Impulsivity from the personality psychologist's perspective

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Helena Schmitt[1], Jon D. Elhai[2] and Christian Montag[1]
[1]Department of Molecular Psychology, Institute of Psychology and Education, Ulm University, Ulm, Baden-Wuerttemberg, Germany, [2]Department of Psychology, and Department of Psychiatry, University of Toledo, Toledo, OH, United States

19.1 Why does impulsivity matter?

Impulsivity plays a pivotal role in many areas of life. Lack of impulse control is a common feature of several psychopathologies, such as borderline and antisocial personality disorder, attention-deficit/hyperactivity disorder, and substance use disorders, as classified in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013). Also, impulsivity relates to a range of health risk behaviors that do not necessarily cross a threshold of clinical relevance, such as cigarette smoking (Bos et al., 2019; Kale et al., 2018), problematic alcohol consumption (Courtney et al., 2012; Stamates et al., 2021; Stoltenberg et al., 2008), illicit drug use (Rogers et al., 2021), problematic smartphone use (Grant et al., 2019), risky sexual behaviors (Derefinko et al., 2014; Rogers et al., 2021) as well as dysfunctional eating habits and cognitions (Guerrieri et al., 2007), overweight and obesity (Fields et al., 2013; Zhang et al., 2022). Beyond that, impulsivity goes along with a greater general tendency for risk-taking across multiple domains (Casini et al., 2020; Megías-Robles et al., 2022) and is of relevance in deviant, violent, and crime-related behaviors (Bresin, 2019; Foroozandeh, 2017; Loeber et al., 2012). Selected studies further find impulsivity to relate to procrastination (Rebetez et al., 2018) and lower academic achievement (Chamorro-Premuzic & Furnham, 2003; Vigil-Coleţ & Morales-Vives, 2005), which may affect the performance domain or professional life. The aforementioned examples emphasize the important role of impulsivity in many aspects of daily life.

19.2 Impulsivity through the lens of personality psychology

Given that impulsivity represents a key variable in understanding many human behaviors including psychiatric disorders (Evenden, 1999), it is not surprising that various disciplines are devoted to the study of impulsivity, including neuroscience as well as general and clinical psychology. The present chapter takes the

perspective of personality psychology, a field that seeks to understand why and in what ways people differ from one another and how their individual personalities are shaped. Among other things, this field involves disentangling the influences of nature (i.e., genetic variables and heritability) and nurture (i.e., education and socialization) on interindividual differences in impulsivity (Bezdjian et al., 2011). Accordingly, personality psychology deals with the cause and development of psychological variables and is furthermore concerned with their correlates and (behavioral) outcomes and consequences (Larsen et al., 2013). Moreover, personality psychology focuses on appropriate measurement of human perception, attitudes, behavior, and personality dispositions.

A personality disposition or trait refers to rather temporally stable (and to some extent also cross-situation consistent) characteristics of a person (Montag & Elhai, 2019) which become largely consolidated after young adulthood (Bleidorn et al., 2022). An individual who is generally considered impulsive would be expected to act impulsively across many different situations in his or her life. However, such (prevailing) stability has been questioned in many studies. Classical work has already shown that context and characteristics of the situation add variability to personality. It has now become clear that behavior varies as a function of person−situation interactions (for a taxonomy of situations, see Rauthmann et al., 2014), but at the same time might remain more consistent across the same such interactions. Accordingly, certain well-defined situations ("if…") are very likely to elicit similar responses ("then…") in an individual across different points in time, leading to intra-individually stable behavioral patterns (Mischel, 2009; Mischel & Shoda, 1995; Shoda et al., 1994). Going further, more recent advances in this field have pointed at the nonlinearity of such person by situation effects (see Blum et al., 2018).

19.3   The many faces of impulsivity

But what is impulsivity exactly? There are several definitions of impulsivity available. Moeller et al. (2001) brought forward their integrative, prominent definition of impulsivity as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individual or to others" (p. 1784). Although an overarching definition has been provided, impulsivity is viewed as a multidimensional and multifaceted construct that can be operationalized in numerous ways, which poses a challenge for impulsivity research. Two prominent approaches to measuring impulsivity in psychology are laboratory behavioral tasks on the one hand, and self-report questionnaires on the other. Even though these sources of impulsivity assessment are intended to tap into the same psychological construct, it is disillusioning that mainly low and inconsistent associations can be observed between them (Reynolds et al., 2008; Sánchez-Kuhn et al., 2017). In other words, self-ratings of high impulse control are not necessarily reflected in great performances on laboratory impulsivity measures, and vice-versa (meta-analytic associations between self-report and behavioral impulsivity measures can be obtained from Table 6 in Sharma et al., 2014).

These findings are, however, not surprising, given the fundamentally different conditions under which the two measurement types assess impulsivity. Behavioral tasks are usually employed in laboratory surroundings and are designed to measure maximum performance (e.g., reaction times, error rates). In contrast, self-report measures of *impulsive personality* can be applied in any natural environment—especially with online surveys—and map perceptions of one's typical behaviors. Thus the two types of measurement also capture distinct response processes (Dang et al., 2020). There has been consensus that behavioral impulsivity includes two, if not more, facets. Specifically, corresponding tasks measure *impulsive choice* (i.e., impulsive decision making) which reflects individual differences in the inclination to prioritize immediate but smaller rewards over larger but delayed ones. Other tasks assess *impulsive action* (i.e., behavioral (dis)inhibition), which pertains to individual differences in the propensity to act prematurely and the ability to inhibit inappropriate responses (MacKillop et al., 2016; Weafer et al., 2013). Evidence for the relative independence of various impulsivity measures has also been demonstrated in a study examining their factor structure using structural equation modeling. The model best fitting the data revealed three correlated latent factors reflecting impulsive choice, impulsive action, and impulsive personality. The latter showed minor yet positive associations with the other two categories, which in turn showed no associations with each other (MacKillop et al., 2016). Additionally, *inattention* (i.e., distractibility) has been recognized as a third category of laboratory measures, reflecting differences in the ability to sustain attention (Sharma et al., 2014; Weafer et al., 2013). Corresponding measures were, however, not considered in the work by MacKillop et al. (2016). Despite the disconnect and lack of robust overlap between behavioral impulsivity and impulsive personality, there is no question that different measurement domains show individual links with relevant outcome variables (Strickland & Johnson, 2021; Weafer et al., 2013).

19.4   Measuring impulsive personality

In personality psychology, self-report measures are widely used to assess impulsive personality. Table 19.1

presents a selection of inventories for measuring impulsivity through self-reports alongside definitions of subscales where applicable. For a recent overview of further personality and behavioral measures of impulsivity, see Strickland and Johnson (2021).

Table 19.1 illustrates that various researchers have taken different approaches to defining and organizing impulsive personality, and developed inventories accordingly. Given that the conceptual considerations underlying these questionnaires vary, it is not surprising that the scales also do not exhibit perfect correlations with one another (Dickman, 1990; Stanford et al., 2009). Consequently, comparing empirical findings on the relationships between impulsive personality and relevant outcome variables can be challenging when different scales are employed. This is further complicated by the fact that impulsive personality itself is multifaceted.

Table 19.1 Overview on self-report measures for impulsive personality.

Measure	(Sub)Scales	Definition	References
Barratt impulsive ness scale, version 11[a] (BIS-11) 30 items	Motor impulsiveness	Acting without thinking	Patton et al. (1995)
	Nonplanning impulsiveness	Present orientation or lack of future orientation	
	Attentional impulsiveness	Inability to focus attention or concentrate	
Dickman impulsive ness inventory (DII) 23 items	Functional impulsivity	Tendency to engage in rapid, error-prone information processing when such a strategy is rendered optimal by the individual's other personality traits.	Dickman (1990)
	Dysfunctional impulsivity	Tendency to engage in rapid, error-prone information processing because of an inability to use a slower, more methodical approach under certain circumstances.	
I$_7$ Question naire[b] 54 items	Impulsiveness	Acting with no planning and no regard for possible risks involved.	Eysenck et al. (1985)
	Venturesomeness	Deliberately acting in a risky manner with prior consideration of possible consequences.	
	Empathy		
UPPS /UPPS-P impulsive behavior scales[c] 59 items	Negative urgency	Tendency to commit rash or regrettable actions as a result of negative affect.	Whiteside and Lynam (2001)
	Lack of premediation	Absence of a tendency to delay action in favor of careful thinking and planning.	
	Lack of perseverance	Absence of an ability to remain with a task until completion and avoid boredom.	
	Sensation seeking	Tendency to seek excitement and adventure	
	Positive urgency	Rash action in response to a positive mood.	Cyders et al. (2007)

(*Continued*)

Table 19.1 (Continued)

Measure	(Sub)Scales	Definition	References
Impulsive behavior short scale-8 (I-8) 8 items	Urgency	Tendency to commit rash or regrettable actions as a result of negative affect.	Groskurth et al. (2022), Kovaleva et al. (2014)
	Lack of premediation	Acting without careful thinking and planning and without reflecting on the consequences of an act.	
	Lack of perseverance	Inability to remain focused on boring or difficult tasks or to ignore distracting stimuli.	
	Sensation seeking	Tendency to engage in and enjoy exciting and risky activities.	

[a]Besides the three second-order factors presented here, Patton et al. (1995) identified six first-order factors: motor impulsiveness and perseverance (I motor impulsiveness), self-control and cognitive complexity (II nonplanning impulsiveness), and attention and cognitive instability (III attentional impulsiveness).

[b]Eysenck et al. (1985) defined two correlated yet different types of impulsivity, of which impulsiveness is closely linked to psychoticism and venturesomeness to extraversion. Empathy is a third subscale of the I_7 questionnaire, which is not described in detail here.

[c]The initial version of the UPPS impulsive behavior scales consisted of only four subscales. In 2007 it was extended by the positive urgency subscale, which resulted in the addition of a "-P" in the name of the questionnaire, that is, UPPS-P.

However, a stronger conceptual proximity is evident between the UPPS and I-8 scales. Precisely, the I-8 scale was created following the work surrounding the UPPS and the corresponding facets also demonstrate substantial correlations with one another ($0.66 \leq r \leq 0.76$, Kovaleva et al., 2014).

Arguably the most often used impulsivity trait measures are the Barratt impulsiveness scale, 11th version (BIS-11; Patton et al., 1995) and the UPPS(-P) impulsive behavior scales (Cyders et al., 2007; Whiteside & Lynam, 2001), for which brief versions are also available (Cyders et al., 2014; Spinella, 2007). Yet, the BIS-11 has been repeatedly questioned with regards to its psychometric properties and factor structure. More precisely, the three- (or six-) factor structure identified in the original work failed to yield empirical support in later research (Reise et al., 2013; Vasconcelos et al., 2012).

19.5 Gender differences on self-report measures of impulsivity

As a key variable in predicting a number of outcomes (see Section 19.1) that differ in prevalence between males and females, it is also worth looking at the empirical evidence for gender differences in impulsive personality. A meta-analytic

aggregation of studies on such differences yielded that males tend to score higher on several self-report measures of impulsivity. However, the results were not consistent across different questionnaires. Specifically, males exhibited higher levels on I_7 venturesomeness (but not impulsiveness), DII functional and dysfunctional impulsivity, as well as attentional, nonplanning, and total BIS impulsivity. On the UPPS impulsive behavior scales, males had considerably higher mean values on sensation seeking, but females scored slightly higher on urgency (Cross et al., 2011). Positive effects of male gender on sensation seeking were also observed in the I-8 scale, which follows the four-factor impulsivity model of the UPPS. However, no significant gender differences were found for urgency (Groskurth et al., 2022; Kovaleva et al., 2014). More recent studies investigating the UPPS-P scales only found strong associations between male gender with both sensation seeking and positive urgency, but also no effects of female gender (Argyriou et al., 2020; Cyders, 2013).

19.6   Genetic nature of impulsivity

As stated earlier in this chapter, personality psychology is concerned with carving out causes of interindividual differences in personality traits. In this context, studies on the heritability of human traits provide a way to understand the genetic contributions as well as influences of shared and nonshared environments on such interindividual variability. A meta-analytic synthesis was conducted on over 41 studies considering twin and adoption studies, males and females, as well as various measures on impulsivity (behavioral and self-report) and age groups. Overall, a substantial broad-sense heritability of $H^2 = 0.50$ (0.38 additive genetic effects, 0.12 nonadditive genetic effects) was observed, which means that 50% of the variance in impulsivity can be attributed to genetic effects. Nonshared environmental influences accounted for the other 50% (Bezdjian et al., 2011). These findings align with those obtained in a large-scale meta-analysis across thousands of traits, in which an average heritability across all traits of 49% was observed (Polderman et al., 2015). Together, the findings robustly show that there is a strong genetic etiology to impulsivity.

19.7   A prominent personality taxonomy and the place of impulsivity in it

To further the understanding of who is prone to higher (self-reported) impulsivity (including its many facets), it is relevant to locate impulsivity in well-established personality frameworks, such as the Five Factor Model (FFM). The FFM includes five broad orthogonal personality domains labeled extraversion (vs introversion), conscientiousness (vs undirectedness), neuroticism (vs emotional stability), openness to experience (vs closedness), and agreeableness (vs antagonism) which

represent bipolar dimensions, respectively, that are hierarchically arranged (McCrae & John, 1992). It should be noted that the big five of personality (Goldberg, 1981, 1990), yet conceptually distinct, encompass a similar set of five factors.[1] The hierarchical and five-factorial organization of these personality domains has been observed across many cultures (McCrae et al., 2005; Rolland, 2002), which led to the claim of the FFM as describing individual differences in personality universally and comprehensively (McCrae & Costa, 1986). However, exceptions could be observed especially for samples that do not fall under the description as "WEIRD" (Laajaj et al., 2019), that is, people who are Western, Educated, Industrialized, Rich, and Democratic, from whom most psychological evidence has been generated although they do not represent the majority (Henrich et al., 2010). But how does impulsive personality fall in the five-factor space? Across studies investigating the relationships between impulsivity and the big five, (directions of) effects are most robust for neuroticism and conscientiousness, regardless of the kind of self-report measures employed. More specifically, conscientiousness was negatively related to overall BIS-11 scores (Hair & Hampson, 2006; Lange et al., 2017; Mao et al., 2018) and its three subscales, in both nonclinical and patient samples (Lange et al., 2017). With regard to correlations of conscientiousness with the UPPS impulsive behavior scales, negative associations were observed for lack of perseverance and lack of premeditation (Keye et al., 2009; Whiteside & Lynam, 2001) urgency, and sensation seeking (Keye et al., 2009). A more recently presented scale building upon the work around the UPPS, that is, the I-8, exhibited similar patterns of associations. More specifically, lack of premeditation, lack of perseverance, and urgency related negatively to conscientiousness, in both German and UK samples (Groskurth et al., 2022; Kovaleva et al., 2014). Besides, conscientiousness was the trait that most strongly predicted self-reported delay of gratification (i.e., giving up immediate gratification in favor of a longer-term reward) (Furnham & Cheng, 2019). Regarding neuroticism, positive associations with attentional impulsiveness (Lange et al., 2017), as well as the BIS-11 composite, were observed across different samples (Garcia-Argibay, 2019; Hair & Hampson, 2006; Mao et al., 2018). Further, neuroticism has been positively linked to urgency (Groskurth et al., 2022; Keye et al., 2009; Whiteside & Lynam, 2001) and to lower gratification delay (Furnham & Cheng, 2019). Also, impulsivity constitutes a hierarchically subordinate facet of neuroticism according to the FFM, as per operationalization in the NEO personality inventory-revised (NEO-PI-R), additionally indicating a meaningful association between the traits (Costa & McCrae, 1992). Associations with extraversion have been most consistent for sensation seeking (Groskurth et al., 2022; Keye et al., 2009; Kovaleva et al., 2014; Whiteside & Lynam, 2001). Furthermore,

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[1] The big five are rooted in a psycho-lexical approach, which assumes that personality-describing adjectives are reflected in natural language. Over years of their assessment, adaption and factorization, five robust factors emerged (Norman, 1963). Instead of Extraversion and Openness to Experience, Goldberg (1981, 1990) used the terms Surgency and Culture/Intellect, respectively. By contrast, the FFM was successively established based on extant and new personality scales, seeking to identifying common factors, which were then found to overlap with those obtained from lexical studies (Costa & McCrae, 1992; McCrae & Costa, 1980; McCrae & John, 1992).

motor impulsiveness appears to positively relate to extraversion, yet some studies find opposing or negligible associations for extraversion and overall BIS-11 impulsivity (Garcia-Argibay, 2019; Lange et al., 2017; Mao et al., 2018). In addition, two studies found agreeableness to correlate negatively with lack of perseverance and lack of premeditation and total BIS-11 scores (Groskurth et al., 2022; Hair & Hampson, 2006; Keye et al., 2009), whereas other studies observed statistically nonsignificant effects (Garcia-Argibay, 2019; Lange et al., 2017; Mao et al., 2018). Especially associations between measures of trait impulsivity and openness are mixed, ranging from negative and positive bivariate associations with BIS-11 scores (Garcia-Argibay, 2019; Mao et al., 2018) to null effects (Lange et al., 2017). Taking the findings together, conscientiousness and neuroticism robustly show negative and positive associations with a range of impulsivity facets, respectively, while for extraversion, the association with sensation seeking has gained most empirical support. Worth noting with special regard to opposing effects is that the studies reviewed here have applied different measures and controlled for the influences of third variables as well as big five intercorrelations to varying degrees. Therefore regression models including all big five traits as predictors of impulsivity reveal the distinctive contribution of each trait, whereas bivariate correlations are not adjusted for the influence of potential covariates. For instance, extraversion and neuroticism show substantial negative intercorrelations (e.g., Lange et al., 2017), which may cause biased effect sizes. Additionally, just a few studies corrected the significance levels in accordance with the number of tests computed (also see Section 19.10).

19.8   Personality traits beyond the big five

As pointed out earlier in this chapter, the FFM claims to describe human personality comprehensively (McCrae & Costa, 1986). Lee and Ashton (2004), on the other hand, postulated the addition of a sixth factor to more adequately describe human personality. Factor analyses of the FFM domains repeatedly revealed a six-dimensional structure in their work, from which the HEXACO personality model resulted. HEXACO represents an acronym for the personality factors Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness. The latter five are conceptually close to the big five (however, see Gaughan et al., 2012 and Lee & Ashton, 2004 for deviations). Honesty-humility complements the five personality factors and includes attributes as sincerity, fairness, and modesty (Lee et al., 2005; Lee & Ashton, 2004). In two studies with children and adult samples, bivariate correlation analyses showed a negative link between this personality dimension and BIS assessments (Lainidi et al., 2022; MacDonell & Willoughby, 2020).

An ongoing scientific discourse has been concerned with the question as to what extent, if at all, so-called "dark" personality traits differ from the prominent trait models just mentioned. There have been efforts to locate dark personality traits as

extreme variants in the widely used FFM or HEXACO taxonomy, as they show negative associations with agreeableness and honesty-humility (Muris et al., 2017; Vize et al., 2020). Still, they do not seem to be fully captured by these personality models. In this context, examinations of further adjective clusters have demonstrated that, among others, personal attributes with negative valence, such as manipulative, egotistical, deceitful, and conceited are only weakly represented within the big five space (Paunonen & Jackson, 2000). However, these very traits are core characteristics of many dark personality traits. Dark traits are generally considered socially aversive and maladaptive, with the potential to be interpersonally harmful. In particular, dark traits manifest subclinically. Accordingly, unlike clinically or criminally relevant cases, individuals with higher dark traits manage to maintain an intact functional level, or even prosper in everyday life (Furnham et al., 2013; Jones & Paulhus, 2014; Marcus & Zeigler-Hill, 2015; Paulhus, 2014; Paulhus & Williams, 2002). With the introduction of the dark triad of personality, Paulhus and Williams (2002) pioneered research surrounding the identification and taxonomic classification of traits belonging to the dark personality spectrum. The dark triad comprises narcissism, Machiavellianism, and psychopathy. This collection of dark traits was later extended to include a fourth trait, called (everyday) sadism, to form the dark tetrad of personality (Paulhus, 2014). Narcissism[2] is characterized by the constant strive for ego-reinforcement, a sense of entitlement and feelings of grandiosity. Machiavellianism is mainly defined by coalition building strategies, manipulative tactics as well as shallow affect, while recklessness, impulsivity, and callousness describe trait psychopathy (Jones & Paulhus, 2014; Paulhus & Jones, 2015). Finally, everyday sadism describes the pleasure, if not excitement, of observing or performing harmful acts against others in daily life (Buckels et al., 2013; Chabrol et al., 2009).

19.9 Impulsivity in the dark personality space

A number of studies have dealt with the distinctiveness of the dark triad/tetrad components. Although they are based on different historical and theoretical backgrounds (e.g., Greek mythology, political leadership, psychiatry), the traits show empirical and phenotypical overlaps (Furnham et al., 2013; Muris et al., 2017). Nevertheless, recent work has again indicated that the four traits are sufficiently distinct that they can be regarded as separate, noninterchangeable constructs (Neumann et al., 2022). In terms of overlap, impulsivity in particular has been understood as a key feature distinguishing Machiavellianism from psychopathy. More precisely, by definition, psychopathy has been characterized by disinhibited tendencies, whereas Machiavellianism is described by average or higher impulse control. For psychopathy, empirical studies have consistently and across measures found an association

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[2] Throughout this chapter, reference is made to findings on *grandiose* narcissism. Please note that research on narcissism also yielded a *vulnerable* subtype. For more details on this distinction see, e.g., Miller et al. (2011).

with higher levels of impulsivity. Accordingly, psychopathy positively predicted all UPPS-P subscales in a regression model (Kiire et al., 2020) and was linked to DII dysfunctional impulsivity (March et al., 2017), which was also confirmed in regression models (Jones & Paulhus, 2011). Psychopathy further exhibited positive (bivariate) associations with the global BIS-11 score (Lainidi et al., 2022), almost all BIS-11 first-order factors—with the exception of self-control—as well as the I_7 impulsiveness scale (Malesza & Ostaszewski, 2016). While the studies agree on the direction of the effects for psychopathy, the effects for narcissism and Machiavellianism are more ambiguous. For instance, positive correlations with BIS-11 composite scores (Lainidi et al., 2022) and all BIS facets, as well as I_7 impulsiveness and venturesomeness (Malesza & Kaczmarek, 2018; Malesza & Ostaszewski, 2016) were found for narcissism. Moreover, narcissism positively predicted UPPS-P sensation seeking and negatively predicted lack of perseverance in a regression model (Kiire et al., 2020), suggesting opposed tendencies for different aspects of impulsive personality. Conversely, one study found narcissism as positively related to DII dysfunctional impulsivity, whereas another work identified narcissism as the trait most strongly predictive of DII functional impulsivity among the dark triad components (Jones & Paulhus, 2011). Some positive associations for Machiavellianism with trait measures of impulsivity have also been reported, which is at odds with its original definition. Specifically, small yet positive bivariate correlations were demonstrated for DII dysfunctional impulsivity (Jones & Paulhus, 2011; March et al., 2017) and the first-order factors of cognitive instability and perseverance (higher scores on this subfacet imply higher levels of volatility) of the BIS-11 scale (Malesza & Ostaszewski, 2016). In greater accordance with its theoretical conceptualization, Machiavellianism was found as a negative predictor of lack of perseverance and lack of premeditation (Kiire et al., 2020), reflecting its thoughtful, strategic nature. In addition, Machiavellianism no longer showed a positive link to DII dysfunctional impulsivity when entered into a regression model in early work by Jones and Paulhus (2011), which highlights the necessity of partialling out interrelations among the dark triad/tetrad traits in order to work out their unique effects. This issue was most recently re-emphasized in a meta-analysis computing both the raw and residualized associations between dark triad traits and impulsivity. When shared variance across the dark triad components was accounted for, only psychopathy showed robust and strong positive associations with impulsivity across different types of measurement. Narcissism showed only negligible and measurement-dependent associations with impulsivity. Machiavellianism was also found unrelated to impulsivity after overlap between the traits was controlled for. The effects were slightly different when the dirty dozen measure was utilized to assess the dark triad traits. In fact, obtained patterns of effects of Machiavellianism and psychopathy were hardly any different, not only for impulsivity, but also other outcome variables. Hence, these observations may be due to the type of measurement rather than similarities between the traits. As far as residualized associations are concerned, single construct approaches, as well as employment of the short dark triad measure, have been able to sufficiently distinguish between the three traits and their nomological networks (Vize et al., 2018).

Effects on individual facets of trait impulsivity, however, were not the subject of the meta-analysis. In addition, as compared to the dark triad traits, much less empirical evidence is available on the links between everyday sadism and impulsivity. One study reported a positive correlation with DII dysfunctional impulsivity (March et al., 2017) and Blötner et al. (2022) observed positive correlations between everyday sadism, as measured by the short dark tetrad scale, and all dimensions of the UPPS-P, with largest effect sizes for positive urgency. How these effects may be altered when intercorrelations between dark traits, as well as the effect of other covariates, are controlled for, however, is unclear. Besides, effects of the dark tetrad components on the different dimensions of impulsive personality have only gained little scientific attention. Data that will be presented in the subsequent section aim at tackling the issues and research gaps mentioned in the sections above.

19.10 Novel data on impulsive personality, the big five and the dark tetrad

19.10.1 Research objective

The present chapter has so far presented a series of findings obtained on trait impulsivity in relation to "normal-range" and "dark" personality models, among others. Equally, it has highlighted the weaknesses in extant literature, which are aimed at being tackled here. These include (1) insufficient regard for the overlap and intercorrelations between predictor variables; (2) poor consideration of the influence of relevant third variables or covariates; and (3) deficient control for multiple testing artifacts. Beyond that, (4) individual effects of the big five on different dimensions of impulsive personality are unclear in light of (1) and (2) and there is (5) uncertainty regarding the explanatory power of the dark tetrad beyond the big five. Following on from this aspect, it is also (6) not known, whether and how everyday sadism exhibits an effect on the dimensions of impulsive personality in general and beyond its three dark companions. Furthermore, many studies have considered (7) rather homogeneous samples of undergraduates that are typically young and educated.

19.10.2 Methods

In order to address the research gaps, as well as methodological and statistical issues mentioned earlier, a cross-sectional online survey was conducted. Data were collected in Germany through an online panel provider. During data cleaning, cases with self-reported untruthful response behaviors ($n = 25$), nonbinary gender ($n = 1$), and careless or monotonous response behaviors (i.e., cases with zero intra-individual variance on scales under investigation; $n = 43$) were removed. The final dataset consisted of $N = 1313$ individuals with a roughly even gender ratio of $n = 620$ females (47.22%) and $n = 693$ males (52.78%) and a mean age of $M = 37.37$ ($SD = 12.37$) years. The sample was diverse in terms of education level, with most study participants having

intermediate secondary school-leaving certificates ($n = 559$, 42.57%), followed by university or university of applied science degrees ($n = 311$, 23.69%), high school diploma ($n = 193$, 14.70%), and lower secondary school-leaving certificates ($n = 165$, 12.57%). The remaining participants had vocational baccalaureate diploma ($n = 71$, 5.41%), PhDs ($n = 12$, 0.91%) or no school-leaving qualifications ($n = 2$, 0.15%). Occupation wise, most participants were employed ($n = 858$, 65.35%) and regarding marital status, the majority were married ($n = 471$, 35.87%) or single ($n = 413$, 31.45%). Together the sociodemographic characteristics indicate that data were obtained from a large and diverse sample.

The big five were measured by means of the German 45-item version of the Big Five Inventory (BFI-45, Rammstedt & Danner, 2017). Eight items each assess extraversion and neuroticism, while conscientiousness is assessed with nine items, and ten items each capture agreeableness and openness to experience. Dark tetrad traits were assessed using a German translation of the short dark tetrad scale (SD4, Paulhus et al., 2021) comprising 28 items, of which seven items capture each trait. The German I-8 scale (Kovaleva et al., 2014) was employed to tap into the four dimensions of impulsive personality as carved out by Whiteside and Lynam (2001) with two items each. Beyond that, study participants provided information on socio-demographic variables and completed a range of further inventories that were assessed as part of a larger project. Inclusion criteria were German native speaker level, minimum age of 18 years and (digital) informed consent. Data collection was completely anonymized and the study was approved by the local ethics committee at Ulm University.

19.10.3   Results

Detailed information on means, standard deviations, and McDonald's Omega of the scales under study, as well as their zero-order bivariate correlations are presented in Table 19.2. Notably, depicted are Spearman's rho rank correlation coefficients due to non-normality of variables (see Appendix 19.A1 for Shapiro−Wilk test statistics and detailed descriptive statistics and see Appendix 19.A2 for additional Pearson's r correlation coefficients). In addition, p-values are Holm-adjusted to control for multiple testing artifacts.

Examination of potentially confounding variables revealed meaningful associations for age with all variables except for openness (Table 19.2). With regard to gender differences, males had substantially higher sensation seeking scores and exhibited significantly higher mean values on all dark tetrad traits. By contrast, females were more extraverted, agreeable, and conscientious and had higher neuroticism and lack of premeditation scores than males. Gender-specific descriptive statistics and Wilcoxon test statistics can be obtained from Table 19.3.

After having inspected relevant covariates of the variables of interest, separate ordinary least squares (OLS) hierarchical multiple linear regression models were computed for each of the four impulsivity factors—urgency, lack of premeditation, lack of perseverance, and sensation seeking—as outcomes. For each regression analysis, age and gender (dummy-coded with male = 0 and female = 1) were added

Table 19.2 Means, standard deviations, and internal consistencies of the variables of interest alongside Holm-adjusted zero-order bivariate correlations (Spearman's ρ).

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	ω
1 Age	37.37	12.37														
2 Urgency	2.68	1.04	−0.21													0.79
3 Lack of premeditation	2.37	0.92	−0.10	0.40												0.83
4 Lack of perseverance	2.23	0.79	−0.17	0.23	0.40											0.61
5 Sensation seeking	3.03	0.98	−0.24	0.29	0.16	−0.04										0.89
6 Extraversion	3.23	0.77	0.10	−0.07	−0.03	−0.29	0.23									0.86
7 Neuroticism	2.86	0.82	−0.26	0.37	0.18	0.31	−0.06	−0.39								0.87
8 Conscientiousness	3.68	0.64	0.21	−0.33	−0.40	−0.65	−0.02	0.33	−0.39							0.83
9 Agreeableness	3.50	0.54	0.14	−0.27	−0.20	−0.22	−0.12	0.19	−0.39	0.33						0.73
10 Openness	3.27	0.62	0.01	0.05	−0.08[a]	−0.11	0.25	0.29	−0.09[a]	0.14	0.13					0.80
11 Narcissism	2.58	0.73	−0.12	0.20	0.02	−0.10	0.37	0.42	−0.16	0.05	−0.12	0.32				0.82
12 Machiavellianism	3.26	0.59	−0.11	0.19	−0.18	−0.12	0.18	−0.00	0.06	0.05	−0.15	0.07	0.27			0.71
13 Psychopathy	2.05	0.79	−0.10	0.49	0.35	0.22	0.37	0.02	0.22	−0.33	−0.48	0.06	0.44	0.17		0.83
14 Everyday sadism	2.19	0.81	−0.23	0.34	0.15	0.17	0.26	−0.07	0.16	−0.26	−0.43	−0.04	0.31	0.24	0.54	0.82

M, Mean; *SD*, standard deviation; ω, McDonald's Omega; *Openness*, openness to experience. $p < .001$ in **bold**, $p < .01$ in *italics*.
[a] $p < .05$.

Table 19.3 Descriptive statistics in the male and female samples alongside Wilcoxon test statistics for gender differences.

	Females (n = 620)		Males (n = 693)			
	M	SD	M	SD	W	p
Age	35.74	12.10	38.83	12.44	245,138.00	<.001
Urgency	2.69	1.07	2.67	1.02	213,671.00	.860
Lack of premeditation	2.43	0.94	2.31	0.89	200,487.00	.033
Lack of perseverance	2.20	0.81	2.25	0.77	223,527.00	.200
Sensation seeking	2.91	1.00	3.14	0.95	244,016.00	<.001
Extraversion	3.27	0.78	3.19	0.76	201,107.00	.045
Neuroticism	3.07	0.81	2.68	0.79	155,151.00	<.001
Conscientiousness	3.73	0.62	3.63	0.66	196,977.00	.009
Agreeableness	3.54	0.53	3.47	0.55	195,660.00	.005
Openness	3.29	0.64	3.26	0.61	207,255.00	.270
Narcissism	2.50	0.70	2.65	0.74	242,229.00	<.001
Machiavellianism	3.16	0.59	3.35	0.58	256,806.00	<.001
Psychopathy	1.92	0.75	2.17	0.81	254,651.00	<.001
Everyday sadism	1.95	0.73	2.40	0.82	284,607.00	<.001

M, Mean; *SD*, standard deviation; *n*, number of participants per subsample; *W*, Wilcoxon's W test statistic; *p*, *p*-value.

as a first block. In order to investigate the predictive influence of the big five beyond those demographic characteristics, they were entered in a second block. Finally, the third block included the dark tetrad traits, to gain information on their account for variance in impulsive personality beyond the big five.

19.10.3.1 Urgency

Age and gender accounted for $R^2_{adj} = 4.24\%$ of the variance in urgency, whereas younger age corresponded with higher urgency ($\beta = -0.21$, $p < .001$). Addition of the big five traits in model 2 elevated the explained variance to $R^2_{adj} = 22.07\%$. Neuroticism was the variable to most strongly predict urgency ($\beta = 0.31$, $p < .001$), followed by a negative effect of conscientiousness ($\beta = -0.20$, $p < .001$). The remaining big five traits also significantly predicted urgency, though effect sizes were overall small in magnitude. Extraversion ($\beta = 0.13$, $p < .001$) and openness ($\beta = 0.08$, $p = .002$) predicted urgency positively and higher agreeableness ($\beta = -0.10$, $p < .001$) was associated with lower urgency. Entering the dark tetrad into model 3 led to a significantly better account for variance with $R^2_{adj} = 35.24\%$. Specifically, psychopathy positively and strongly predicted urgency ($\beta = 0.38$, $P < .001$), while Machiavellianism ($\beta = 0.11$, $p < .001$) and everyday sadism ($\beta = 0.07$, $p = .020$) also exhibited significantly positive, albeit small effects on urgency. Detailed effect sizes for the regression analysis are shown in Table 19.4.

Table 19.4 Hierarchical multiple linear regression with *urgency* as the outcome variable.

	Model 1			Model 2			Model 3		
	$F_{(2,1310)} = 30.08; p < .001$			$F_{(7,1305)} = 54.09; p < .001$			$F_{(11,1301)} = 65.90; p < .001$		
	b(SE)	β	*p*	b(SE)	β	*p*	b(SE)	β	*p*
(Intercept)	3.36(0.10)		<.001	2.73(0.34)		<.001	−0.24(0.37)		.507
Age	−0.02(0.00)	−0.21	<.001	−0.01(0.00)	−0.10	<.001	−0.00(0.00)	−0.06	.016
Gender	−0.03(0.06)	−0.01	.593	−0.13(0.05)	−0.06	.018	0.07(0.05)	0.03	.171
Extraversion				0.18(0.04)	0.13	<.001	0.08(0.04)	0.06	.035
Neuroticism				0.40(0.04)	0.31	<.001	0.34(0.04)	0.27	<.001
Conscientiousness				−0.32(0.05)	−0.20	<.001	−0.20(0.04)	−0.12	<.001
Agreeableness				−0.20(0.05)	−0.10	<.001	0.18(0.05)	0.09	<.001
Openness				0.14(0.04)	0.08	.002	0.05(0.04)	0.03	.268
Narcissism							−0.01(0.05)	−0.01	.787
Machiavellianism							0.19(0.04)	0.11	<.001
Psychopathy							0.50(0.04)	0.38	<.001
Everyday sadism							0.09(0.04)	0.07	.020
R^2		0.0439			0.2249			0.3578	
Adj. R^2		0.0424			0.2207			0.3524	

F, F-test statistic; *p*, p-value; *b*, unstandardized regression coefficient; *SE*, standard error; β, standardized regression coefficients; R^2, coefficient of determination/explained variance; *Adj. R^2*, adjusted coefficient of determination.

19.10.3.2   Lack of premeditation

As with urgency, younger age exhibited a positive effect on lack of premeditation, however, hardly contributed to variance in the outcome variable with $R^2_{adj} = 1.17\%$. Inclusion of the big five traits led to a significant better model with $R^2_{adj} = 18.11\%$ of explained variance in lack of premeditation. While extraversion ($\beta = 0.17$, $p < .001$) related to higher lack of premeditation, conscientiousness showed a strong negative association ($\beta = -0.39$, $p < .001$) with the outcome variable. Smaller negative, yet significant effects were found for agreeableness ($\beta = -0.11$, $p < .001$) and openness ($\beta = -0.06$, $p < .001$). Interestingly and in contrast to urgency as the dependent variable, no meaningful effect of neuroticism was observed ($p = 0.265$). Consideration of the dark tetrad in the third step accounted for significantly more variance in lack of premeditation, $R^2_{adj} = 26.10\%$. Again, psychopathy exhibited a strong positive effect ($\beta = 0.32$, $p < .001$). Machiavellianism ($\beta = -0.19$, $p < .001$) inversely predicted lack of premeditation, as did narcissism ($\beta = -0.09$, $p = .011$), but to a smaller extent. Table 19.5 presents detailed results of the blockwise regression with lack of premeditation as the outcome.

19.10.3.3   Lack of perseverance

Just as for the aforementioned facets of impulsive personality, age was also negatively related to lack of perseverance, but demographic variables only accounted for little variance with $R^2_{adj} = 3.10\%$. Inclusion of the big five traits into the regression model led to a major change in explained variance by $\Delta R^2_{adj} = 0.3875$, resulting in $R^2_{adj} = 41.85\%$. Conscientiousness ($\beta = -0.60$, $p < .001$) exhibited a strong negative effect on lack of perseverance. Beyond this, a small positive effect was found for neuroticism ($\beta = 0.06$, $p = .039$), and extraversion ($\beta = -0.05$, $p = .050$) had a marginal negative effect on lack of perseverance. Further inclusion of the dark tetrad only slightly, but significantly increased the explained variance to $R^2_{adj} = 42.67\%$. Only Machiavellianism ($\beta = -0.10$, $p = < .001$) demonstrated a significant negative effect on lack of perseverance above the big five traits and the effect size was small. Also, no predictive effect of psychopathy ($p = .393$) was observed on lack of perseverance as outcome variable. These observations together indicate that lack of perseverance appears to be already well captured by the big five traits. Detailed effect sizes for the regression analysis are depicted in Table 19.6.

19.8.3.4   Sensation seeking

Male gender ($\beta = -0.15$, $p = < .001$) and younger age ($\beta = -0.26$, $p = < .001$) were associated with higher sensation seeking; $R^2_{adj} = 7.77\%$. Additional inclusion of the big five traits improved the predictive power significantly and elevated the overall explained variance to $R^2_{adj} = 22.07\%$. Precisely, extraversion ($\beta = 0.22$, $p < .001$) and openness ($\beta = 0.24$, $p < .001$) both positively predicted sensation seeking, while negative effects of agreeableness ($\beta = -0.17$, $p < .001$) and, to a lesser extent, of neuroticism ($\beta = -0.07$, $p = .030$) could be observed. The third model also comprising the dark tetrad traits accounted for $R^2_{adj} = 29.92\%$ of

Table 19.5 Hierarchical multiple linear regression with *lack of premeditation* as the outcome variable.

	Model 1			Model 2			Model 3		
	F(2,1310) = 8.74; $p < .001$			F(7,1305) = 42.44; $p < .001$			F(11,1301) = 43.12; $p < .001$		
	b(SE)	β	p	b(SE)	β	p	b(SE)	β	p
(Intercept)	2.59(0.09)		<.001	4.50(0.30)		<.001	4.35(0.35)		<.001
Age	−0.01(0.00)	−0.09	<.001	−0.00(0.00)	−0.00	.890	−0.00(0.00)	−0.04	.127
Gender	0.10(0.05)	0.05	.051	0.16(0.05)	0.09	.001	0.13(0.05)	0.07	.007
Extraversion				0.20(0.04)	0.17	<.001	0.18(0.04)	0.15	<.001
Neuroticism				0.04(0.04)	0.04	.265	0.03(0.04)	0.02	.473
Conscientiousness				−0.55(0.04)	−0.39	<.001	−0.41(0.04)	−0.29	<.001
Agreeableness				−0.18(0.05)	−0.11	<.001	−0.06(0.05)	−0.03	.248
Openness				−0.09(0.04)	−0.06	.021	−0.09(0.04)	−0.06	.020
Narcissism							−0.11(0.04)	−0.09	.011
Machiavellianism							−0.29(0.04)	−0.19	<.001
Psychopathy							0.37(0.04)	0.32	<.001
Everyday sadism							−0.04(0.04)	−0.04	.246
R^2		0.0132			0.1854			0.2672	
Adj. R^2		0.0117			0.1811			0.2610	

F, F-test statistic; *P*, P-value; *b*, unstandardized regression coefficient; *SE*, standard error; *β*, standardized regression coefficients; R^2, coefficient of determination/explained variance; *Adj. R^2*, adjusted coefficient of determination.

Table 19.6 Hierarchical multiple linear regression with *lack of perseverance* as the outcome variable.

	Model 1			Model 2			Model 3		
	$F(2,1310) = 21.99; p < .001$			$F(7,1305) = 135.88; p < .001$			$F(11,1301) = 89.79; p < .001$		
	b(SE)	β	p	b(SE)	β	p	b(SE)	β	p
(Intercept)	2.69(0.07)		<.001	4.98(0.22)		<.001	5.38(0.26)		<.001
Age	−0.01(0.00)	−0.18	<.001	−0.00(0.00)	−0.04	.109	−0.00(0.00)	−0.05	.023
Gender	−0.08(0.04)	−0.05	.059	−0.00(0.04)	−0.00	.944	−0.04(0.04)	−0.02	.314
Extraversion				−0.05(0.03)	−0.05	.050	−0.05(0.03)	−0.05	.087
Neuroticism				0.05(0.03)	0.06	.039	0.06(0.03)	0.06	.020
Conscientiousness				−0.74(0.03)	−0.60	<.001	−0.71(0.03)	−0.58	<.001
Agreeableness				0.02(0.03)	0.02	.507	0.01(0.04)	0.00	.873
Openness				−0.01(0.03)	−0.01	.715	0.00(0.03)	0.00	.960
Narcissism							−0.02(0.03)	−0.01	.630
Machiavellianism							−0.13(0.03)	−0.10	<.001
Psychopathy							0.03(0.03)	0.03	.393
Everyday sadism							−0.01(0.03)	−0.01	.688
R^2		0.0325			0.4216			0.4316	
Adj. R^2		0.0310			0.4185			0.4267	

F, F-test statistic; *p*, p-value; *b*, unstandardized regression coefficient; *SE*, standard error; β, standardized regression coefficients; R^2, coefficient of determination/explained variance; *Adj. R^2*, adjusted coefficient of determination.

variance in sensation seeking, which was positively predicted by psychopathy ($\beta = 0.29$, $p < .001$). A small positive effect was moreover found for Machiavellianism ($\beta = 0.06$, $p = .030$). Table 19.7 provides detailed information on the results for sensation seeking as the dependent variable.

19.11 Discussion

An overview of the results drawn from the regression models is given in Table 19.8.

Regarding the big five traits, many of the results found here reinforce previous findings on the UPPS and I-8 scales. The findings observed for conscientiousness confirm the findings from prior research across both the UPPS impulsive behavior scales and the I-8 (Groskurth et al., 2022; Keye et al., 2009; Kovaleva et al., 2014; Whiteside & Lynam, 2001). However, unlike Keye et al. (2009), the present study did not identify a significant effect of conscientiousness on sensation seeking. Moreover, both the positive effect of neuroticism on urgency as well as the positive effect of extraversion on sensation seeking could be once again strengthened with the present data (Groskurth et al., 2022; Keye et al., 2009; Kovaleva et al., 2014; Whiteside & Lynam, 2001). Agreeableness was found to inversely predict urgency, lack of premeditation, and sensation seeking, but not lack of perseverance, which is not fully in accordance with some previous works (Groskurth et al., 2022; Keye et al., 2009). However, it is noteworthy that the two studies just mentioned did not investigate associations in regression models. Beyond this, a substantial positive effect was observed of openness on sensation seeking, which approves what has recently been reported in Groskurth et al. (2022).

Among the dark tetrad traits, psychopathy could be carved out as most robustly predicting higher impulsive personality, as has been demonstrated in previous studies (Jones & Paulhus, 2011; Kiire et al., 2020). However, in contrast to the work of Kiire et al. (2020), no positive effect was observable on lack of perseverance with the present dataset, which may be explained by the strong overlap of conscientiousness and this impulsivity dimension. Also of note is that the internal reliability of lack of perseverance was comparably low with Mc Donald's $\omega = 0.61$, which may have affected the results further. Taken together, the findings still strongly support the impulsive nature of psychopathy. As previously reported in the Kiire et al. (2020) study, Machiavellianism had negative effects on lack of premeditation and lack of perseverance. This finding again emphasizes the notion of the trait as characterized by foresight and careful thinking and planning, weighing the consequences of actions, and seeing an endeavor through to completion. The observation of a small positive effect of Machiavellianism on urgency is therefore all the more surprising and requires further replication with more comprehensive inventories such as the UPPS-P scales. Narcissism was mostly unrelated with impulsive personality, with the exemption of a small negative effect on lack of premeditation. Negligible effects of narcissism on trait impulsivity were also reported in the meta-analysis by Vize et al. (2018). The finding of a positive association of narcissism

Table 19.7 Hierarchical multiple linear regression with *sensation seeking* as the outcome variable.

	Model 1			Model 2			Model 3		
	$F_{(2,1310)} = 56.23; p < .001$			$F_{(7,1305)} = 54.08; p < .001$			$F_{(11,1301)} = 51.92; p < .001$		
	b(SE)	β	*p*	b(SE)	β	*p*	b(SE)	β	*p*
(Intercept)	3.93(0.09)		<.001	3.28(0.32)		<.001	1.23(0.36)		<.001
Age	−0.02(0.00)	−0.26	<.001	−0.02(0.00)	−0.27	<.001	−0.02(0.00)	−0.24	<.001
Gender	−0.29(0.05)	−0.15	<.001	−0.27(0.05)	−0.14	<.001	−0.13(0.05)	−0.07	.010
Extraversion				0.28(0.04)	0.22	<.001	0.18(0.04)	0.14	<.001
Neuroticism				−0.08(0.04)	−0.07	.031	−0.11(0.04)	−0.10	.002
Conscientiousness				−0.04(0.04)	−0.03	.340	0.04(0.04)	0.03	.303
Agreeableness				−0.30(0.05)	−0.17	<.001	−0.03(0.05)	−0.01	.625
Openness				0.37(0.04)	0.24	<.001	0.29(0.04)	0.18	<.001
Narcissism							0.07(0.04)	0.05	.102
Machiavellianism							0.09(0.04)	0.06	.030
Psychopathy							0.35(0.04)	0.29	<.001
Everyday sadism							0.04(0.04)	0.03	.277
R^2		0.0791			0.2249			0.3050	
Adj. R^2		0.0777			0.2207			0.2992	

F, F-test statistic; *p*, p-value; *b*, unstandardized regression coefficient; *SE*, standard error; β, standardized regression coefficients; R^2, coefficient of determination/explained variance; *Adj. R^2*, adjusted coefficient of determination.

Table 19.8 (Simplified) Overview of effects observed in the present study.

	Urgency	Lack of premeditation	Lack of perseverance	Sensation seeking
1	(−) Age	(−) Age	(−) *Age*	(−) Age (+) *Male gender*
2	(+) *Extraversion* (+) Neuroticism (−) Conscientiousness (−) *Agreeableness* (+) Openness	(+) *Extraversion* (−) Conscientiousness (−) *Agreeableness* (−) Openness	(−) Extraversion (+) Neuroticism (−) Conscientiousness	(+) Extraversion (−) Neuroticism (−) *Agreeableness* (+) Openness
3	(+) *Machiavellianism* (+) Psychopathy	(−) Narcissism (−) *Machiavellianism* (+) Psychopathy	(−) *Machiavellianism*	(+) Machiavellianism (+) Psychopathy

Note. All effects presented here reached statistical significance. The numbers 1−3 on the right side of the table refer to the model from which the results have been taken for the table. (+) Positive effect, (−) negative effect. Underlined variables showed effects with $\beta \geq |0.20|$, *italicized* variables had effects of $|0.10| \leq \beta \leq |0.19|$.

with sensation seeking as in Kiire et al. (2020) was not supported with the present data. However, extraversion and narcissism have been found to share variance (Fernández-del-Río et al., 2020; Ong et al., 2011; Wang, 2017). This finding was also supported with the present data ($\rho = 0.42$, $p < .001$) and extraversion already predicted sensation seeking positively in the regression models. It is therefore reasonable that narcissism does not explain any further variance in sensation seeking beyond extraversion. Finally, the present study did not yield any significant effects of everyday sadism beyond the other traits. This finding can be attributed either to the methodological challenge of distinguishing measurements of sadism from those of psychopathy, as discussed recently (Blötner & Mokros, 2023). Or, sadism simply exhibits no effect on the four impulsivity facets when its overlap with psychopathy is controlled for. So far, the strongest bivariate associations had been reported for everyday sadism with positive urgency (Blötner et al., 2022). However, this impulsivity facet was not considered in the construction of the economic I-8 scale. Accordingly, the effects require further exploration with the inclusion of positive urgency.

In summary, urgency was most strongly predicted by younger age, higher neuroticism, lower conscientiousness, and higher psychopathy. Lack of premeditation was most strongly predicted by lower conscientiousness and higher psychopathy, and lack of perseverance was almost exclusively and substantially influenced by conscientiousness, although Machiavellianism also showed a small effect. Sensation seeking, by contrast, was most strongly predicted by higher levels of extraversion, openness, and psychopathy. Notably, the direction of effects of Machiavellianism on impulsive personality varied by facet, which can be understood as an important distinguishing feature from psychopathy, for which again only positive effects were obtained. The data presented here provided further evidence that the distinction of the dark tetrad traits is useful. Nonetheless, a replication study is needed that employs a more comprehensive assessment of impulsive personality but performs equally rigorous statistical analyses. The inclusion of positive urgency as fifth dimension of trait impulsivity is particularly recommended for such future studies, to allow for the identification of differential effects of the predictor variables on different types or drivers (i.e., positive or negative affect) of urgency.

19.12   Summary and conclusion

The present chapter provided deep insights into the role of impulsivity from the perspective of personality psychology. Starting with an overview over important correlates of impulsivity, its relevance for pathologies as well as health relevant outcomes was pointed out. Subsequently, a detailed description was given of what exactly is meant by "personality." Further, the various approaches to defining and measuring impulsivity were discussed, underscoring the challenge of generalizing findings obtained from impulsivity research. Not only do behavioral measures correlate poorly with self-report measures of impulsivity, but there is also considerable

variation in how impulsivity is captured within these categories. Based on this, impulsive personality was described in more detail and widely used self-report inventories for its measurement were presented. After a brief look at its genetic nature, trait impulsivity was located in prominent personality models as the big five of personality. Because these models cannot fully describe the complexity of human personality, further approaches to the definition of socially deviant characteristics in particular were introduced, among which the dark triad/tetrad of personality represent a well-known taxonomy. In addition to a review of the associations between trait impulsivity and the personality models mentioned, the shortcomings and ambiguities of the previously available works were also outlined. With the aim of providing more clarity on the actual personality correlates of impulsivity, new data from a recent research project were analyzed, taking into account the methodological and statistical limitations of previous studies. This procedure eventually made it possible to identify the unique influences of various traits from "normal-range" and "dark" personality models on impulsive personality.

19.13 Outlook

Recent advances in personality research have pointed at a novel approach to assessing interindividual differences. Going beyond the self-report or laboratory approaches to personality mentioned, inferences on impulsivity may also be drawn from smartphone data (for a conceptual work on smartphone sensing, see Harari et al., 2017). Assessing real-world data has the potential of tackling the common constraints that come with self-report and experimental assessments. Whereas the former rely on individuals to accurately rate themselves, which requires sufficient interoceptive and self-reflection ability, the latter capture very specific skills in artificial environments. Thus both techniques are susceptible to biasing personality measurement. Further thoughts about the future of self-report measures in the digital age have recently also been shared in theoretical work by Montag et al. (2022).

By examining the digital footprints left by people as they interact with smartphones or on social media, it will likely be possible to link self-reported impulsivity to smartphone-log-data (for a tracking app see Montag et al., 2019), but perhaps also to derive digital data patterns robustly forming a higher order factor called impulsivity. These days, it is comparatively easy to carry out such investigations using mobile sensing technology and digital phenotyping methods (Baumeister & Montag, 2023). A number of studies linking smartphone data to personality have already been conducted on the big five, and their findings were even recently synthesized in a meta-analysis (Marengo et al., 2023). Some previous work has also suggested that digital footprints may be used to detect impulsivity. For instance, sensor data on battery usage and screen-checking frequency, as well as data from call logs, significantly predicted sensation seeking (Wen et al., 2021).

To name possible specific examples to measure impulsivity using mobile sensing technologies, impulsive choice may be reflected in rapid purchasing behaviors, distractibility/inattention might be demonstrated by fast and repeated switching between apps, while unlocking the smartphone once a notification pops up, as well as short reaction times to messages on social media can represent impulsive action. Such assumptions need to be further explored in upcoming studies.

Future research endeavors need to rely more on observing and tracking real-world behaviors and relating them to impulsivity across different situations. The study of digital footprints holds great potential to shed new light on impulsivity and thus further advance the knowledge about impulsivity. That being said, this novel approach to collecting data also raises new ethical issues that need to be addressed (Dagum & Montag, 2019; Montag et al., 2020).

Appendix 19.A1   Detailed descriptive statistics alongside Shapiro−Wilk tests of normality

	M	*SD*	*Mdn*	*Min*	*Max*	*Shapiro−Wilk*	*p*
Age	37.37	12.37	35.00	18.00	69.00	0.942	<.001
Urgency	2.68	1.04	2.50	1.00	5.00	0.957	<.001
Lack of premeditation	2.37	0.92	2.00	1.00	5.00	0.944	<.001
Lack of perseverance	2.23	0.79	2.00	1.00	5.00	0.946	<.001
Sensation seeking	3.03	0.98	3.00	1.00	5.00	0.952	<.001
Extraversion	3.23	0.77	3.25	1.00	5.00	0.992	<.001
Neuroticism	2.86	0.82	2.88	1.00	5.00	0.993	<.001
Conscientiousness	3.68	0.64	3.67	1.44	5.00	0.990	<.001
Agreeableness	3.50	0.54	3.50	1.70	5.00	0.996	.001
Openness	3.27	0.62	3.30	1.30	5.00	0.995	<.001
Narcissism	2.58	0.73	2.57	1.00	5.00	0.991	<.001
Machiavellianism	3.26	0.59	3.29	1.00	5.00	0.989	<.001
Psychopathy	2.05	0.79	1.86	1.00	4.86	0.944	<.001
Everyday sadism	2.19	0.81	2.14	1.00	5.00	0.965	<.001

M, Mean; *SD*, standard deviation; *Mdn*, median; *Min*, minimum; *Max*, maximum; *p*, *p*-value.

Appendix 19.A2 Holm-adjusted zero-order bivariate correlations (Pearson's *r*) between the variables of interest.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Age													
2 Urgency	**-0.21**												
3 Lack of Premeditation	*-0.10*	**0.40**											
4 Lack of Perseverance	**-0.17**	**0.23**	**0.39**										
5 Sensation Seeking	**-0.24**	**0.30**	**0.18**	-0.04									
6 Extraversion	0.09[a]	-0.07	0.01	**-0.28**	**0.24**								
7 Neuroticism	**-0.26**	**0.38**	**0.19**	**0.32**	-0.07	**-0.41**							
8 Conscientiousness	**0.20**	**-0.32**	**-0.38**	**-0.64**	-0.01	**0.34**	**-0.40**						
9 Agreeableness	**0.14**	**-0.27**	**-0.21**	**-0.21**	-0.12	**0.20**	**-0.39**	**0.32**					
10 Openness	0.02	0.05	-0.08	*-0.11*	**0.28**	**0.30**	-0.09[a]	**0.14**	**0.11**				
11 Narcissism	**-0.13**	**0.19**	0.00	*-0.11*	**0.39**	**0.44**	**-0.17**	0.09[a]	**-0.11**	**0.36**			
12 Machiavellianism	**-0.11**	**0.20**	**-0.18**	**-0.12**	**0.18**	-0.01	0.07	0.05	**-0.16**	0.08	**0.31**		
13 Psychopathy	**-0.12**	**0.50**	**0.33**	**0.20**	**0.37**	0.02	**0.22**	**-0.32**	**-0.48**	0.09[a]	**0.44**	**0.20**	
14 Everyday Sadism	**-0.23**	**0.34**	**0.14**	**0.15**	**0.28**	-0.05	**0.15**	**-0.25**	**-0.42**	-0.02	**0.33**	**0.26**	**0.57**

Note. Openness = Openness to Experience. $p < .001$ in **bold**, $p < .01$ in *italics*.
[a]$p < .05$.

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