one's sexual life (see “Sexuality-related measures” below).

Multidimensional Sexual Self-Concept Questionnaire (MSSCQ; Snell, 2011). The MSSCQ was used to assess sexual self-concept (SSC). The MSSCQ measures 20 psychological aspects of human sexuality with 5 items per subscale. Responses were given on 5-point Likert-scales (1 “not at all characteristic of me”, 5 “very characteristic of me”). The following 6 subscales were used in this study: *sexual preoccupation* (i.e. “the tendency to think about sex to an excessive degree”; Snell, 2011, p. 537; Cronbach α = 0.92), *sexual motivation* (i.e. “the motivation and desire to be involved in a sexual relationship”; Snell, 2011, p. 537; Cronbach α = 0.87), *sexual self-esteem* (i.e. “a generalized tendency to positively evaluate one's own capacity to engage in healthy sexual behaviors and to experience one's sexuality in a satisfying and enjoyable way”; Snell, 2011, p. 537; Cronbach α = 0.88), *sexual assertiveness* (i.e. “the tendency to be assertive about the sexual aspects of one's life”; Snell, 2011, p. 537; Cronbach α = 0.83), *sexual anxiety* (i.e. “the tendency to feel tension, discomfort, and anxiety about the sexual aspects of one's life”; Snell, 2011, p. 537;

Cronbach $\alpha = 0.89$), and *sexual fear* (i.e. “a fear of engaging in sexual relations with another individual”; Snell, 2011, p. 537; Cronbach $\alpha = 0.83$). Therefore, internal consistency could be characterized as good to excellent throughout. Items reflecting the 6 facets of the construct were averaged to create subscale scores. Following the approach of Pilch and Smolorz (2019), better sexual functioning was indicated by high scores on sexual self-esteem and sexual assertiveness and low scores on sexual fear and sexual anxiety, while higher scores in sexual motivation and sexual preoccupation indicated interest in sexual activity. Furthermore, a single-item measure was utilized to ask participants about their overall satisfaction with their sexual life on a 10-point Likert-scale (1 “not satisfied at all”, 10 “completely satisfied”).

Analyses

Analyses regarding sexuality-related outcomes. All statistical analyses were conducted in R version 4.0.3 (R Core Team, 2020), using the RStudio version 1.3.1073 (718e6d75) environment (RStudio Team, 2020). Gender differences on all relevant study variables were computed using Welch’s t-tests, in order to adjust for potential violations of the assumption of homogeneity of variance, a procedure especially recommended for analyses when sample sizes are unequal, which was the case here (see for example Field et al., 2012; Zimmerman, 2004). As the sample sizes of men and women differed substantially in size, Hedges’ *g* was used as the effect size indicating gender differences as it takes the standard deviation and sample size of each group into account and is generally preferable to report (Ellis, 2010; Lakens, 2013).

Differing from the planned use of Pearson correlations, Spearman’s rank correlation coefficients were computed to examine the relationship between dark traits and quality of sexual life or sexual self-concept, because various study variables deviated from being normally distributed. As stated in the preregistration report, analyses were conducted separately for men and women, as well as for both genders.

Additionally, as preregistered, 24 multiple regression models were calculated to examine the unique contributions of dark traits on the sexuality-related variables specified above. Therefore, sexuality-related variables were specified as outcome variables, while the Dark Triad traits were specified as predictors. All regression models were computed utilizing the forced entry method, wherein all predictors were included into the models simultaneously, without any specified order. It should be noted that the prerequisite of normally distributed residuals was not fulfilled for all the regression models used in analyzing the data. However, simulation studies showed that in sufficiently large samples, linear regression arrives at valid

results even in extremely non-normal data (e.g., Lumley et al., 2002). For the analyses described above, missing data was excluded pairwise.

Analyses regarding the factorial structure of the Dark Triad. Statistical analyses of the structural equation models were conducted with lavaan (Rosseel, 2012) in R version 4.0.3 (R Core Team, 2020), using the RStudio version 1.3.1073 (718e6d75) environment (RStudio Team, 2020). The factorial structure of dark personalities was analyzed using various structural equation models derived from recent literature in order to describe the latent structure of the Dark Triad, Dark Tetrad, and the Dark Core (Bertl et al., 2017). A robust mean- and variance-adjusted weighted least squares (WLSMV) estimator was employed for the model on item-level, as the used scales cannot be qualified as measuring the latent constructs on an interval-scale level but are more adequately described as categorical indicators (Brown, 2015). For all remaining models, a robust mean- and variance-adjusted likelihood ratio test statistic (MLMV) was utilized, as it yields adequate standard and Type I errors, even for non-normally distributed data (Maydeu-Olivares, 2017). Model fit was evaluated with the following criteria, which are recommended by the current literature (e.g. Brown, 2015; Kline, 2016). Adequate model fit was indicated by SRMR values close to or below 0.08, RMSEA values close to 0.06 or below, and CFI/TLI values close to 0.95 or larger. For the analyses regarding the structural equation models described above, missing data was excluded listwise.

Results

Results regarding sexuality-related outcomes

Regarding the Dark Triad traits, significant gender differences were found for all of the constructs, whereby men consistently scored higher than women on Narcissism ($t(462.71) = 7.51, p < .001$, Hedges' $g = 0.56 [0.41, 0.71]$), Machiavellianism ($t(426.01) = 3.00, p = .003, g = 0.23 [0.08, 0.37]$), and Psychopathy ($t(396.36) = 8.21, p < .001, g = 0.68 [0.53, 0.83]$), indicating small to medium-sized effects. Regarding the sexuality-related constructs, men scored higher on sexual preoccupation ($t(399.04) = 8.02, p < .001, g = 0.64 [0.49, 0.79]$), sexual motivation ($t(487.59) = 4.63, p < .001, g = 0.33 [0.18, 0.47]$), sexual anxiety ($t(420.26) = 2.79, p = .006, g = 0.21 [0.07, 0.36]$), and number of lifetime sexual partners ($t(264.78) = 2.29, p = .023, g = 0.25 [0.11, 0.40]$), also indicating small to medium-sized effects. Women, in turn, had higher scores on sexual self-esteem ($t(452.44) = 2.01, p = .045, g = 0.15 [0.00, 0.30]$) and satisfaction with sexual life ($t(413.33) = 3.25, p = .001, g = 0.26$

[0.11, 0.40]), indicating negligible to small effects. Descriptive statistics are displayed in Table 1, while correlations between all study variables can be found in Table C1 in the appendix.

As stated in Table 2, Narcissism was positively associated with sexual preoccupation (in women as well as the overall sample), sexual motivation, sexual self-esteem, sexual assertiveness, the number of lifetime sexual partners, and the satisfaction with sexual life (men only), characterized by small effect sizes ($r_s = .133$ to $.245$). Regarding the emotional dimensions of sexual self-concept, Narcissism was negatively associated with sexual anxiety (in men as well as the overall sample) and sexual fear, to negligible and small degrees ($r_s = -.075$ to $-.171$). Machiavellianism exhibited positive associations with sexual preoccupation, sexual motivation (in men), as well as sexual anxiety and fear (in women and the overall sample only), characterized by negligible to small effects ($r_s = .098$ to $.157$). Conversely, Machiavellianism was weakly and negatively associated with satisfaction with sexual life in women ($r = -.096$) and the overall sample ($r = -.095$). Lastly, Psychopathy was positively associated with sexual preoccupation, sexual motivation, sexual self-esteem, sexual assertiveness, and the number of partners, exhibiting the strongest associations with effects ranging from small to moderate in size ($r_s = .117$ to $.317$). In contrast, Psychopathy was negatively associated with sexual fear, with small effects ($r_s = -.124$ to $-.200$).

Table 1*Means and standard deviations regarding variables included in the replicatory analyses*

	Overall			Women			Men		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Narcissism	892	2.81	0.55	643	2.73	0.54	249	3.03	0.53
Machiavellianism	896	3.03	0.59	645	3.00	0.57	251	3.13	0.61
Psychopathy	895	2.20	0.47	644	2.12	0.42	251	2.42	0.50
Sexual preoccupation	896	2.08	1.00	645	1.91	0.91	251	2.52	1.07
Sexual motivation	895	3.44	0.99	645	3.35	1.00	250	3.67	0.93
Sexual self-esteem	896	3.21	1.00	645	3.25	1.00	251	3.10	1.01
Sexual assertiveness	894	3.11	0.99	645	3.12	1.00	249	3.07	0.96
Sexual anxiety	895	1.87	0.95	645	1.82	0.92	250	2.02	1.00
Sexual fear	894	1.96	0.91	644	1.96	0.90	250	1.96	0.93
Number of partners	896	11.33	25.57	645	9.52	12.07	251	15.98	43.99
Satisfaction with sexual life	896	6.77	2.43	645	6.94	2.34	251	6.32	2.62

Table 2
Associations between Dark Triad traits and sexuality-related variables

	Narcissism			Machiavellianism			Psychopathy		
	Overall	Women	Men	Overall	Women	Men	Overall	Women	Men
Sexual preoccupation	.244 ($< .001$)	.217 ($< .001$)	.122 (.054)	.138 ($< .001$)	.103 (.009)	.126 (.048)	.311 ($< .001$)	.271 ($< .001$)	.219 ($< .001$)
Sexual motivation	.204 ($< .001$)	.175 ($< .001$)	.195 (.002)	.065 (.053)	-.000 (.998)	.157 (.013)	.265 ($< .001$)	.233 ($< .001$)	.243 ($< .001$)
Sexual self-esteem	.165 ($< .001$)	.168 ($< .001$)	.245 ($< .001$)	-.049 (.142)	-.061 (.121)	.004 (.950)	.133 ($< .001$)	.117 (.003)	.266 ($< .001$)
Sexual assertiveness	.201 ($< .001$)	.207 ($< .001$)	.241 ($< .001$)	-.042 (.213)	-.050 (.205)	-.017 (.795)	.196 ($< .001$)	.188 ($< .001$)	.266 ($< .001$)
Sexual anxiety	-.075 (.026)	-.075 (.057)	-.171 (.007)	.115 ($< .001$)	.118 (.003)	.070 (.270)	-.040 (.228)	-.058 (.145)	-.110 (.082)
Sexual fear	-.136 ($< .001$)	-.130 (.001)	-.166 (.008)	.098 (.004)	.123 (.002)	.046 (.472)	-.134 ($< .001$)	-.112 (.004)	-.201 (.001)
Number of partners	.155 ($< .001$)	.147 ($< .001$)	.173 (.006)	.022 (.504)	.038 (.336)	-.016 (.807)	.299 ($< .001$)	.317 ($< .001$)	.292 ($< .001$)
Satisfaction with sexual life	.022 (.512)	.020 (.610)	.133 (.036)	-.095 (.004)	-.096 (.015)	-.064 (.315)	.047 (.164)	.069 (.083)	.111 (.078)

Note. Top row denotes Spearman's ρ . Bottom row (in parentheses) denotes the corresponding p -values.

Furthermore, to investigate the unique associations between Dark Triad traits and sexuality-related variables, multiple regression models were analyzed. For a detailed overview of the models and effects in the male and female subsamples, see Tables D1 – D8 in the appendix. Controlling for the shared variance between the Dark Triad traits, while taking the entire sample into account, all dark traits significantly predicted sexual preoccupation, with the association being especially pronounced with Psychopathy. Sexual motivation, in turn, was positively predicted by Narcissism and Psychopathy, but not by Machiavellianism. The predictive patterns regarding sexual self-esteem and sexual anxiety were identical, whereby both were positively predicted by Narcissism and Psychopathy, while the prediction was inverse when focusing on Machiavellianism. Contrarily, sexual anxiety was positively predicted by Machiavellianism, while simultaneously being negatively predicted by Narcissism. Furthermore, Machiavellianism positively predicted sexual fear, while the relationship between sexual fear and Narcissism, as well as Psychopathy, was a negative one. Regarding the number of lifetime sexual partners, only Psychopathy positively predicted a higher number of partners in the overall sample, while Narcissism and Machiavellianism did not. Satisfaction with one's sexual life was positively predicted by Psychopathy, while it was negatively predicted by Machiavellianism. Effects tended to be negligible to small in the overall sample (β s = .067 to .277), with Psychopathy exhibiting the largest effects.

Results regarding the factorial structure of the Dark Triad

Descriptive statistics and Spearman correlations of the dark personality measures of the sample used for computing the structural equation models can be found in Tables 3 and 4 for the scales and subscales, respectively. As stated above, various structural equation models were calculated in order to gain a better understanding of the factorial structure of the dark personality.

Following the approach by Bertl et al. (2017), the first model (Figure 1) conceptualized the Dark Triad as a hierarchical model with one higher-order latent factor, termed the Dark Triad Factor. This model – in contrast to the ones that followed (see below) – utilized an item-level approach in the analysis, using the robust WLSMV estimator for computation of the specified model. While the SRMR and RMSEA indicated acceptable model fit, the CFI and TLI, in turn, indicated a fairly poor fitting model ($\chi^2(2076) = 5165.103$, $p < .001$; SRMR = 0.068; RMSEA [90 % CI] = 0.038 [0.037; 0.039]; CFI = 0.709; TLI = 0.699). Inspection of the modification indices revealed cross-loadings for several items. Therefore, items were individually and iteratively removed until none of the cross-loadings

had modification indices > 100.00 . Following that procedure, the resulting model ($\chi^2(1481) = 3446.900$, $p < .001$; SRMR = 0.062; RMSEA [90 % CI] = 0.036 [0.034; 0.038]; CFI = 0.751; TLI = 0.741) was characterized by a marginally better – yet still not adequate – overall fit.

Table 3

Means, standard deviations, and Spearman rank correlations between the dark personality traits in the sample used for the structural equation models

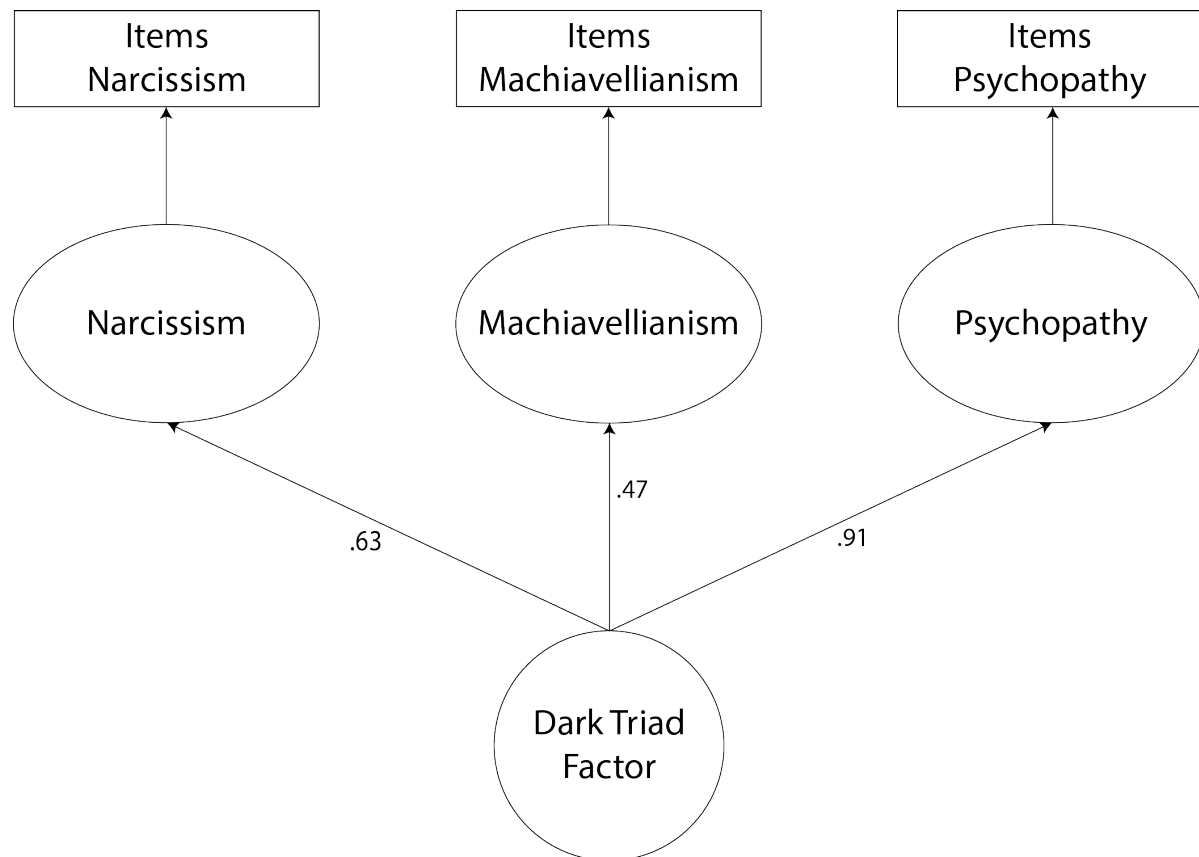
	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)
(1) Psychopathy	2.20	0.46	.82				
(2) Narcissism	2.82	0.56	.443***	.85			
(3) Machiavellianism	3.04	0.59	.307***	.218***	.79		
(4) Sadism - SSIS	1.53	0.60	.373***	.220***	.386***	.77	
(5) Sadism - ASP	1.55	0.57	.434***	.293***	.344***	.608***	.77

Note. Cronbach's alpha is on the diagonal. *** $p < .001$.

Table 4*Means, standard deviations, and Spearman correlations of subscale scores of the dark personality measures*

	<i>M (SD)</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Psychopathy											
(1) Manipulation	2.51 (0.69)	.65									
(2) Erratic	2.45 (0.72)	.452***	.76								
(3) Antisocial	1.70 (0.58)	.332***	.404***	.69							
(4) Callousness	2.33 (0.46)	.201***	.311***	.200***	.05						
Narcissism											
(5) Leadership	3.02 (0.59)	.387***	.386***	.140***	.302***	.84					
(6) Grandiosity	2.40 (0.75)	.327***	.277***	.109***	.300***	.483***	.63				
Machiavellianism											
(7) Tactics	2.78 (0.72)	.310***	.163***	.192***	.201***	.133***	.237***	.68			
(8) Views	3.17 (0.70)	.234***	.136***	.134***	.177***	.094**	.254***	.518***	.65		
Sadism											
(9) SSIS	1.50 (0.59)	.289***	.209***	.328***	.276***	.167***	.227***	.352***	.326***	.77	
(10) ASP	1.55 (0.57)	.386***	.271***	.325***	.302***	.251***	.256***	.354***	.251***	.608***	.77

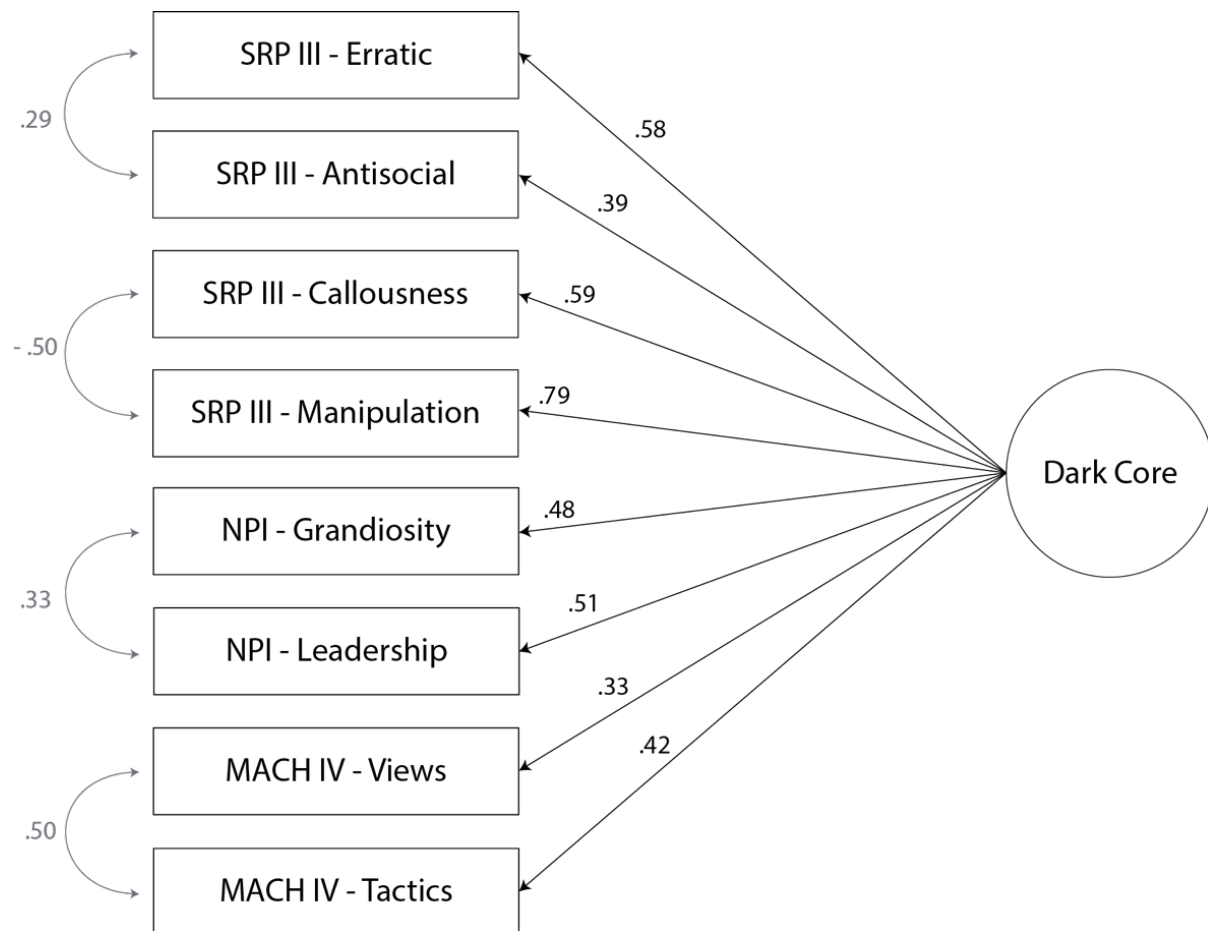
Note. Cronbach's alpha is on the diagonal. ** $p < .01$. *** $p < .001$.

Figure 1*Model 1 – Hierarchical structural equation model of the Dark Triad on item level*

To examine the Dark Core of personality, the item-level analysis approach was dropped, instead the subscales of the Dark Triad measures were used as indicators for the latent Dark Core (see Figure 2). Therefore, the subscales needed to be specified as manifest variables. Note that for this analysis and all following computations a robust maximum likelihood estimator (MLMV) was used. Compared to Model 1, the CFI and TLI in Model 2 increased substantially, with both indicating a better, yet not adequate, fit of the model ($\chi^2(16) = 90.567, p < .001$; SRMR = 0.041; RMSEA = 0.067 [0.054; 0.081]; CFI = 0.917; TLI = 0.854). Additionally, the SRMR decreased, also hinting at a better fitting model. However, the RMSEA increased, indicating a slightly worse model fit when compared to the corresponding value of the first model.

Figure 2

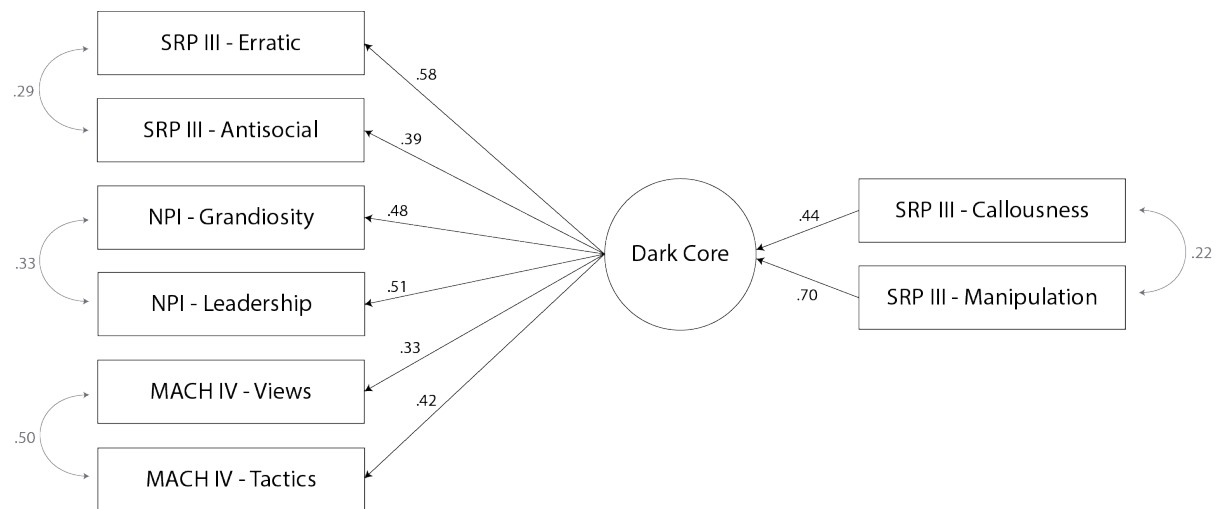
Model 2 – Structural equation model of the Dark Core of personality with subscales of the Dark Traid measures used as indicators



Model 3 then adopted an approach from prior research (Bertl et al., 2017; Jones & Figueredo, 2013), in which the SRP III subscales manipulation and callousness were specified as regressive factors (Figure 3). Focusing on the fit indices alone, Model 3 could not be differentiated from Model 2 ($\chi^2(16) = 90.567, p < .001$; SRMR = 0.041; RMSEA = 0.067 [0.054; 0.081]; CFI = 0.917; TLI = 0.854). Moreover, 81% of the variance in the Dark Core of personality could be accounted for by callousness and manipulation.

Figure 3

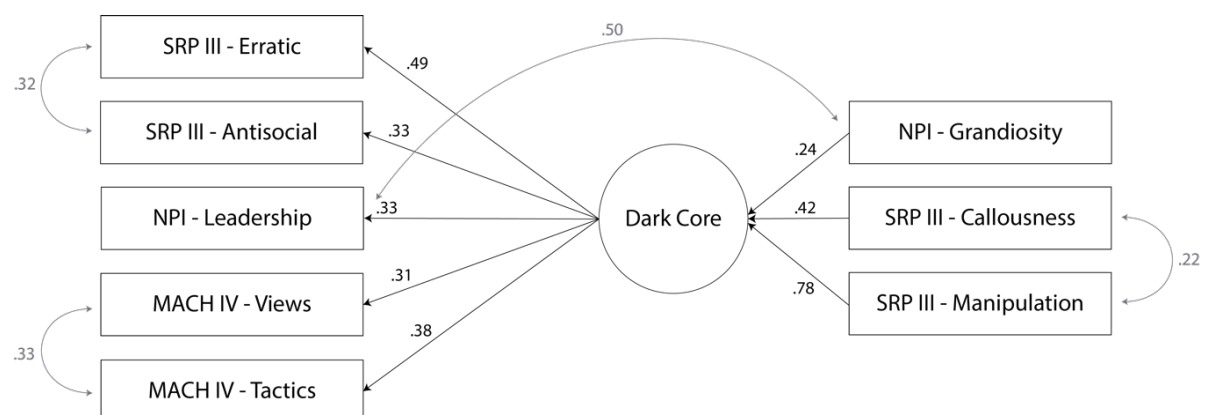
Model 3 – Examination of the Dark Core using the SRP III subscales callousness and manipulation as regressive factors



To test if the explanatory value of the model could be increased by specifying Antagonism (operationalized here by the SRP-III subscales callousness and manipulation, as well as the NPI-15 subscale grandiosity) as the primary component of the Dark Core, another structural equation model was calculated, adding the grandiosity subscale of the NPI as a regressive factor (Figure 4). The resulting model, Model 4, exhibited a substantial increase in the test statistic, as did the RMSEA and SRMR, while the CFI and TLI decreased considerably ($\chi^2(16) = 258.687, p < .001$; SRMR = 0.112; RMSEA = 0.121 [0.109; 0.135]; CFI = 0.729; TLI = 0.525). However, adding grandiosity as a regressive factor led to an increase of the variance accounted for in the Dark Core ($R^2 = 0.984$).

Figure 4

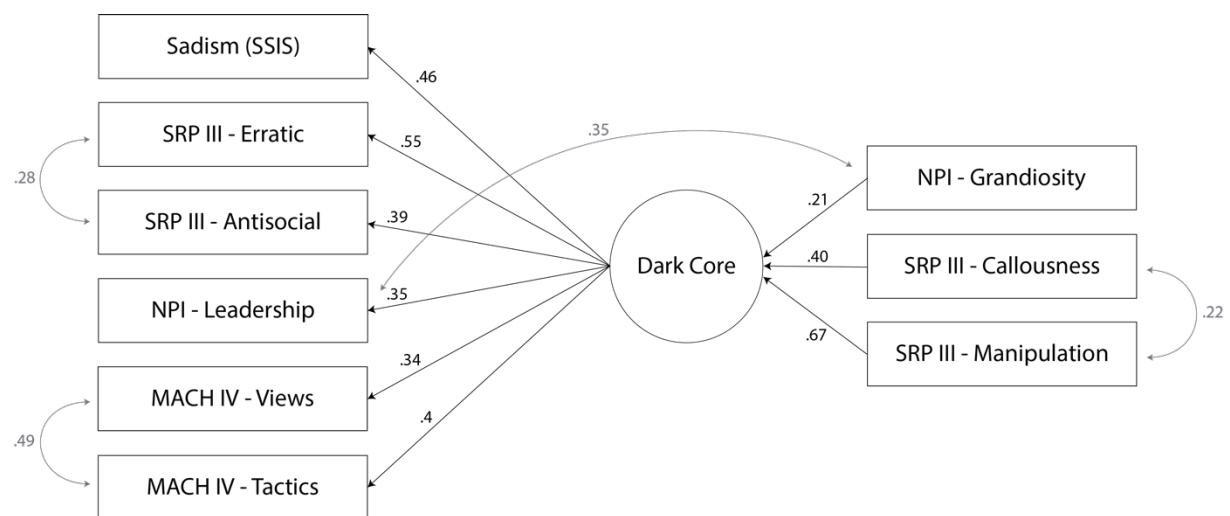
Model 4 – Examination of the Dark Core using the SRP III subscales callousness and manipulation, as well as the NPI subscale grandiosity as regressive factors



Model 5 then extended the prior model to a conceptualization of the Dark Tetrad by adding trait Sadism as measured by the SSIS. With all fit indices decreasing, the SRMR and RMSEA indicated a slightly better fitting model than Model 4, yet the decrease in the CFI and TLI values hinted at a worse fit of the model ($\chi^2(23) = 321.763, p < .001$; SRMR = 0.113; RMSEA = 0.112 [0.102; 0.123]; CFI = 0.640; TLI = 0.436).

Figure 5

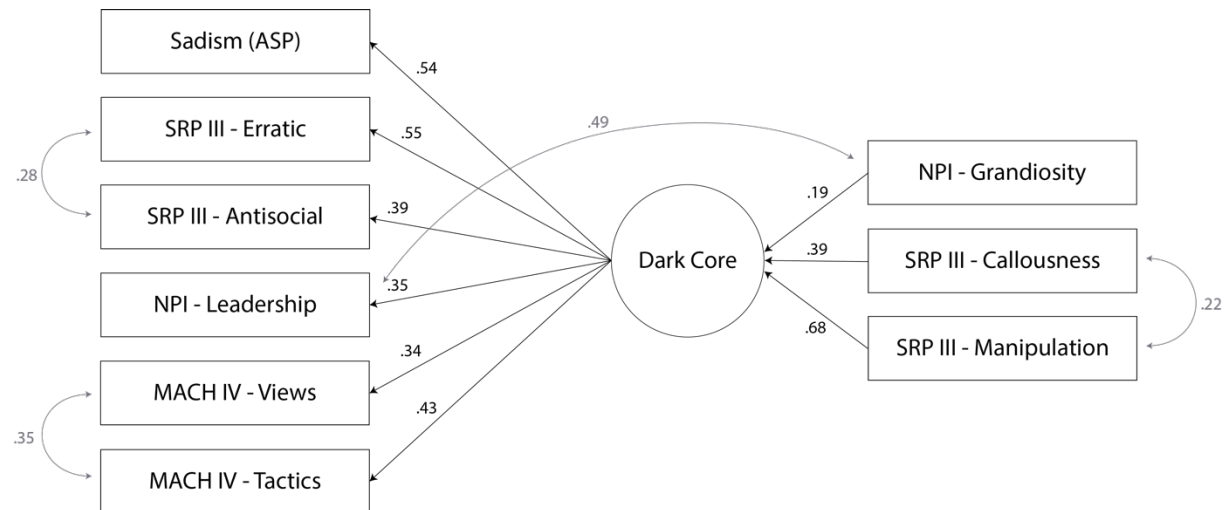
Model 5 – Examination of the Dark Core and the Dark Tetrad (SSIS as Sadism measure) using the SRP III subscales callousness and manipulation, as well as the NPI subscale grandiosity as regressive factors



To test whether using the ASP would improve model fit when compared to the SSIS as a measurement of trait Sadism, a similar model – Model 6 – was computed (Figure 6). The CFI and TLI somewhat increased while the SRMR and RMSEA decreased in comparison to model 5, indicating a marginally better fit for the model when the ASP is used as a measure for Sadism ($\chi^2(23) = 315.234, p < .001$; SRMR = 0.111; RMSEA = 0.111 [0.100; 0.122]; CFI = 0.662; TLI = 0.471).

Figure 6

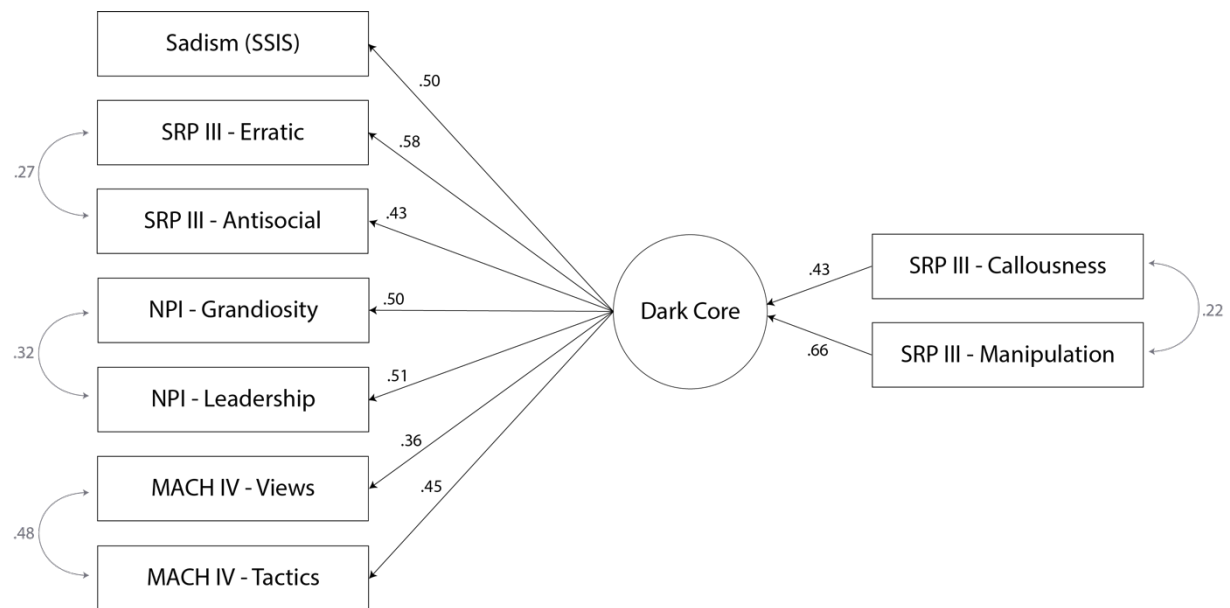
Model 6 – Examination of the Dark Core and the Dark Tetrad (ASP as Sadism measure) using the SRP III subscales callousness and manipulation, as well as the NPI subscale grandiosity as regressive factors



Since all models using Antagonism facets as regressive factors appeared to be inadequate in view of overall fit of the models, this approach was dropped for the remaining conceptualizations of the dark personality. Henceforth, the approach used for Model 3 was adopted yet again, using only callousness and manipulation as primary components of the Dark Core. Further exploring the Dark Tetrad (with Sadism measured by the SSIS), Model 7 yielded an overall better fit as compared to the Antagonism models, as the CFI and TLI increased substantially, and the SRMR and RMSEA simultaneously decreased ($\chi^2(23) = 166.933, p < .001$; SRMR = 0.056; RMSEA = 0.078 [0.067; 0.089]; CFI = 0.826; TLI = 0.728; see Figure 7).

Figure 7

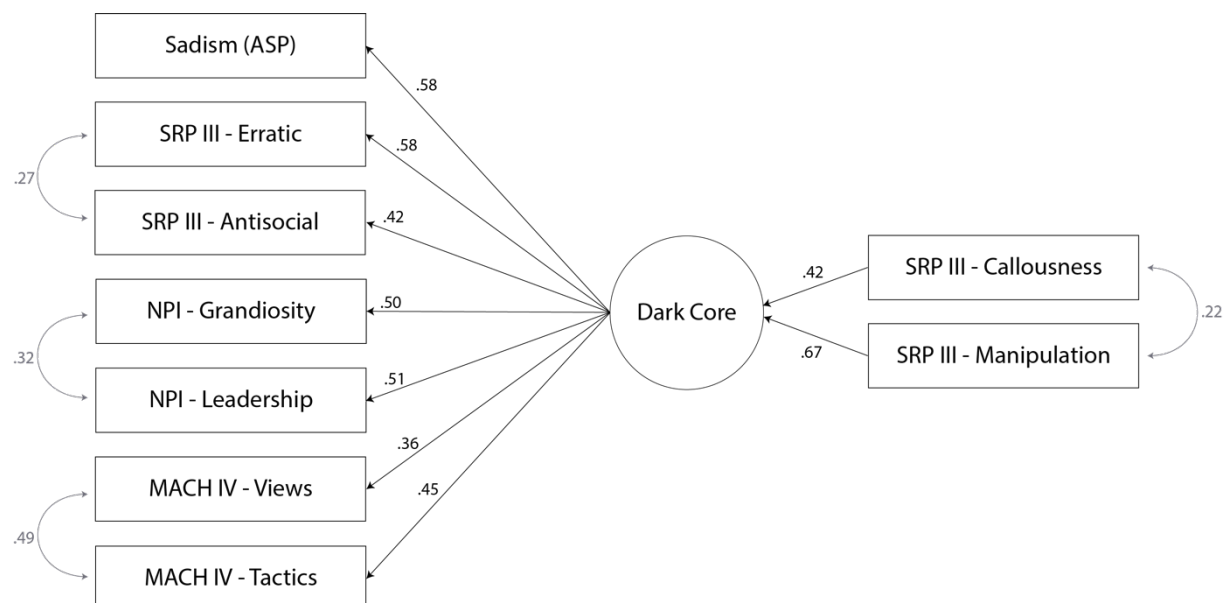
Model 7 – Examination of the Dark Core and the Dark Tetrad (SSIS as Sadism measure) using the SRP III subscales callousness and manipulation as regressive factors



Substituting the SSIS by the ASP as a Sadism measure for Model 8 (Figure 8) led to yet another increase in model fit, as indicated by a decrease in the test statistic, the SRMR, and the RMSEA, as well as an increase in the CFI and TLI ($\chi^2(23) = 146.992, p < .001$; SRMR = 0.048; RMSEA = 0.072 [0.061; 0.084]; CFI = 0.857; TLI = 0.776).

Figure 8

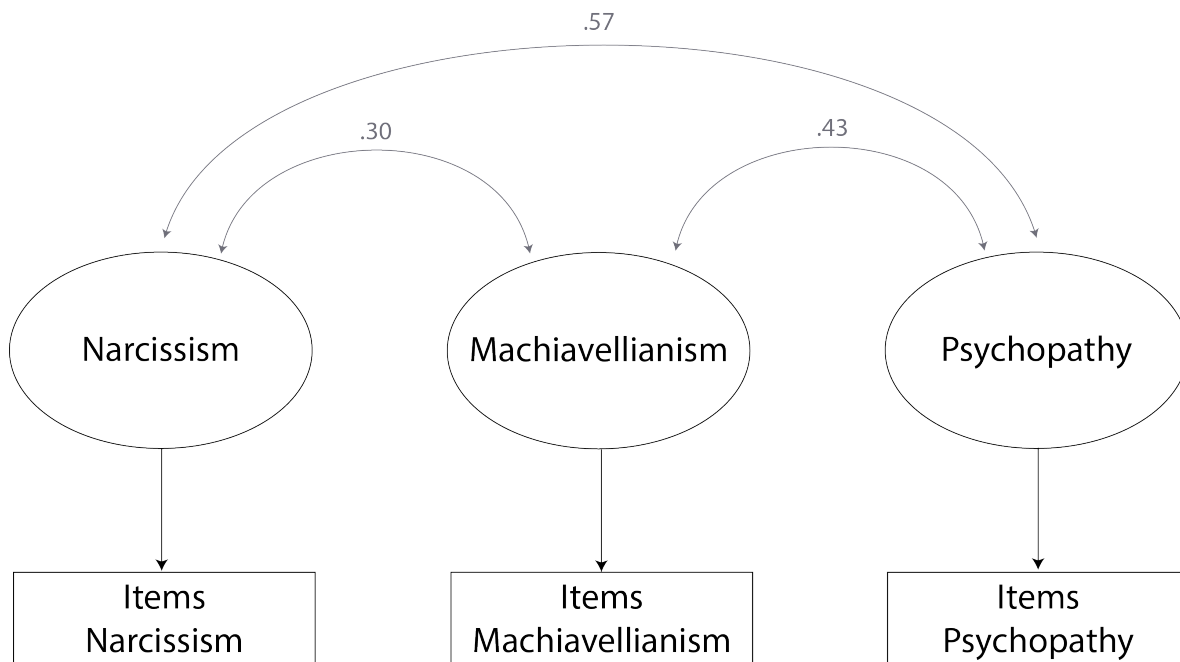
Model 8 – Examination of the Dark Core and the Dark Tetrad (ASP as Sadism measure) using the SRP III subscales callousness and manipulation as regressive factors



In a purely exploratory manner, another model (which was not preregistered) was computed in order to examine the original Dark Triad conceptualization by Paulhus & Williams (2002). A graphical representation of said model can be obtained from Figure 9. As this was another model analyzed on item level, the WLSMV method was used to estimate the model. Based on fit indices, it could not be distinguished from the hierarchical Model 1 including a latent higher-order Dark Triad factor (see above) and therefore did not fit the data particularly well ($\chi^2(2076) = 5165.103, p < .001$; SRMR = 0.068; RMSEA [90 % CI] = 0.038 [0.037; 0.039]; CFI = 0.709; TLI = 0.699). Analogous to Model 1, inspection of the modification indices revealed cross-loadings for several items. Therefore, items were again individually and iteratively removed until none of the cross-loadings had modification indices > 100.00 . The resulting model was again characterized by a marginally better overall fit, which could however not be described as adequate ($\chi^2(1481) = 3388.182, p < .001$; SRMR = 0.061; RMSEA [90 % CI] = 0.035 [0.034; 0.037]; CFI = 0.750; TLI = 0.740).

Figure 9

Exploratory model – Dark Triad model as conceptualized by Paulhus and Williams (2002)



Discussion

The Dark Triad and Quality of Sexual Life

The aim of the current study was to investigate the associations between the Dark Triad traits and components of sexual self-concept as well as generalized sexual satisfaction, or quality of sexual life in short, and thereby to conceptually replicate the findings of Pilch and Smolorz (2019).

Sexual preoccupation, characterized by excessive thinking about sex (Snell, 2011), exhibited positive relations to all dark traits, whereas the strongest associations were found with Narcissism and Psychopathy, although the relationship between preoccupation and Narcissism in men did not reach statistical significance. The size of the effects could be described as small throughout. When the shared variance between the Dark Triad traits was controlled for, the predictive pattern of all traits on sexual preoccupation remained unchanged for women, yet Psychopathy turned out to be the only dark trait able to predict sexual preoccupation in men. This finding is well in line with the results obtained by Pilch and Smolorz (2019), and the pattern of Psychopathy being especially indicative of sexual preoccupation is consistent with previous research, in which it has been already demonstrated that there seems to be an association between being preoccupied with the sexual aspects of one's life and aspects of antisocial behavior, antisocial practices, as well as impulsivity (Lee & Forbey, 2010). People with pronounced dark traits – especially those high in Psychopathy – indeed seem prone to be worrying excessively about their sex lives.

Higher sexual motivation, defined by the desire and drive to be sexually active (Snell, 2011), was associated with Narcissism and Psychopathy in both sexes, and with Machiavellianism in men. However, inspecting the unique contributions of the individual Dark Triad traits, Narcissism and Machiavellianism could only predict sexual motivation in women, while Psychopathy emerged yet again as the main predictor for men and women, exhibiting small effects on the sexual motivation of respective individuals. For women, it appears that Narcissism and especially Psychopathy can increase the wish to be sexually active, while Machiavellianism turns out to be rather counterproductive in these terms, as it inversely predicted sexual motivation. In men, conversely, only Psychopathy seems to be linked to an increased motivation to have sex. These results of the Dark Triad traits being indicative of sexual motivation cohere with previous findings on sexual motivation or sexually motivated behavior. For example, previous work on the subject linked a Dark Triad composite to sexual desire and recreational sexual behavior (Carter et al., 2014), as well as

research that found higher manifestations of the Dark triad traits in individuals that use the dating platform Tinder (Sevi, 2019). Additionally, all Dark Triad traits, but especially Psychopathy, were associated with the use of Tinder for short-term mating rather than finding a romantic relationship in previous research (Sevi, 2019). The present findings can for the most part also be reconciled with another study, in which overall sex drive was positively predicted by Narcissism and especially Psychopathy (Baughman et al., 2014). Contrarily, Machiavellianism, on the other hand, was not able to predict sex drive when the other Dark Triad traits were controlled for.

Inspecting the correlational patterns, only Narcissism and Psychopathy seemed to be positively linked to higher sexual self-esteem, i.e., enjoying one's own sexuality and the sense of pride in how one's sexual desire is being dealt with (Snell, 2011). Looking at the individual traits while keeping the others constant, however, provided additional information. While Narcissism and Psychopathy still positively predicted sexual self-esteem, there appeared to be an inverse relationship to Machiavellianism in women. It seems that while narcissistic and psychopathic individuals appear to be more optimistic about their ability to engage in sexual relations, Machiavellian women seem to be affected in a negative way. For women high in Machiavellianism, sexuality therefore apparently does not only not lead to a satisfying experience, but it also seems to be somewhat detrimental to it. It appears noteworthy that this effect – which is small in size – was also evident in the male sample, yet it did not reach statistical significance at the .05 level, which could maybe be attributed to the comparatively small subsample size.

Sexual assertiveness primarily describes the confidence to express sexual desires (Snell, 2011), and was positively associated with Narcissism and Psychopathy in men and women. Inspecting the unique predictive contributions of the Dark Triad traits, assertiveness in the sexual context was again positively predicted by Narcissism and Psychopathy in men and women, while it was negatively predicted by Machiavellianism in women. It thus appears that narcissistic and psychopathic individuals tend to be assertive regarding their sexual lives, and do not shy away from telling their respective sexual partners what they want. The same does not appear to be the case for women with pronounced Machiavellianism, which could potentially lead to more negative emotions. This assumption can be considered in more detail when negative emotions – like anxiety or fear – are considered below. Interestingly, the predictive pattern of the dark traits on sexual assertiveness obtained here is identical to the correlational pattern between the Dark Triad traits and assertiveness (as a facet of emotional intelligence) in another study (Petrides et al., 2011). Based on this convergence, it could be

speculated that the assertiveness associated with narcissists and psychopaths also spills over into their respective sex lives, while the same holds for Machiavellians – only in a negative way. It should be noted, however, that only the effect regarding Narcissism reached statistical significance in the previously mentioned study – though the identical directions of the effects are interesting in their own right.

Worrying about the sexual aspects of one's life, meaning sexual anxiety (Snell, 2011), was characterized by an inverse relationship with Narcissism in men, as well as a positive association with Machiavellianism in women. However, controlling for the shared variance between the dark traits, additional relationships were uncovered. Narcissism in men and women, as well as Psychopathy in women negatively predicted sexual anxiety with small to negligible effects, as did Psychopathy in men, yet that association was not statistically significant. Conversely, Machiavellianism in men and women positively predicted sexual anxiety. Similarly, sexual fear (i.e., a fear of being sexually active; Snell, 2011) was associated with lower Narcissism and Psychopathy in men and women, while being simultaneously related to higher Machiavellianism in women. Inspecting unique contributions of the Dark Triad traits, the small negative associations between sexual fear and Psychopathy persisted for both men and women, while the ones with Narcissism were limited to the female subsample, likely due to insufficient power in the male subsample. The negative link between these negative emotions and Psychopathy could be expected, as low levels of fear and anxiety have been part of conceptualizations of the Psychopathy construct from the beginning (Lilienfeld & Andrews, 1996; McDonald et al., 2012). Additionally, Machiavellianism predicted higher sexual fear in men and women, exhibiting small effect sizes. The associations regarding Machiavellianism are of little surprise, considering the already mentioned findings regarding the negative relations between Machiavellianism and sexual self-esteem and assertiveness. It thus appears that while narcissistic and psychopathic individuals do not appear to feel fearful or anxious when it comes to contemplating about their sexual lives or engaging in sexual activities, Machiavellian individuals tend to be left with negative feelings regarding their sex lives.

When inspecting correlational patterns, Narcissism as well as Psychopathy were associated with a greater number of lifetime sexual partners in men and women, while Machiavellianism did not show such associations. However, when controlling for the shared variance between the dark traits, only Psychopathy in men and women positively predicted the number of sex partners. Interestingly, the positive effect of Narcissism in men turned to a negative one when the other Dark Triad traits were held constant. This finding is partly in line

with recent research in which Psychopathy predicted a greater number of sexual partners (Borráz-León & Rantala, 2021), while in the same study the number of partners was additionally positively predicted by Narcissism, which was not the case in the present study. Especially the link between Narcissism and lesser number of sexual partners – when inspected in isolation from the other Dark triad members – could be considered as surprising, as it previously exhibited medium correlations with sociosexuality (Sevi, 2019), and as narcissists tend to be judged as being more appealing than their psychopathic and Machiavellian counterparts (Rauthmann & Kolar, 2013). Contrarily, however, there has also been evidence in the available literature that the leadership, as well as grandiosity facets of Narcissism are related to a slow life strategy (McDonald et al., 2012), which are consistent with the present findings.

Interestingly, while most of the effects of the Dark Triad traits on components of sexual self-concept were predominantly small in size, the effects of these traits on the generalized satisfaction with sexual life were almost exclusively negligible based on their respective effect sizes. Accounting for the shared variance between the traits, the effect sizes became somewhat clearer. For men, Narcissism and Psychopathy appeared to be an enhancing factor to their quality of sexual life, though not to a statistically significant degree. Conversely, Machiavellianism appeared to reduce the subjective satisfaction with sexual life, also by a small, yet not statistically significant effect. As effect sizes of similar magnitude generally reached significance in the female sample, this circumstance is probably attributable to deficient power in the male subsample caused by the smaller sample size of men in the present study. For women, Psychopathy positively predicted satisfaction, while satisfaction was simultaneously negatively predicted by Machiavellianism. Being high on Narcissism, however, did not appear to have any impact on generalized sexual satisfaction for women.

Two groups of dark traits with differing outcomes regarding their quality of sexual life could be differentiated in the present study. The following categorization directly mirrors the one obtained by Pilch and Smolorz (2019), thereby hinting at a relatively stable and conceptually replicable categorization when the relationships between Dark Triad traits and quality of sexual life is observed. Individuals higher in Narcissism and Psychopathy, constituting the first group, were associated with higher sexual preoccupation, higher motivation to be sexually active, higher sexual self-esteem and assertiveness, and, in turn, less negative emotions regarding their respective sexual lives, that is lower levels of sexual anxiety and fear. Additionally, Psychopathy – but not Narcissism – predicted a higher number of lifetime sexual partners and greater generalized satisfaction with sexual life in the overall

sample. These individuals, especially those high in Psychopathy, seem to derive more pleasure from their sexual activity and sexuality, hinting at a tendentially higher sexual functioning and more positive quality of sexual life. Based on prior research that linked sexual satisfaction to life satisfaction (e.g., Schmiedeberg et al., 2017; Stephenson & Meston, 2015), one could assume that the positive sexual outcomes associated with Narcissism and Psychopathy are also evident when subjective well-being or life satisfaction are examined more generally. Indeed, the findings obtained here are consistent with extant works that link Narcissism to life satisfaction, positive affect, self-esteem, and subjective well-being, whereas this association of ideas does not seem to be true for the Psychopathy construct (Aghababaei & Błachnio, 2015; Womick et al., 2019). Remarkably, Machiavellianism, however, inverted almost all the effects mentioned above when unique contributions of the Dark Triad traits were analyzed. With a negligible association to sexual preoccupation as well as motivation, individuals scoring high on Machiavellianism exhibited significantly more negative emotions regarding their sex lives, namely higher sexual anxiety and fear, while simultaneously showing significantly less sexual self-esteem and anxiety, as well as a lower satisfaction with sexual life. Prior research already demonstrated various associations to negative outcome variables for individuals scoring high on Machiavellianism, with negative relationships to subjective well-being and meaning in life (Womick et al., 2019), lower relationship satisfaction (Brewer & Abell, 2017), and having sex for reasons related to insecurity (Brewer & Abell, 2015). The present study is consistent with these findings, and thereby contributes to the growing catalogue of negative outcomes, especially those regarding sexuality, for individuals with pronounced Machiavellianism.

Factorial Structure of the Dark Personality

The second aim of the current study was to assess the empirical compatibility of various conceptualizations of the dark personality with data obtained from a sizable community-based German-speaking sample. Overall, none of the tested models achieved a satisfactory degree of adequacy in themselves, based on the widely used fit indices found in the current literature (see for example Brown, 2015; Kline, 2016).

Interestingly, the conceptualization corresponding best to the data at hand differed in dependence of the fit measure considered. It so happens that when SRMR and CFI values are focused on, one may prefer the models featuring a Dark Core, either by itself (Model 2) or being composed by Primary Psychopathy (Model 3). However, using RMSEA values alone shifted the plausibility in favor of the models conceptualizing the Dark Triad as three

overlapping, yet distinct factors, as represented either by the three traits loading onto one superordinate factor (i.e., the Dark Triad Factor; Model 1) or three intercorrelating, yet separate factors (Exploratory Model). The latter two models again were not numerically differentiable. Therefore, declaring a higher-order Dark Triad factor, as opposed to freely correlating factors, seems to solely reflect a theoretical decision with no empirical implications. On a broader perspective, however, these conflicting findings are indeed consistent with previous work on the subject, as prior attempts to explore the factorial structure of the Dark Triad – as well as the Dark Core – yielded varying results. That circumstance is rendered even more complicated when one considers that several measurement instruments are now available which seem to produce varying factor counts. For example, in recent research a three-dimensional conceptualization was compared to a bifactor model (including the Dark Core), using standard measures of the Dark Triad as well as the substantially shorter Dirty Dozen and Short Dark Triad scale (Volmer et al., 2019). While the three-dimensional model was characterized by acceptable fit measures, the bifactor model outperformed the previous one, hinting strongly at a common underlying core underneath the Dark Triad traits. Employing the Dirty Dozen, a three-factor solution has been previously proposed, reflecting the classic conceptualization of the Dark Triad as three overlapping, yet distinct constructs, as originally proposed by Paulhus and Williams (Jonason & Webster, 2010). Conversely, using the most widely used measures in assessing the Dark Triad (i.e., NPI-15, MACH-IV, and SRP-III), Bertl et al. (2017) found evidence in favor of a single Dark Core as opposed to a hierarchical Dark Triad model, when comparing various models reflecting the dark personality. Moreover, the SRP-III subscales callousness and manipulation were able to account for 66% of the variance of the Dark Core. When callousness and manipulation were placed at the center of the Dark Triad in the present study, these facets of Psychopathy were able to account for 81% of the variance in the Dark Core, a finding consistent with previous research on Primary Psychopathy as the constituting trait of the Dark Core (Bertl et al., 2017; Jones & Figueredo, 2013). This result appears plausible when inspected from a theoretical perspective. Interpersonal manipulation seems to conform to the conceptual idea of a common aversive core inherent in dark personality features, as it can be conceptually described as the opposite of Honesty-Humility (Jones & Figueredo, 2013), which had already been shown to account for considerable variation within the Dark Triad (Lee & Ashton, 2005). However, as was already pointed out in prior research, it lacks callousness, which can be conceived as a lack of empathy (Jones & Figueredo, 2013). When combined, both – callousness as well as manipulation – appeared to be sufficiently descriptive

of a malevolent personality (Jones & Figueredo, 2013), thereby underscoring the relative explanatory relevance of (Primary) Psychopathy when relationships between the Dark Triad and variables of interest are studied (Muris et al., 2017). When grandiosity as measured by the NPI-15 was added as a regressive factor in the structural equation models, thereby modelling Antagonism as the core of the dark personality, 98% of the variance could be accounted for. However, this went hand in hand with a substantial decrease in model fit, based on which the models involving Antagonism were altogether discarded, because they lacked a plausible fit to the data. Yet this finding does not necessarily eliminate Antagonism as a potential candidate of added value in explaining the contents of the Dark Core, as the way of measurement utilized in this study was imperfect and purely exploratory by declaring various facets of instruments used for assessing different constructs as indicators for an altogether different construct, and thereby possibly overly simplifying matters. Removing the grandiosity facet from the measurement model and declaring it a regressive factor increased the economic aspects of the study by omitting an additional measurement instrument. However, that could have led to an inadequate representation of the dark personality network. If Antagonism is to be studied in context with the Dark Core of personality, future research should therefore employ instruments especially dedicated to capturing this trait. One such possibility presents itself in the form of the Antagonism subscale from the Personality Inventory for DSM-5 (PID-5; American Psychiatric Association, 2013).

A pressing problem in uncovering the underlying factor structure of the dark personality traits is brought upon by the conceivably inept measures used in assessing them. One of the issues in the overlap between Dark Triad traits is the existence of rather redundant content among their respective instruments. In line with this claim, several crossloadings were observed when modification indices for the models on item-level were inspected in the present study. It could be argued, however, that these redundancies should be expected, as the constructs are, by definition, linked by their “dark” and “aversive” qualities. Yet this argument should not hide obvious theoretical and methodological shortcomings, especially regarding the relationship between Psychopathy and Machiavellianism (e.g., see Glenn & Sellbom, 2015; Miller et al., 2019). As the statistical models used in the present study rely heavily on the quality of the measures used, sound instruments of the constructs in question can and should be considered a prerequisite of valid findings. However, evidence is mounting hinting at some limitations in the instruments themselves. In addition to and complementing the concerns already mentioned, in recent works on Machiavellianism it was noted that the extant measures of the construct do indeed not reflect the Machiavellianism construct itself,

but rather a form of Psychopathy (Miller et al., 2019; Vize et al., 2018). This is in line with research that detected discrepancies between typical assessments of Machiavellianism and theoretical descriptions, which should in fact have formed the basis for these instruments (Miller et al., 2017).

The present study also investigated the possibility of an extension of the Dark Triad framework into a Dark Tetrad by the addition of Sadism, as proposed by Chabrol et al. (2009). However, testing if the inclusion of Sadism would improve the explanatory value of models of the Dark Core of personality, previous research suggested the opposite, elaborating that while it may be reasonable to include Sadism based on conceptual considerations, that inclusion did not increase incremental validity (Bertl et al., 2017). The results of the present study support that view. The models including Sadism exhibited an overall worse fit than the models without it, thereby rendering the conceptualization of a Dark Tetrad rather unwarranted. However much sense the inclusion of Sadism offers from a theoretical perspective, it thus does not appear to be justified from an empirical standpoint based on the available data.

To summarize the findings above, the different conceptualizations of the factorial structure of the dark personality did not yield satisfactory and thereby conclusive results. The present findings underline the fact that the factorial structure of dark personalities is still not yet established to a suitable degree, which should serve as an incentive to further explore the empirical validity of theoretical conceptualizations of the Dark Triad, Dark Tetrad, and the Dark Core of personality.

Limitations

Because the study was conducted on a convenience sample, the usual limitations of such a sampling plan also apply to the analyses conducted here, which could have led to biased results, as non-probability samples are known to be potentially vulnerable to various hidden biases, which – along with their probabilities – cannot be quantified by the researcher (Leiner, 2014). However, the recruited sample in the present study was relatively large and, in contrast to numerous previous studies regarding the Dark Triad, was not exclusively based on psychology students or students in general, which could to a certain degree compensate for these limitations. Furthermore, the subsamples of men and women differed substantially in size. However, to compensate for that circumstance, various modifications were made, like the utilization of Hedges' *g* as an indicator of sex differences, or separate analyses of the previously stated subsamples.

Additionally, three limitations regard the use of self-report measures. Firstly, in spite of the fact that an overwhelming portion of the extant research regarding the Dark Triad, Dark Tetrad, or the Dark Core of personality rely heavily on self-report, the accompanying use of alternative measures, like for example informant ratings, should be encouraged in addition to the traditionally used self-reports. Secondly, another main issue with the use of self-report in assessing the dark triad is socially desirable response patterns in answering questions regarding aversive traits and the concomitant skewness of the distributions of questionnaire responses. To compensate for that, statistical analyses were adapted accordingly, like the use of Spearman's ρ for correlational analyses as well as the use of robust parameter estimators in the computation of the structural equation models, which can compensate for distributional deviations from normality. Thirdly, the quality of the measures used in this study is disputed. The debate about the dimensionality of the widely used measures of the Dark Triad, for example, has already been mentioned in the introduction.

Lastly, a specific limitation regarding the structural equation models computed for this study should be noted. The use of item parceling, although associated with certain benefits, could also lead to severe problems like biased parameter estimates or misspecification, especially in multidimensional scales (Matsunaga, 2008). Consequently, future research should additionally compute the models utilized here on an item-level basis.

Conclusion

The present study provided insights into the way individuals high in Dark Triad traits differ regarding their sexual self-concept and quality of sexual life. While those high in Psychopathy and Narcissism tend to enjoy more positive sexuality-related outcomes, individuals high in Machiavellianism appear to be afflicted with more pronounced negative experiences related to the sexual sphere of their lives. The present results demonstrate that the effects originally obtained by Pilch and Smolorz (2019) are well replicable in a large, community-based, German-speaking sample and therefore hint at stable and reproducible effects of Dark Triad traits on the quality of sexual life.

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Appendix A

Abstracts in English and German

Abstract (English)

The present study investigated the quality of sexual life as well as aspects of sexual self-concept and their association to Dark Triad traits by conceptually replicating a recent study on the subject matter. Furthermore, the present study also examined the factorial structure of the Dark Triad and Dark Tetrad by comparing different conceptualizations utilizing structural equation modeling. Therefore, a large, community-based, German-speaking sample completed online self-report measures of the Dark Triad, Sadism, and sexual self-concept ($N = 1033$, 69% women, mean age = 27.9 years). For the replicatory analyses only, 137 individuals had to be excluded based on criteria stated prior to the collection of data. Results of the replicatory analyses allowed a distinction of two groups of dark traits. The first one, being comprised of Narcissism and Psychopathy, positively predicted variables indicating a higher quality of their sexual experience, while they simultaneously inversely predicted variables indicating a lower quality of sexual life. In turn, individuals higher in Machiavellianism exhibited the opposite associations, thereby hinting at a lower quality of their sexual experience. However, all Dark Triad traits, especially Narcissism and Psychopathy, seem to predispose individuals scoring high on them to think excessively about their sex lives. Regarding the factorial structure of dark personality traits, the best fitting models hinted at either a hierarchical Dark Triad model or a single latent Dark Core of personality, whose variance was to a large extent accounted for by the Primary Psychopathy facets callousness and manipulation. Extending the Dark Triad into a Dark Tetrad by adding Sadism did not increase the explanatory value of the computed models. However, as none of the models exhibited an adequate fit, being indicated by fit measures recommended in the contemporary literature, a sufficiently conclusive solution could not be obtained. The present findings suggest that previously observed effects of the Dark Triad traits on various variables regarding the quality of one's sexual life can be considered stable and replicable across samples.

Keywords: Dark Triad, Dark Tetrad, Narcissism, Machiavellianism, Psychopathy, Sadism, Quality of sexual life, Sexual self-concept, Structural equation modelling.

Abstract (German)

Die vorliegende Studie untersuchte die Qualität des Sexuallebens sowie Aspekte des sexuellen Selbstkonzepts und deren Zusammenhang mit Merkmalen der Dunklen Triade, indem sie eine Studie zu diesem Thema konzeptionell replizierte. Darüber hinaus wurde in der vorliegenden Studie auch die faktorielle Struktur der Dunklen Triade und der Dunklen Tetrade untersucht, indem verschiedene Konzeptualisierungen mittels Strukturgleichungsmodellierung verglichen wurden. Zu diesem Zweck füllte eine große, deutschsprachige Stichprobe Online-Fragebögen zur Dunklen Triade, Sadismus und zum sexuellen Selbstkonzept aus ($N = 1033$, 69% Frauen, Durchschnittsalter = 27,9 Jahre). Nur für die Replikationsanalysen mussten 137 Personen aufgrund von präregistrierten Kriterien ausgeschlossen werden. Die Ergebnisse der Replikationsanalysen erlaubten eine Unterscheidung von zwei Gruppen von Dark Triad Traits. Die erste Gruppe, bestehend aus Narzissmus und Psychopathie, sagte Variablen positiv voraus, die eine höhere Qualität ihres sexuellen Erlebens anzeigten, während sie gleichzeitig Variablen negativ voraussagten, die eine niedrigere Qualität des Sexuallebens anzeigten. Im Gegenzug wiesen Individuen mit höherem Machiavellismus die gegenteiligen Assoziationen auf, was auf eine geringere Qualität ihrer sexuellen Erfahrung hindeutet. Allerdings scheinen alle Merkmale der Dunklen Triade, insbesondere Narzissmus und Psychopathie, Personen mit hohen Werten dazu zu prädisponieren, übermäßig über ihr Sexualleben nachzudenken. Hinsichtlich der faktoriellen Struktur der dunklen Persönlichkeitsmerkmale deuteten die am besten passenden Modelle entweder auf ein hierarchisches Modell der Dunklen Triade oder einen einzelnen latenten dunklen Kern der Persönlichkeit hin, dessen Varianz zu einem großen Teil durch die primären Psychopathie-Facetten Kaltherzigkeit und Manipulation erklärt wurde. Das Erweitern der Dunklen Triade zu einer Dunklen Tetrade durch Hinzufügen von Sadismus erhöhte den Erklärungswert der berechneten Modelle nicht. Da jedoch keines der Modelle einen adäquaten Fit aufwies, der durch die in der kontemporären Literatur empfohlenen Fit-Indizes angezeigt wird, konnte keine ausreichend eindeutige Lösung erzielt werden. Die vorliegenden Ergebnisse deuten darauf hin, dass die zuvor beobachteten Effekte der Merkmale der Dunklen Triade auf verschiedene Variablen bezüglich der Qualität des Sexuallebens als stabil und stichprobenübergreifend replizierbar angesehen werden können.

Schlüsselwörter: Dunkle Triade, Dunkle Tetrade, Narzissmus, Machiavellismus, Psychopathie, Sadismus, Qualität des Sexuallebens, Sexuelles Selbstkonzept, Strukturgleichungsmodellierung.

Appendix B*Detailed description of samples used in the present study***Table B1***Sample characteristics*

Variable	Sample			
	General / SEM sample		Replication sample	
	Frequency	Proportion	Frequency	Proportion
Gender				
Male	314	30.4	251	28.0
Female	709	68.6	645	72.0
Diverse	10	< 1.0	0	0
Not specified	0	0	0	0
Nationality				
Austrian	488	47.2	426	47.5
German	493	47.7	428	47.8
Other	52	5.0	42	4.7
Not specified	0	0	0	0
Educational level				
Compulsory school	18	1.7	16	1.8
Apprenticeship	28	2.7	25	2.8
Master apprenticeship	5	< 1.0	5	< 1.0
Vocational middle school	10	< 1.0	10	1.1
University entrance qualification	417	40.4	354	39.5
Bachelor's degree or equivalent	317	30.7	279	31.1
Master's degree or equivalent	211	20.4	187	20.9
PhD	20	1.9	15	1.7
Other	7	< 1.0	5	< 1.0
Not specified	0	0	0	0
Sexuality				
Heterosexual	813	78.7	763	85.2
Homosexual	65	6.3	0	0
Bisexual	128	12.4	119	13.3
Asexual	5	< 1.0	0	0
Other	20	1.9	14	1.6
Not specified	2	< 1.0	0	0

Note. $N_{general} = 1033$. $N_{replication} = 896$.

Appendix C

*Correlations between study variables in the replication sample***Table C1***Spearman correlations between study variables in the replication sample*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Narcissism										
(2) Machiavellianism	.204***									
(3) Psychopathy	.437***	.321***								
(4) Sexual preoccupation	.244***	.138***	.311***							
(5) Sexual motivation	.204***	.065	.265***	.611***						
(6) Sexual self-esteem	.165***	-.049	.133***	.277***	.503***					
(7) Sexual assertiveness	.201***	-.042	.196***	.262***	.434***	.719***				
(8) Sexual anxiety	-.075*	.115***	-.040	-.029	-.231***	-.531***	-.541***			
(9) Sexual fear	-.136***	.098**	-.134***	-.178***	-.410***	-.514***	-.530***	.564***		
(10) Number of partners	.155***	.022	.299***	.171***	.180***	.194***	.254***	-.205***	-.284***	
(11) Satisfaction with sexual life	.022	-.095**	.047	.050	.298***	.570***	.449***	-.578***	-.402***	.076*

Note. * $p \leq .05$. ** $p \leq .01$. *** $p < .001$.

Appendix D

Detailed results from regressions models

Table D1
Regression results obtained by predicting sexual preoccupation from Machiavellianism, Narcissism, and Psychopathy

Variable	Sexual preoccupation								
	Men			Women			Overall		
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]
Constant	1.15 [0.21; 2.09]	0.48		.017	0.00 [-0.47; 0.48]	0.24		.984	-0.02 [-0.44; 0.40]
Machiavellianism	0.11 [-0.12; 0.33]	0.12	0.06	.349	0.13 [0.00; 0.25]	0.06	0.08	.049	0.11 [0.00; 0.23]
Narcissism	-0.03 [-0.31; 0.24]	0.14	-0.02	.814	0.24 [0.11; 0.38]	0.07	0.14	<.001	0.22 [0.09; 0.34]
Psychopathy	0.47 [0.18; 0.76]	0.15	0.22	.002	0.41 [0.23; 0.59]	0.09	0.19	<.001	0.52 [0.37; 0.67]
<i>F(df), p</i>	5.01 (3, 245), .002				23.31 (3, 638), <.001				39.66 (3, 887), <.001
<i>R² (R²_{adjusted})</i>	.06 (.05)				.10 (.09)				.118 (.115)

Table D2
Regression results obtained by predicting sexual motivation from Machiavellianism, Narcissism, and Psychopathy

Variable	Sexual motivation												
	Men					Women					Overall		
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	
Constant	2.21 [1.40; 3.02]	0.41		< .001	2.28 [1.75; 2.82]	0.27		< .001	2.13 [1.70; 2.56]	0.22		< .001	
Machiavellianism	0.08 [-0.11; 0.28]	0.10	0.06	.394	-0.17 [-0.31; -0.02]	0.07	-0.09	.022	-0.09 [-0.20; 0.03]	0.06	-0.05	.131	
Narcissism	0.11 [-0.12; 0.35]	0.12	0.07	.336	0.19 [0.04; 0.34]	0.08	0.10	.014	0.20 [0.07; 0.32]	0.06	0.11	.003	
Psychopathy	0.35 [0.10; 0.60]	0.13	0.19	.006	0.49 [0.28; 0.69]	0.10	0.21	< .001	0.47 [0.31; 0.62]	0.08	0.22	< .001	
<i>F(df), p</i>	5.49 (3, 244), .001					14.04 (3, 638), < .001					23.57 (3, 886), < .001		
<i>R</i> ² (<i>R</i> ² _{adjusted})	0.06 (0.05)					0.06 (0.06)					0.07 (0.07)		

Table D3
Regression results obtained by predicting sexual self-esteem from Machiavellianism, Narcissism, and Psychopathy

Variable	Sexual self-esteem									
	Men					Women				
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>
Constant	1.45 [0.59; 2.31]	0.44		.001	2.65 [2.11; 3.18]	0.27		< .001	2.54 [2.10; 2.98]	0.22
Machiavellianism	- 0.17 [-0.38; 0.04]	0.11	- 0.10	.107	- 0.22 [-0.36; -0.08]	0.07	- 0.13	.002	- 0.21 [-0.32; -0.09]	0.06
Narcissism	0.34 [0.09; 0.59]	0.13	0.18	.008	0.27 [0.12; 0.42]	0.08	0.15	< .001	0.25 [0.12; 0.38]	0.07
Psychopathy	0.48 [0.21; 0.75]	0.14	0.24	< .001	0.25 [0.04; 0.45]	0.10	0.11	.017	0.27 [0.11; 0.43]	0.08
<i>F(df), p</i>	10.18 (3, 245), < .001					9.97 (3, 638), < .001				
<i>R</i> ² (<i>R</i> ² _{adjusted})	.11 (.10)					.04 (.04)				
						14.49 (3, 887), < .001				
						.05 (.04)				

Table D4*Regression results obtained by predicting sexual assertiveness from Machiavellianism, Narcissism, and Psychopathy*

Variable	Sexual assertiveness									
	Men			Women			Overall			<i>p</i>
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	
Constant	1.61 [0.78; 2.44]	0.42		< .001	2.13 [1.61; 2.66]	0.27		< .001	2.17 [1.74; 2.60]	< .001
Machiavellianism	-0.16 [-0.36; 0.04]	0.10	-0.10	.128	-0.24 [-0.38; -0.10]	0.07	-0.14	< .001	-0.22 [-0.33; -0.10]	< .001
Narcissism	0.30 [0.06; 0.54]	0.12	0.17	.014	0.30 [0.15; 0.45]	0.08	0.16	< .001	0.27 [0.15; 0.40]	< .001
Psychopathy	0.43 [0.17; 0.68]	0.13	0.22	.001	0.43 [0.22; 0.63]	0.10	0.18	< .001	0.37 [0.22; 0.53]	< .001
<i>F(df), p</i>	8.81 (3, 243), < .001				17.47 (3, 638), < .001				22.55 (3, 885), < .001	
<i>R² (R²_{adjusted})</i>	.10 (.09)				.08 (.07)				.07 (.07)	

Table D5
Regression results obtained by predicting sexual anxiety from Machiavellianism, Narcissism, and Psychopathy

Variable	Sexual anxiety									
	Men					Women				
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	Overall
Constant	2.67 [1.78; 3.56]	0.45		< .001	1.89 [1.39; 2.39]	0.25		< .001	1.88 [1.46; 2.30]	0.21 < .001
Machiavellianism	0.22 [0.00; 0.43]	0.11	0.13	.045	0.26 [0.13; 0.39]	0.07	0.16	< .001	0.25 [0.13; 0.36]	0.06 0.15 < .001
Narcissism	-0.30 [-0.56; 0.04]	0.13	-0.16	.024	-0.15 [-0.29; -0.01]	0.07	-0.09	.042	-0.16 [-0.28; -0.03]	0.06 -0.09 .015
Psychopathy	-0.18 [-0.46; 0.10]	0.14	-0.09	.204	-0.21 [-0.40; -0.02]	0.10	-0.10	.028	-0.14 [-0.30; -0.01]	0.08 -0.07 .070
<i>F(df)</i>	3.82 (3, 244), .011					7.57 (3, 638), < .001				
<i>R</i> ² (<i>R</i> ² _{adjusted})	.04 (.03)					.03 (.03)				
						8.636 (3, 886), < .001				
						.03 (.03)				

Table D6
Regression results obtained by predicting sexual fear from Machiavellianism, Narcissism, and Psychopathy

Variable	Sexual fear									
	Men					Women				
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>
Constant	2.92 [2.10; 3.74]	0.42		< .001	2.18 [1.70; 2.66]	0.25		< .001	2.31 [1.91; 2.71]	0.20
Machiavellianism	0.20 [0.00; 0.39]	0.10	0.13	.053	0.29 [0.16; 0.42]	0.06	0.18	< .001	0.26 [0.15; 0.37]	0.05
Narcissism	- 0.22 [-0.46; 0.02]	0.12	- 0.13	.068	- 0.19 [-0.33; -0.05]	0.07	- 0.11	.008	- 0.18 [-0.30; -0.06]	0.06
Psychopathy	- 0.37 [-0.63; -0.12]	0.13	- 0.20	.004	- 0.27 [-0.45; -0.08]	0.09	- 0.12	.005	- 0.28 [-0.42; -0.13]	0.07
<i>F(df)</i>	6.123 (3, 244), < .001					11.09 (3, 637), < .001				
<i>R² (R² adjusted)</i>	.07 (.06)					.05 (.05)				
						15.75 (3, 885), < .001				
						.05 (.05)				

Table D7*Regression results obtained by predicting number of lifetime sexual partners from Machiavellianism, Narcissism, and Psychopathy*

Variable	Number of lifetime sexual partners									
	Men					Women				
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>
Constant	-15.88 [-53.70; 21.95]	19.20		.409	-3.30 [-9.73; 3.12]	3.27		.313	-10.71 [-21.86; 0.44]	5.68
Machiavellianism	0.76 [-8.36; 9.89]	4.63	0.01	.869	-1.62 [-3.32; 0.08]	0.86	-0.08	.062	-1.45 [-4.42; 1.53]	1.51
Narcissism	-13.68 [-24.66; -2.70]	5.57	-0.17	.015	1.40 [-0.44; 3.24]	0.94	0.06	.137	-2.50 [-5.79; 0.79]	1.68
Psychopathy	29.22 [17.48; 40.97]	5.96	0.33	<.001	6.54 [4.07; 9.00]	1.25	0.23	<.001	15.15 [11.09; 19.21]	2.07
<i>F(df)</i>	8.57 (3, 245), <.001					13.56 (3, 638), <.001				
<i>R</i> ² (<i>R</i> ² <i>adjusted</i>)	.09 (.08)					.06 (.06)				
						19.47 (3, 887), <.001				
						.04 (.03)				

Table D8*Regression results obtained by predicting sexual satisfaction from Machiavellianism, Narcissism, and Psychopathy*

Variable	Sexual satisfaction									
	Men					Women				
	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i>	β	<i>p</i>	<i>B</i> [95% CI]	<i>SE B</i> β <i>p</i>
Constant	4.91 [2.59; 7.25]	1.18		< .001	7.17 [5.90; 8.44]	0.65		< .001	7.16 [6.07; 8.25]	0.56 < .001
Machiavellianism	-0.56 [-1.12; 0.01]	0.29	-0.13	.053	-0.54 [-0.88; -0.21]	0.17	-0.13	.002	-0.54 [-0.83; -0.25]	0.15 -0.13 < .001
Narcissism	0.50 [-0.18; 1.17]	0.34	0.10	.150	0.03 [-0.33; 0.39]	0.19	0.01	.871	0.06 [-0.26; 0.38]	0.16 0.01 .701
Psychopathy	0.68 [-0.04; 1.40]	0.37	0.13	.065	0.62 [0.13; 1.11]	0.25	0.11	.013	0.48 [0.09; 0.88]	0.20 0.09 .017
<i>F(df), p</i>	3.25 (3, 245), .023					4.17 (3, 626), .006				
<i>R</i> ² (<i>R</i> ² _{adjusted})	.04 (.03)					.02 (.02)				
						5.34 (3, 887), .001				
						.02 (.01)				

Appendix E*R-Code*

```
#####  
### load required packages #####  
#####  
  
library(car)  
library(tidyverse)  
library(psych)  
library(corr)  
library(Hmisc)  
library(effsize)  
library(QuantPsyc)  
library(lindia)  
library(lavaan)  
library(semPlot)  
  
#####  
### recode missing #####  
#####  
  
# recode -9 to NA  
ds[ds == -9] <- NA  
  
#####  
### recode inverse items #####  
#####  
  
### NPI ###  
ds$np_i_lead01.r = car::recode(ds$np_i_lead01, '1=5; 2=4; 3=3; 4=2; 5=1')  
ds$np_i_lead05.r = car::recode(ds$np_i_lead05, '1=5; 2=4; 3=3; 4=2; 5=1')  
ds$np_i_lead06.r = car::recode(ds$np_i_lead06, '1=5; 2=4; 3=3; 4=2; 5=1')  
ds$np_i_grand03.r = car::recode(ds$np_i_grand03, '1=5; 2=4; 3=3; 4=2; 5=1')
```

```
ds$np_i_lead07.r = car::recode(ds$np_i_lead07, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$np_i_lead09.r = car::recode(ds$np_i_lead09, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$np_i_lead10.r = car::recode(ds$np_i_lead10, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$np_i_grand04.r = car::recode(ds$np_i_grand04, '1=5; 2=4; 3=3; 4=2; 5=1')
```

SRP

```
ds$srp_c01.r = car::recode(ds$srp_c01, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$srp_c04.r = car::recode(ds$srp_c04, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$srp_m05.r = car::recode(ds$srp_m05, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$srp_m06.r = car::recode(ds$srp_m06, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$srp_m07.r = car::recode(ds$srp_m07, '1=5; 2=4; 3=3; 4=2; 5=1')
```

MACH

```
ds$mach_t03.r = car::recode(ds$mach_t03, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_t04.r = car::recode(ds$mach_t04, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_t05.r = car::recode(ds$mach_t05, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_t06.r = car::recode(ds$mach_t06, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_t09.r = car::recode(ds$mach_t09, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_v01.r = car::recode(ds$mach_v01, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_v04.r = car::recode(ds$mach_v04, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_v06.r = car::recode(ds$mach_v06, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_v07.r = car::recode(ds$mach_v07, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
ds$mach_m01.r = car::recode(ds$mach_m01, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
```

SSIS

```
ds$ssis08.r = car::recode(ds$ssis08, '1=6; 2=5; 3=4; 4=3; 5=2; 6=1')
```

ASP

```
ds$asp09.r = car::recode(ds$asp09, '1=5; 2=4; 3=3; 4=2; 5=1')
```

MSSCQ

```
ds$msscq_ass02.r = car::recode(ds$msscq_ass02, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$msscq_ass03.r = car::recode(ds$msscq_ass03, '1=5; 2=4; 3=3; 4=2; 5=1')
ds$msscq_fear04.r = car::recode(ds$msscq_fear04, '1=5; 2=4; 3=3; 4=2; 5=1')
```

```
ds$msscq_fear05.r = car::recode(ds$msscq_fear05, '1=5; 2=4; 3=3; 4=2; 5=1')
```

```
#####  
### create scores #####  
#####
```

```
##### NPI #####
```

```
# total score
```

```
ds$npi.total <- apply(cbind(ds$npi_lead01.r, ds$npi_lead02, ds$npi_lead03, ds$npi_lead04,  
ds$npi_lead05.r, ds$npi_lead06.r, ds$npi_lead07.r, ds$npi_lead08, ds$npi_lead09.r,  
ds$npi_lead10,  
ds$npi_grand01, ds$npi_grand02, ds$npi_grand03.r, ds$npi_grand04.r,  
ds$npi_grand05),  
1, mean)
```

```
# Leadership score
```

```
ds$npi.lead <- apply(cbind(ds$npi_lead01.r, ds$npi_lead02, ds$npi_lead03, ds$npi_lead04,  
ds$npi_lead05.r, ds$npi_lead06.r, ds$npi_lead07.r, ds$npi_lead08, ds$npi_lead09.r,  
ds$npi_lead10),  
1, mean)
```

```
# Grandiosity score
```

```
ds$npi.grand <- apply(cbind(ds$npi_grand01, ds$npi_grand02, ds$npi_grand03.r,  
ds$npi_grand04.r, ds$npi_grand05),  
1, mean)
```

```
##### MACH #####
```

```
# MACH total score
```

```
ds$mach.total <- apply(cbind(ds$mach_t01, ds$mach_t02, ds$mach_t03.r, ds$mach_t04.r,  
ds$mach_t05.r, ds$mach_t06.r, ds$mach_t07, ds$mach_t08, ds$mach_t09.r,  
ds$mach_v01.r, ds$mach_v02, ds$mach_v03, ds$mach_v04.r,  
ds$mach_v05, ds$mach_v06.r, ds$mach_v07.r, ds$mach_v08, ds$mach_v09,  
ds$mach_m01.r, ds$mach_m02),  
1, mean)
```

```
# Tactics score
```

```

ds$mach.tactics <- apply(cbind(ds$mach_t01, ds$mach_t02, ds$mach_t03.r, ds$mach_t04.r,
ds$mach_t05.r, ds$mach_t06.r, ds$mach_t07, ds$mach_t08, ds$mach_t09.r),
                        1, mean)

# Views score
ds$mach.views <- apply(cbind(ds$mach_v01.r, ds$mach_v02, ds$mach_v03, ds$mach_v04.r,
ds$mach_v05, ds$mach_v06.r, ds$mach_v07.r, ds$mach_v08, ds$mach_v09),
                        1, mean)

# Morality score
ds$mach.morality <- apply(cbind(ds$mach_m01.r, ds$mach_m02),
                           1, mean)

##### SRP #####
# SRP total score

ds$srp.total <- apply(cbind(ds$srp_e01, ds$srp_e02, ds$srp_e03, ds$srp_e04, ds$srp_e05,
ds$srp_e06, ds$srp_e07, ds$srp_e08, ds$srp_e09,
                           ds$srp_m01, ds$srp_m02, ds$srp_m03, ds$srp_m04, ds$srp_m05.r,
ds$srp_m06.r, ds$srp_m07.r,
                           ds$srp_c01.r, ds$srp_c02, ds$srp_c03, ds$srp_c04.r, ds$srp_c05,
                           ds$srp_a01, ds$srp_a02, ds$srp_a03, ds$srp_a04, ds$srp_a05, ds$srp_a06,
ds$srp_a07, ds$srp_a08, ds$srp_a09, ds$srp_a10),
                        1, mean)

# Erratic lifestyle score
ds$srp.erratic <- apply(cbind(ds$srp_e01, ds$srp_e02, ds$srp_e03, ds$srp_e04, ds$srp_e05,
ds$srp_e06, ds$srp_e07, ds$srp_e08, ds$srp_e09),
                        1, mean)

# Interpersonal manipulation score
ds$srp.manipulation <- apply(cbind(ds$srp_m01, ds$srp_m02, ds$srp_m03, ds$srp_m04,
ds$srp_m05.r, ds$srp_m06.r, ds$srp_m07.r),
                             1, mean)

# Callous affect score
ds$srp.callous <- apply(cbind(ds$srp_c01.r, ds$srp_c02, ds$srp_c03, ds$srp_c04.r,
ds$srp_c05),
                        1, mean)

```

```
# Antisocial behaviour score
```

```
ds$srp.antisocial <- apply(cbind(ds$srp_a01, ds$srp_a02, ds$srp_a03, ds$srp_a04,  
ds$srp_a05, ds$srp_a06, ds$srp_a07, ds$srp_a08, ds$srp_a09, ds$srp_a10),  
1, mean)
```

```
##### SSIS #####
```

```
# SSIS total score
```

```
ds$ssis.total <- apply(cbind(ds$ssis01, ds$ssis02, ds$ssis03, ds$ssis04, ds$ssis05, ds$ssis06,  
ds$ssis07, ds$ssis08.r, ds$ssis09, ds$ssis10),  
1, mean)
```

```
##### ASP #####
```

```
# ASP total score
```

```
ds$asp.total <- apply(cbind(ds$asp01, ds$asp02, ds$asp03, ds$asp04, ds$asp05, ds$asp06,  
ds$asp07, ds$asp08, ds$asp09.r),  
1, mean)
```

```
##### MSSCQ #####
```

```
# Anxiety score
```

```
ds$msscq.anx <- apply(cbind(ds$msscq_anx01, ds$msscq_anx02, ds$msscq_anx03,  
ds$msscq_anx04, ds$msscq_anx05),  
1, mean)
```

```
# Preoccupation score
```

```
ds$msscq.pre <- apply(cbind(ds$msscq_pre01, ds$msscq_pre02, ds$msscq_pre03,  
ds$msscq_pre04, ds$msscq_pre05),  
1, mean)
```

```
# Assertiveness score
```

```
ds$msscq.ass <- apply(cbind(ds$msscq_ass01, ds$msscq_ass02.r, ds$msscq_ass03.r,  
ds$msscq_ass04, ds$msscq_ass05),  
1, mean)
```

```
# Motivation score
```

```
ds$msscq.mot <- apply(cbind(ds$msscq_mot01, ds$msscq_mot02, ds$msscq_mot03,  
ds$msscq_mot04, ds$msscq_mot05),  
1, mean)
```

```

# Self-esteem score
ds$msscq.self <- apply(cbind(ds$msscq_self01, ds$msscq_self02, ds$msscq_self03,
ds$msscq_self04, ds$msscq_self05),
                        1, mean)

# Fear score
ds$msscq.fear <- apply(cbind(ds$msscq_fear01, ds$msscq_fear02, ds$msscq_fear03,
ds$msscq_fear04.r, ds$msscq_fear05.r),
                        1, mean)

#####
### deletion #####
#####

# deletes participants < 18 yrs
df <- dplyr::filter(ds, ds$SD_age >= 18)

#####
### define (sub)samples #####
#####

### Confirmatory analysis ###
# defines the subsamples for confirmatory analysis; excludes other gender, people who define
themselves as homosexual, asexual, or "other sexuality", age < 18, number of sexual partners
= 0
conf.men <- dplyr::filter(df, SD_sex == "männlich",
                          SA03 == "Heterosexuell" | df$SA03 == "Bisexuell" | df$SA03 == "Andere:",
                          df$SA02_01 > 0)
conf.women <- dplyr::filter(df, SD_sex == "weiblich",
                             SA03 == "Heterosexuell" | df$SA03 == "Bisexuell" | df$SA03 == "Andere:",
                             df$SA02_01 > 0)
conf.all <- bind_rows(conf.men, conf.women)

### Exploratory analysis ###
sample.SEM <- df

```

```
#####
### sample descriptives #####
#####
```

```
### general sample (df) ###
summary(df$SD_sex)
psych::describe(df$SD_age)
summary(df$SD_age)
summary(df$SD_country)
summary(df$sd_edu)
summary(df$SA03)
psych::describe(df$SA02_01)
```

```
### confirmatory ###
summary(conf.all$SD_sex)
psych::describe(conf.all$SD_age)
summary(conf.all$SD_age)
summary(conf.all$SD_country)
summary(conf.all$sd_edu)
summary(conf.all$SA03)
psych::describe(conf.all$SA02_01)
```

```
### descriptives for regression ###
# total
psych::describe(conf.all$mach.total)
psych::describe(conf.all$npv.total)
psych::describe(conf.all$srp.total)
psych::describe(conf.all$msscq.pre)
psych::describe(conf.all$msscq.mot)
psych::describe(conf.all$msscq.self)
psych::describe(conf.all$msscq.ass)
psych::describe(conf.all$msscq.anx)
psych::describe(conf.all$msscq.fear)
psych::describe(conf.all$SA02_01)
```

```
psych::describe(conf.all$SA01_01)
psych::describe(conf.all$SD_age)
# men
psych::describe(conf.men$mach.total)
psych::describe(conf.men$npi.total)
psych::describe(conf.men$srp.total)
psych::describe(conf.men$msscq.pre)
psych::describe(conf.men$msscq.mot)
psych::describe(conf.men$msscq.self)
psych::describe(conf.men$msscq.ass)
psych::describe(conf.men$msscq.anx)
psych::describe(conf.men$msscq.fear)
psych::describe(conf.men$SA02_01)
psych::describe(conf.men$SA01_01)
psych::describe(conf.men$SD_age)
# women
psych::describe(conf.women$mach.total)
psych::describe(conf.women$npi.total)
psych::describe(conf.women$srp.total)
psych::describe(conf.women$msscq.pre)
psych::describe(conf.women$msscq.mot)
psych::describe(conf.women$msscq.self)
psych::describe(conf.women$msscq.ass)
psych::describe(conf.women$msscq.anx)
psych::describe(conf.women$msscq.fear)
psych::describe(conf.women$SA02_01)
psych::describe(conf.women$SA01_01)
psych::describe(conf.women$SD_age)
```

```
#####
### correlational analyses #####
#####
```

```
### confirmatory sample - overall ###
```

```
# selects variables for correlation matrix
cor.data.all <- conf.all %>%
  dplyr::select(mach.total, npj.total, srp.total, msscq.pre, msscq.mot, msscq.self, msscq.ass,
msscq.anx, msscq.fear, SA02_01, SA01_01, SD_age)

# saves and prints correlation matrix via corrr
co.all.spearman <- correlate(cor.data.all, method = "spearman")
co.all.spearman
# shows significance levels of the correlation matrix via Hmisc
co.all.spearman.p = rcorr(as.matrix(cor.data.all), type = c("spearman"))
print (co.all.spearman.p)

### confirmatory sample - men ###
# selects variables for correlation matrix
cor.data.men <- conf.men %>%
  dplyr::select(mach.total, npj.total, srp.total, msscq.pre, msscq.mot, msscq.self, msscq.ass,
msscq.anx, msscq.fear, SA02_01, SA01_01, SD_age)
# saves and prints correlation matrix via corrr
co.men.spearman <- correlate(cor.data.men, method = "spearman")
co.men.spearman
# shows significance levels of the correlation matrix via Hmisc
co.men.spearman.p = rcorr(as.matrix(cor.data.men), type = c("spearman"))
print (co.men.spearman.p)

### confirmatory sample - women ###
# selects variables for correlation matrix
cor.data.women <- conf.women %>%
  dplyr::select(mach.total, npj.total, srp.total, msscq.pre, msscq.mot, msscq.self, msscq.ass,
msscq.anx, msscq.fear, SA02_01, SA01_01, SD_age)
# saves and prints correlation matrix via corrr
co.women.spearman <- correlate(cor.data.women, method = "spearman")
co.women.spearman
# shows significance levels of the correlation matrix via Hmisc
co.women.spearman.p = rcorr(as.matrix(cor.data.women), type = c("spearman"))
```

```
print (co.women.spearman.p)
```

```
#####  
### gender differences #####  
#####
```

```
t.test(conf.all$mach.total~conf.all$SD_sex)  
cohen.d(conf.all$mach.total, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$npi.total~conf.all$SD_sex)  
cohen.d(conf.all$npi.total, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$srp.total~conf.all$SD_sex)  
cohen.d(conf.all$srp.total, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.pre~conf.all$SD_sex)  
cohen.d(conf.all$msscq.pre, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.mot~conf.all$SD_sex)  
cohen.d(conf.all$msscq.mot, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.self~conf.all$SD_sex)  
cohen.d(conf.all$msscq.self, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.ass~conf.all$SD_sex)  
cohen.d(conf.all$msscq.ass, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.anx~conf.all$SD_sex)  
cohen.d(conf.all$msscq.anx, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$msscq.fear~conf.all$SD_sex)  
cohen.d(conf.all$msscq.fear, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$SA02_01~conf.all$SD_sex)  
cohen.d(conf.all$SA02_01, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$SA01_01~conf.all$SD_sex)  
cohen.d(conf.all$SA01_01, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)  
t.test(conf.all$SD_age~conf.all$SD_sex)  
cohen.d(conf.all$SD_age, conf.all$SD_sex, na.rm = TRUE, hedges.correction = TRUE)
```

```
#####  
### reliability analyses #####  
#####
```

Confirmatory

MSSCQ

MSSCQ-Anxiety

alpha(conf.all[c("msscq_anx01", "msscq_anx02", "msscq_anx03", "msscq_anx04",
"msscq_anx05")]))

MSSCQ-Preoccupation

alpha(conf.all[c("msscq_pre01", "msscq_pre02", "msscq_pre03", "msscq_pre04",
"msscq_pre05")]))

#MSSCQ-Assertiveness

alpha(conf.all[c("msscq_ass01", "msscq_ass02.r", "msscq_ass03.r", "msscq_ass04",
"msscq_ass05")]))

#MSSCQ-Motivation

alpha(conf.all[c("msscq_mot01", "msscq_mot02", "msscq_mot03", "msscq_mot04",
"msscq_mot05")]))

#MSSCQ-Self-esteem

alpha(conf.all[c("msscq_self01", "msscq_self02", "msscq_self03", "msscq_self04",
"msscq_self05")]))

#MSSCQ-Fear

alpha(conf.all[c("msscq_fear01", "msscq_fear02", "msscq_fear03", "msscq_fear04.r",
"msscq_fear05.r")]))

Machiavellianism

#MACH-Views

alpha(conf.all[c("mach_v01.r", "mach_v02", "mach_v03", "mach_v04.r", "mach_v05",
"mach_v06.r", "mach_v07.r", "mach_v08", "mach_v09")]))

#MACH-Tactics

alpha(conf.all[c("mach_t01", "mach_t02", "mach_t03.r", "mach_t04.r", "mach_t05.r",
"mach_t06.r", "mach_t07", "mach_t08", "mach_t09.r")]))

#MACH-Morality

alpha(conf.all[c("mach_m01.r", "mach_m02")]))

#MACH-Total

alpha(conf.all[c("mach_v01.r", "mach_v02", "mach_v03", "mach_v04.r", "mach_v05",
"mach_v06.r", "mach_v07.r", "mach_v08", "mach_v09",

```

        "mach_t01", "mach_t02", "mach_t03.r", "mach_t04.r", "mach_t05.r",
        "mach_t06.r", "mach_t07", "mach_t08", "mach_t09.r",
        "mach_m01.r", "mach_m02"))))
## Narcissism ##
#NPI-Leadership
alpha(conf.all[c("npi_lead01.r", "npi_lead02", "npi_lead03", "npi_lead04", "npi_lead05.r",
        "npi_lead06.r", "npi_lead07.r", "npi_lead08", "npi_lead09.r", "npi_lead10.r"))])
#NPI-Grandiosity
alpha(conf.all[c("npi_grand01", "npi_grand02", "npi_grand03.r", "npi_grand04.r",
        "npi_grand05.r"))])
#NPI-Total
alpha(conf.all[c("npi_lead01.r", "npi_lead02", "npi_lead03", "npi_lead04", "npi_lead05.r",
        "npi_lead06.r", "npi_lead07.r", "npi_lead08", "npi_lead09.r", "npi_lead10.r",
        "npi_grand01", "npi_grand02", "npi_grand03.r", "npi_grand04.r", "npi_grand05.r"))])
## Psychopathy ##
#SRP-Erratic
alpha(conf.all[c("srp_e01", "srp_e02", "srp_e03", "srp_e04", "srp_e05", "srp_e06", "srp_e07",
        "srp_e08", "srp_e09"))])
#SRP-Antisocial
alpha(conf.all[c("srp_a01", "srp_a02", "srp_a03", "srp_a04", "srp_a05", "srp_a06", "srp_a07",
        "srp_a08", "srp_a09", "srp_a10"))])
#SRP-Callousness
alpha(conf.all[c("srp_c01.r", "srp_c02", "srp_c03", "srp_c04.r", "srp_c05.r"))])
#SRP-Manipulation
alpha(conf.all[c("srp_m01", "srp_m02", "srp_m03", "srp_m04", "srp_m05.r", "srp_m06.r",
        "srp_m07.r"))])
#SRP-Total
alpha(conf.all[c("srp_e01", "srp_e02", "srp_e03", "srp_e04", "srp_e05", "srp_e06", "srp_e07",
        "srp_e08", "srp_e09",
        "srp_a01", "srp_a02", "srp_a03", "srp_a04", "srp_a05", "srp_a06", "srp_a07",
        "srp_a08", "srp_a09", "srp_a10",
        "srp_c01.r", "srp_c02", "srp_c03", "srp_c04.r", "srp_c05",
        "srp_m01", "srp_m02", "srp_m03", "srp_m04", "srp_m05.r", "srp_m06.r",
        "srp_m07.r"))])

```

```
### Exploratory analysis ###
```

```
## Machiavellianism ##
```

```
#MACH-Views
```

```
alpha(sample.SEM[c("mach_v01.r", "mach_v02", "mach_v03", "mach_v04.r", "mach_v05",  
"mach_v06.r", "mach_v07.r", "mach_v08", "mach_v09"))])
```

```
#MACH-Tactics
```

```
alpha(sample.SEM[c("mach_t01", "mach_t02", "mach_t03.r", "mach_t04.r", "mach_t05.r",  
"mach_t06.r", "mach_t07", "mach_t08", "mach_t09.r"))])
```

```
#MACH-Morality
```

```
alpha(sample.SEM[c("mach_m01.r", "mach_m02"))])
```

```
#MACH-Total
```

```
alpha(sample.SEM[c("mach_v01.r", "mach_v02", "mach_v03", "mach_v04.r", "mach_v05",  
"mach_v06.r", "mach_v07.r", "mach_v08", "mach_v09",  
"mach_t01", "mach_t02", "mach_t03.r", "mach_t04.r", "mach_t05.r",  
"mach_t06.r", "mach_t07", "mach_t08", "mach_t09.r",  
"mach_m01.r", "mach_m02"))])
```

```
## Narcissism ##
```

```
#NPI-Leadership
```

```
alpha(sample.SEM[c("npi_lead01.r", "npi_lead02", "npi_lead03", "npi_lead04",  
"npi_lead05.r", "npi_lead06.r", "npi_lead07.r", "npi_lead08", "npi_lead09.r",  
"npi_lead10.r"))])
```

```
#NPI-Grandiosity
```

```
alpha(sample.SEM[c("npi_grand01", "npi_grand02", "npi_grand03.r", "npi_grand04.r",  
"npi_grand05"))])
```

```
#NPI-Total
```

```
alpha(sample.SEM[c("npi_lead01.r", "npi_lead02", "npi_lead03", "npi_lead04",  
"npi_lead05.r", "npi_lead06.r", "npi_lead07.r", "npi_lead08", "npi_lead09.r", "npi_lead10.r",  
"npi_grand01", "npi_grand02", "npi_grand03.r", "npi_grand04.r", "npi_grand05"))])
```

```
## Psychopathy ##
```

```
#SRP-Erratic
```

```
alpha(sample.SEM[c("srp_e01", "srp_e02", "srp_e03", "srp_e04", "srp_e05", "srp_e06",  
"srp_e07", "srp_e08", "srp_e09"))])
```

```
#SRP-Antisocial
```

```

alpha(sample.SEM[c("srp_a01", "srp_a02", "srp_a03", "srp_a04", "srp_a05", "srp_a06",
"srp_a07", "srp_a08", "srp_a09", "srp_a10"))
#SRP-Callousness
alpha(sample.SEM[c("srp_c01.r", "srp_c02", "srp_c03", "srp_c04.r", "srp_c05")])
#SRP-Manipulation
alpha(sample.SEM[c("srp_m01", "srp_m02", "srp_m03", "srp_m04", "srp_m05.r",
"srp_m06.r", "srp_m07.r")])
#SRP-Total
alpha(sample.SEM[c("srp_e01", "srp_e02", "srp_e03", "srp_e04", "srp_e05", "srp_e06",
"srp_e07", "srp_e08", "srp_e09",
"srp_a01", "srp_a02", "srp_a03", "srp_a04", "srp_a05", "srp_a06", "srp_a07",
"srp_a08", "srp_a09", "srp_a10",
"srp_c01.r", "srp_c02", "srp_c03", "srp_c04.r", "srp_c05",
"srp_m01", "srp_m02", "srp_m03", "srp_m04", "srp_m05.r", "srp_m06.r",
"srp_m07.r")])
## Sadism ##
#SSIS
alpha(sample.SEM[c("ssis01", "ssis02", "ssis03", "ssis04", "ssis05", "ssis06", "ssis07",
"ssis08.r", "ssis09", "ssis10")])
#ASP
alpha(sample.SEM[c("asp01", "asp02", "asp03", "asp04", "asp05", "asp06", "asp07", "asp08",
"asp09.r")])

#####
### Regressions - overall #####
#####

m1.overall <- lm(msscq.pre ~ mach.total + np1.total + srp.total, data = cor.data.all)
summary(m1.overall)
confint(m1.overall)
lm.beta(m1.overall)
durbinWatsonTest(m1.overall)
vif(m1.overall)
gg_diagnose(m1.overall)

```

```
# ---
m2.overall <- lm(msscq.mot ~ mach.total + npv.total + srp.total, data = cor.data.all)
summary(m2.overall)
confint(m2.overall)
lm.beta(m2.overall)
durbinWatsonTest(m2.overall)
vif(m2.overall)
gg_diagnose(m2.overall)
# ---
m3.overall <- lm(msscq.self ~ mach.total + npv.total + srp.total, data = cor.data.all)
summary(m3.overall)
confint(m3.overall)
lm.beta(m3.overall)
durbinWatsonTest(m3.overall)
vif(m3.overall)
gg_diagnose(m3.overall)
# ---
m4.overall <- lm(msscq.ass ~ mach.total + npv.total + srp.total, data = cor.data.all)
summary(m4.overall)
confint(m4.overall)
lm.beta(m4.overall)
durbinWatsonTest(m4.overall)
vif(m4.overall)
gg_diagnose(m4.overall)

# ---
m5.overall <- lm(msscq.anx ~ mach.total + npv.total + srp.total, data = cor.data.all)
summary(m5.overall)
confint(m5.overall)
lm.beta(m5.overall)
durbinWatsonTest(m5.overall)
vif(m5.overall)
gg_diagnose(m5.overall)
# ---
```

```
m6.overall <- lm(msscq.fear ~ mach.total + npi.total + srp.total, data = cor.data.all)
summary(m6.overall)
confint(m6.overall)
lm.beta(m6.overall)
durbinWatsonTest(m6.overall)
vif(m6.overall)
gg_diagnose(m6.overall)
# ---

m7.overall <- lm(SA02_01 ~ mach.total + npi.total + srp.total, data = cor.data.all)
summary(m7.overall)
confint(m7.overall)
lm.beta(m7.overall)
durbinWatsonTest(m7.overall)
vif(m7.overall)
gg_diagnose(m7.overall)
# ---

m8.overall <- lm(SA01_01 ~ mach.total + npi.total + srp.total, data = cor.data.all)
summary(m8.overall)
confint(m8.overall)
lm.beta(m8.overall)
durbinWatsonTest(m8.overall)
vif(m8.overall)
gg_diagnose(m8.overall)

#####
### Regressions - Men #####
#####

m1.men <- lm(msscq.pre ~ mach.total + npi.total + srp.total, data = cor.data.men)
summary(m1.men)
confint(m1.men)
lm.beta(m1.men)
durbinWatsonTest(m1.men)
vif(m1.men)
gg_diagnose(m1.men)
```

```
# ---
m2.men <- lm(msscq.mot ~ mach.total + npv.total + srp.total, data = cor.data.men)
summary(m2.men)
confint(m2.men)
lm.beta(m2.men)
durbinWatsonTest(m2.men)
vif(m2.men)
gg_diagnose(m2.men)
# ---
m3.men <- lm(msscq.self ~ mach.total + npv.total + srp.total, data = cor.data.men)
summary(m3.men)
confint(m3.men)
lm.beta(m3.men)
durbinWatsonTest(m3.men)
vif(m3.men)
gg_diagnose(m3.men)
# ---
m4.men <- lm(msscq.ass ~ mach.total + npv.total + srp.total, data = cor.data.men)
summary(m4.men)
confint(m4.men)
lm.beta(m4.men)
durbinWatsonTest(m4.men)
vif(m4.men)
gg_diagnose(m4.men)
# ---
m5.men <- lm(msscq.anx ~ mach.total + npv.total + srp.total, data = cor.data.men)
summary(m5.men)
confint(m5.men)
lm.beta(m5.men)
durbinWatsonTest(m5.men)
vif(m5.men)
gg_diagnose(m5.men)
# ---
m6.men <- lm(msscq.fear ~ mach.total + npv.total + srp.total, data = cor.data.men)
```

```
summary(m6.men)
confint(m6.men)
lm.beta(m6.men)
durbinWatsonTest(m6.men)
vif(m6.men)
gg_diagnose(m6.men)
# ---
m7.men <- lm(SA02_01 ~ mach.total + npi.total + srp.total, data = cor.data.men)
summary(m7.men)
confint(m7.men)
lm.beta(m7.men)
durbinWatsonTest(m7.men)
vif(m7.men)
gg_diagnose(m7.men)
# ---
m8.men <- lm(SA01_01 ~ mach.total + npi.total + srp.total, data = cor.data.men)
summary(m8.men)
confint(m8.men)
lm.beta(m8.men)
durbinWatsonTest(m8.men)
vif(m8.men)
gg_diagnose(m8.men)

#####
### Regressions - Women #####
#####

m1.women <- lm(msscq.pre ~ mach.total + npi.total + srp.total, data = cor.data.women)
summary(m1.women)
confint(m1.women)
lm.beta(m1.women)
durbinWatsonTest(m1.women)
vif(m1.women)
gg_diagnose(m1.women)
```

```
# ---
m2.women <- lm(msscq.mot ~ mach.total + npi.total + srp.total, data = cor.data.women)
summary(m2.women)
confint(m2.women)
lm.beta(m2.women)
durbinWatsonTest(m2.women)
vif(m2.women)
gg_diagnose(m2.women)
# ---
m3.women <- lm(msscq.self ~ mach.total + npi.total + srp.total, data = cor.data.women)
summary(m3.women)
confint(m3.women)
lm.beta(m3.women)
durbinWatsonTest(m3.women)
vif(m3.women)
gg_diagnose(m3.women)
# ---
m4.women <- lm(msscq.ass ~ mach.total + npi.total + srp.total, data = cor.data.women)
summary(m4.women)
confint(m4.women)
lm.beta(m4.women)
durbinWatsonTest(m4.women)
vif(m4.women)
gg_diagnose(m4.women)
# ---
m5.women <- lm(msscq.anx ~ mach.total + npi.total + srp.total, data = cor.data.women)
summary(m5.women)
confint(m5.women)
lm.beta(m5.women)
durbinWatsonTest(m5.women)
vif(m5.women)
gg_diagnose(m5.women)
# ---
m6.women <- lm(msscq.fear ~ mach.total + npi.total + srp.total, data = cor.data.women)
```

```

summary(m6.women)
confint(m6.women)
lm.beta(m6.women)
durbinWatsonTest(m6.women)
vif(m6.women)
gg_diagnose(m6.women)
# ---
m7.women <- lm(SA02_01 ~ mach.total + np_i.total + srp.total, data = cor.data.women)
summary(m7.women)
confint(m7.women)
lm.beta(m7.women)
durbinWatsonTest(m7.women)
vif(m7.women)
gg_diagnose(m7.women)
# ---
m8.women <- lm(SA01_01 ~ mach.total + np_i.total + srp.total, data = cor.data.women)
summary(m8.women)
confint(m8.women)
lm.beta(m8.women)
durbinWatsonTest(m8.women)
vif(m8.women)
gg_diagnose(m8.women)

#####
### SEM #####
#####

### Model 1 ###
model.1 <- '
# measurement model
Narcissism =~ np_i_lead01.r + np_i_lead02 + np_i_lead03 + np_i_lead04 + np_i_lead05.r +
np_i_lead06.r + np_i_lead07.r + np_i_lead08 + np_i_lead09.r + np_i_lead10.r + np_i_grand01 +
np_i_grand02 + np_i_grand03.r + np_i_grand04.r + np_i_grand05

```

Machiavellianism =~ mach_t01 + mach_t02 + mach_t03.r + mach_t04.r + mach_t05.r +
 mach_t06.r + mach_t07 + mach_t08 + mach_t09.r + mach_v01.r + mach_v02 + mach_v03 +
 mach_v04.r + mach_v05 + mach_v06.r + mach_v07.r + mach_v08 + mach_v09 +
 mach_m01.r + mach_m02

Psychopathy =~ srp_e01 + srp_e02 + srp_e03 + srp_e04 + srp_e05 + srp_e06 + srp_e07 +
 srp_e08 + srp_e09 + srp_m01 + srp_m02 + srp_m03 + srp_m04 + srp_m05.r + srp_m06.r +
 srp_m07.r + srp_c01.r + srp_c02 + srp_c03 + srp_c04.r + srp_c05 + srp_a01 + srp_a02 +
 srp_a03 + srp_a04 + srp_a05 + srp_a06 + srp_a07 + srp_a08 + srp_a09 + srp_a10

Dark Triad Factor =~ Narcissism + Machiavellianism + Psychopathy

,

```
fit.model.1 <- sem(model.1,
  data = sample.SEM,
  estimator = "WLSMV",
  std.lv = TRUE)
summary(fit.model.1, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.1, what="paths", whatLabels = "stand")
```

Model 2

model.2 <- '

measurement model

core =~ srp.erratic + srp.antisocial + srp.callous + srp.manipulation + npf.grand + npf.lead
 + mach.views + mach.tactics

residual correlations

srp.erratic ~~ srp.antisocial

srp.callous ~~ srp.manipulation

npf.grand ~~ npf.lead

mach.views ~~ mach.tactics

,

```
fit.model.2 <- sem(model.2,
  data = sample.SEM,
  estimator = "MLMV",
  std.lv = TRUE)
summary(fit.model.2, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.2, what="paths", whatLabels = "stand")
```

```

#### Model 3 ####
model.3 <- '
  # measurement model
  core =~ srp.erratic + srp.antisocial + np.lead + mach.views + mach.tactics
  # regressions
  core ~ srp.callous + srp.manipulation
  # residual correlations
  srp.erratic ~~ srp.antisocial
  srp.callous ~~ srp.manipulation
  np.lead ~~ np.lead
  mach.views ~~ mach.tactics
  ,

fit.model.3 <- sem(model.3,
  data = sample.SEM,
  estimator = "MLMV",
  std.lv = TRUE)
summary(fit.model.3, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.3, what="paths", whatLabels = "stand")
inspect(fit.model.3, 'r2')

#### Model 4 ####
model.4 <- '
  # measurement model
  core =~ srp.erratic + srp.antisocial + np.lead + mach.views + mach.tactics
  # regressions
  core ~ srp.callous + srp.manipulation + np.lead
  # residual correlations
  srp.erratic ~~ srp.antisocial
  srp.callous ~~ srp.manipulation
  mach.views ~~ mach.tactics
  np.lead ~~ np.lead
  ,

fit.model.4 <- sem(model.4,

```

```

        data = sample.SEM,
        estimator = "MLMV",
        std.lv = TRUE)
summary(fit.model.4, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.4, what="paths", whatLabels = "stand")
inspect(fit.model.4, 'r2')

#### Model 5 ####
model.5 <- '
# measurement model
    core =~ srp.erratic + srp.antisocial + np.lead + mach.views + mach.tactics + ssi.total
# regressions
    core ~ srp.callous + srp.manipulation + np.lead
# residual correlations
    srp.erratic ~~ srp.antisocial
    srp.callous ~~ srp.manipulation
    mach.views ~~ mach.tactics
    np.lead ~~ np.lead
'

fit.model.5 <- sem(model.5,
        data = sample.SEM,
        estimator = "MLMV",
        std.lv = TRUE)
summary(fit.model.5, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.5, what="paths", whatLabels = "stand")
inspect(fit.model.5, 'r2')

#### Model 6 ####
model.6 <- '
# measurement model
    core =~ srp.erratic + srp.antisocial + np.lead + mach.views + mach.tactics + asp.total
# regressions
    core ~ srp.callous + srp.manipulation + np.lead

```

```

# residual correlations
srp.erratic ~~ srp.antisocial
srp.callous ~~ srp.manipulation
mach.views ~~ mach.tactics
npi.grand ~~ npi.lead
,

fit.model.6 <- sem(model.6,
  data = sample.SEM,
  estimator = "MLMV",
  std.lv = TRUE)

summary(fit.model.6, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.6, what="paths", whatLabels = "stand")
inspect(fit.model.6, 'r2')

### Model 7 ###
model.7 <- '
# measurement model
core =~ srp.erratic + srp.antisocial + npi.grand + npi.lead + mach.views + mach.tactics +
ssis.total

# regressions
core ~ srp.callous + srp.manipulation

# residual correlations
srp.erratic ~~ srp.antisocial
srp.callous ~~ srp.manipulation
npi.grand ~~ npi.lead
mach.views ~~ mach.tactics
,

fit.model.7 <- sem(model.7,
  data = sample.SEM,
  estimator = "MLMV",
  std.lv = TRUE)

summary(fit.model.7, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.7, what="paths", whatLabels = "stand")
inspect(fit.model.7, 'r2')

```

```
#### Model 8 ####
```

```
model.8 <- '
```

```
  # measurement model
```

```
    core =~ srp.erratic + srp.antisocial + npi.grand + npi.lead + mach.views + mach.tactics +  
    asp.total
```

```
  # regressions
```

```
    core ~ srp.callous + srp.manipulation
```

```
  # residual correlations
```

```
    srp.erratic ~~ srp.antisocial
```

```
    srp.callous ~~ srp.manipulation
```

```
    npi.grand ~~ npi.lead
```

```
    mach.views ~~ mach.tactics
```

```
  '
```

```
fit.model.8 <- sem(model.8,
```

```
    data = sample.SEM,
```

```
    estimator = "MLMV",
```

```
    std.lv = TRUE)
```

```
summary(fit.model.8, standardized = TRUE, fit.measures = TRUE)
```

```
semPaths(fit.model.8, what="paths", whatLabels = "stand")
```

```
inspect(fit.model.8, 'r2')
```

```
#### Exploratory model sensu Paulhus & Williams ####
```

```
model.e <- '
```

```
  # measurement model
```

```
    Narcissism =~ npi_lead01.r + npi_lead02 + npi_lead03 + npi_lead04 + npi_lead05.r +  
    npi_lead06.r + npi_lead07.r + npi_lead08 + npi_lead09.r + npi_lead10.r + npi_grand01 +  
    npi_grand02 + npi_grand03.r + npi_grand04.r + npi_grand05
```

```
    Machiavellianism =~ mach_t01 + mach_t02 + mach_t03.r + mach_t04.r + mach_t05.r +  
    mach_t06.r + mach_t07 + mach_t08 + mach_t09.r + mach_v01.r + mach_v02 + mach_v03 +  
    mach_v04.r + mach_v05 + mach_v06.r + mach_v07.r + mach_v08 + mach_v09 +  
    mach_m01.r + mach_m02
```

```
    Psychopathy =~ srp_e01 + srp_e02 + srp_e03 + srp_e04 + srp_e05 + srp_e06 + srp_e07 +  
    srp_e08 + srp_e09 + srp_m01 + srp_m02 + srp_m03 + srp_m04 + srp_m05.r + srp_m06.r +
```

```
srp_m07.r + srp_c01.r + srp_c02 + srp_c03 + srp_c04.r + srp_c05 + srp_a01 + srp_a02 +
srp_a03 + srp_a04 + srp_a05 + srp_a06 + srp_a07 + srp_a08 + srp_a09 + srp_a10
,
```

```
fit.model.e <- sem(model.e,
  data = sample.SEM,
  estimator = "WLSMV",
  std.lv = TRUE)
summary(fit.model.e, standardized = TRUE, fit.measures = TRUE)
semPaths(fit.model.e, what="paths", whatLabels = "stand")
```

```
#####
### Descriptives (exploratory) #####
#####
```

```
### total scores ###
```

```
psych::describe(sample.SEM$mach.total)
psych::describe(sample.SEM$npi.total)
psych::describe(sample.SEM$srp.total)
psych::describe(sample.SEM$ssis.total)
psych::describe(sample.SEM$asp.total)
```

```
### subscales ###
```

```
psych::describe(sample.SEM$srp.manipulation)
psych::describe(sample.SEM$srp.erratic)
psych::describe(sample.SEM$srp.antisocial)
psych::describe(sample.SEM$srp.callous)
```

```
psych::describe(sample.SEM$npi.lead)
psych::describe(sample.SEM$npi.grand)
```

```
psych::describe(sample.SEM$mach.tactics)
psych::describe(sample.SEM$mach.views)
```

```
#####
### spearman correlations (exploratory) #####
#####

### total scores ###
cor.expl.total <- sample.SEM %>%
  dplyr::select(srp.total, npi.total, mach.total, ssis.total, asp.total)
cor.expl.total.spearman <- correlate(cor.expl.total, method = "spearman")
print(cor.expl.total.spearman)
cor.expl.total.spearman.p = rcorr(as.matrix(cor.expl.total), type = c("spearman"))
print (cor.expl.total.spearman.p)

### subscales ###
cor.expl.sub <- sample.SEM %>%
  dplyr::select(srp.manipulation, srp.erratic, srp.antisocial, srp.callous,
    npi.lead, npi.grand,
    mach.tactics, mach.views,
    ssis.total, asp.total)
cor.expl.sub.spearman <- correlate(cor.expl.sub, method = "spearman")
print(cor.expl.sub.spearman)
cor.expl.sub.spearman.p = rcorr(as.matrix(cor.expl.sub), type = c("spearman"))
print(cor.expl.sub.spearman.p)
```