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EMOTIONAL PROCESSES AS THE BASIS FOR DISTINGUISHING PSYCHOPATHY AND SADISM

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EMOCIONALNI PROCESI KAO OSNOVA RAZLIKOVANJA PSIHOPATIJE I SADIZMA

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Emotional processes as the basis for distinguishing psychopathy and sadism

Abstract

Introduction. Psychopathy and sadism represent overlapping, albeit distinct dark traits. They generally affect interpersonal interactions negatively, and bring damage to other individuals. They are both associated with aggressive and antisocial behavior, and deficient emotional processes. Psychopathy is usually characterized by deficits in experiencing negative emotions and difficulty to recognize them. This leads to a difficulty in inhibiting socially unacceptable behaviors. Unlike psychopathy, sadism is still less investigated. This trait holds enjoyment in other's suffering at its core, which is tightly related to achieving pleasure. Sadistic individuals have intensified positive response to violence, and it is believed this is source of their motivation to torture others. For this reason, it is suggested they probably have normal or better ability to recognize emotional expressions, along with getting positive reaction to distress of others.

Study objective. The main objective of the first study was to explore psychopathy and sadism in relation to emotional experience and aspects of social cognition, such as emotion perception and implicit emotional associations with violence. The main goal of our second study was to explore these traits in context of everyday emotional experience and situational characteristics.

Method. Data for our first study were collected on a sample of 235 university students using self-report measures of psychopathy and sadism (and Brutality as additional trait), and tasks covering different aspects of emotion-related processes – emotion perception, explicit emotional responses to violent and peaceful stimuli, and implicit emotional associations to violent and peaceful stimuli.

Our second study relied on Day Reconstruction Method administered to a subsample of 67 undergraduate students. In two days, we collected 1340 episodes comprising emotional experience in everyday context, situational ratings, and measures capturing subjective effects of interpersonal interactions. These were studied in relation with psychopathy, sadism, and additional dark traits (narcissism, Machiavellianism, Brutality).

Results. Results of our first study indicate differential relations of psychopathy and sadism with emotion perception ability. We confirmed broader deficit in psychopathy, with Cognitive responsiveness and Affective responsiveness as traits most robustly showing negative relations with this ability. On the other hand, sadism showed a positive contribution to identification of emotional expressions. In terms of emotional response to violence, we established different emotional profiles of psychopathic and sadistic individuals – while psychopaths have issues with appropriately generating negative emotions, sadistic individuals are characterized by positive reactivity to violence. Finally, using the implicit paradigm, we primarily showed relations with psychopathy, suggesting easier associating of pleasant emotions with violence.

Our second study used multilevel modeling to determine intra and inter-individual variance of dark traits and their cross-situational relations with emotional experience.

Even though we did not confirm several of our assumptions, especially regarding psychopathy, we showed sadism has links with general negative affectivity, perceived negativity, and adversity of experienced situations with perceived emotional distress.

Conclusion. Our results are mostly reflecting the existing literature on psychopathic traits, and add novel information to growing literature on sadistic traits. Especially relevant are the established differences in emotional processes between these traits. Furthermore, our diary study represents the first one to apply this method in research of sadism.

Key words: psychopathy, sadism, emotional processes
Scientific topic: Psychology
Narrow scientific topic: Individual differences
UDK:

Emocionalni procesi kao osnova razlikovanja psihopatije i sadizma

Rezime

Uvod. Psihopatija i sadizam su crte ličnosti sa izvesnim stepenom preklapanja, ali ujedno i distinktnim karakteristikama. Negativno utiču na međuljudske odnose i nanose štetu drugim pojedincima. Takođe, povezane su sa agresivnim i antisocijalnim ponašanjem, kao i sa deficitarnim emotivnim procesima. Psihopatiju obično karakterišu deficiti u doživljavanju negativnih emocija i teškoće u njihovom prepoznavanju. Takav emotivni obrazac dovodi do poteškoća u inhibiciji socijalno neprihvatljivog ponašanja. Za razliku od psihopatije, sadizam je manje istražen. Ova crta u svojoj suštini svodi se na uživanje u tuđoj patnji, što je usko povezano sa postizanjem zadovoljstva. Sadistički pojedinci imaju intenziviran pozitivan odgovor na nasilje i pretpostavlja se da je to izvor njihove motivacije da muče druge. To je razlog zbog kojeg se sugeriše da verovatno imaju normalnu ili bolju sposobnost prepoznavanja emocionalnih izraza, uz istovremenu pozitivnu reakciju na patnju drugih.

Cilj. Osnovni cilj prve studije bio je istraživanje psihopatije i sadizma u vezi sa emocionalnim iskustvom i aspektima socijalne kognicije, kao što su percepcija emocija i implicitne emocionalne asocijacije sa nasiljem. Naše drugo istraživanje bilo je pak usmereno na ispitivanje tih osobina u kontekstu svakodnevnog emocionalnog iskustva i situacionih karakteristika.

Metod. Podaci za našu prvu studiju prikupljeni su na uzorku od 235 univerzitetskih studenata pomoću self-report mera psihopatije i sadizma, i brutalnosti (kao dodatne crte), i zadataka koji pokrivaju različite aspekte emocionalnih procesa - percepciju emocija, eksplicitne emocionalne reakcije na nasilne i miroljubive stimuluse, kao i implicitne emocionalne asocijacije na nasilne i miroljubive stimuluse.

Naša druga studija oslanja se se na metodu rekonstrukcije dana koja je primenjena na poduzorku od 67 dodiplomskih studenata. U dva dana prikupili smo 1.340 epizoda koje uključuju emocionalno iskustvo u svakodnevnom kontekstu, procene situacija i mere subjektivnih efekata međuljudskih interakcija. Te mere su proučavane su u vezi sa psihopatijom, sadizmom i ostalim mračnim crtama (narcizam, makijavelijanizam, brutalnost).

Rezultati. Rezultati prvog istraživanja ukazuju na različite odnose psihopatije i sadizma sa sposobnostima percepcije emocija. Kod psihopatije, potvrdili smo širi deficit, sa kognitivnom i afektivnom responzivnošću kao crtama koje pokazuju najkonzistentnije negativne odnose sa tom sposobnošću. S druge strane, sadizam je pokazao pozitivan doprinos u identifikaciji emocionalnih izraza. U pogledu emocionalnog odgovora na nasilje, uspostavili smo različite emocionalne profile psihopatskih i sadističkih pojedinaca - dok psihopate imaju problema sa odgovarajućim generisanjem negativnih emocija, sadističke osobe karakteriše pozitivna reaktivnost na nasilje. Najzad, koristeći implicitnu paradigmu, prvenstveno smo pokazali odnose sa psihopatijom, sugerišući lakše povezivanje prijatnih emocija sa nasiljem.

Zaključak. Naši rezultati u celini odslikavaju postojeću literaturu o psihopatskim crtama i rastućim istraživanjima na temu sadističkih crta. Posebno su relevantne utvrđene razlike u

emocionalnim procesima između te dve crte ličnosti. Konačno, naša dnevnička studija predstavlja je prva koja je primenila ovu metodu u istraživanju sadizma.

Klučne reči: psihopatija, sadizam, emocionalni procesi
Naučna oblast: Psihologija
Uža naučna oblast: Individualne razlike
UDK:

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INTRODUCTION

Basic terminology used in the dissertation

Before going into a deeper description of the current theoretical and empirical background, we will first give a brief introduction into the specific terminology relevant for further understanding, despite risking a certain amount of redundancy throughout this dissertation.

Psychopathy, sadism, and other dark traits. Dark Triad represents a construct comprising three distinctive, yet somewhat overlapping constellation of traits: *psychopathy, narcissism*, and *Machiavellianism.* Further, *Dark Tetrad* represents a newer construct, which, besides the abovementioned traits, also includes *sadism* trait. In this thesis, we primarily focus on psychopathy and sadism. The terms *sadist(s)* or *psychopath(s)* are used to represent individual(s) with pronounced trait, i.e. a high scorer on a trait, so to make it easier on the reader. All the mentioned traits are occasionally called dark traits. These traits are thoroughly described in the following sections.

We should also state what this dissertation will not be focused on regarding these traits. The mentioned traits are, as one can assume, measured by different instruments developed over time, therefore our literature review will encompass findings obtained through various instruments. In this dissertation, the primary focus will not be the comparison of different scales, nor whether these traits should always be measured independently or within the Dark Triad/Tetrad (e.g. psychopathy can be measured with a specific scale, or together with Machiavellianism and narcissism), which are some of the discussions existing to this day. Our main focus is to deepen the knowledge on certain correlates and criteria with regard to psychopathy and sadism, and their potentially differing relationships to these phenomena.

Emotion processing/emotional processes. Even though we did not take a deep dive into overview of general models within social cognition and affective (neuro)science, this dissertation will use certain terms coming from these fields. One such term would be emotional processing. In our case, we used this expression as an umbrella term, which encompasses perception (identification) of emotional expressions, explicit emotional responses and implicit emotional associations.

Emotion perception. Hildebrandt and colleagues (2012) differentiate between face recognition and perception. Using this categorization, they clearly point out the difference between identifying/perceiving emotions (perception), and being able to recognize them from memory (recognition); moreover, they also differentiate between *face perception* and facial *emotion perception*. The first one is being defined as "Ability to perceive facial stimuli and to discern information about facial features and their configuration" (Wilhelm, Herzmann, Kunina, Danthiir, Schacht, & Sommer, 2010, p. 542), whereas the latter is

analyzing facial muscle position with the purpose of identifying specific emotional expression (Wilhelm, Hildebrandt, Manske, Schacht, & Sommer, 2014).

Explicit emotional responses versus implicit processing. Explicit emotional responding is understood as emotional sensitivity to a specific type of emotionally saturated stimuli. In the context of dark traits, stimuli depicting distressing events or distressed individuals are especially important. On the other hand, the term *implicit emotional processing,* measured via implicit associations, signifies an automatic and unwilling response (De Houwer & Moors, 2007; Lazarević & Orlić, 2015). This could also be understood as a form of cognitive processing of affective material.

Psychopathy and sadism in dark personality space

Within the field of individual differences in personality, the attention of researchers in the past period is particularly focused on the study of the so-called "Dark Triad", which includes traits of psychopathy, narcissism and Machiavellianism. *Psychopathy* is a constellation of traits that includes: manipulativeness, lack of empathy, and superficial charm and impulsivity; *narcissism* is primarily reflected in grandiosity and a sense of privilege and superiority, while *Machiavellianism* is characterized by unprincipledness, cynicism and manipulativeness (Furnham, Richards, & Paulhus, 2013). However, subclinical sadism was brought to the attention after the publication of Chabrol and collaborators, who first suggested integration of these traits into the “Dark Tetrad” (Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009). From that moment on, the scientific public became interested in sadism’s relation to other dark traits, as well as its behavioral manifestations. Sadism has been shown to be a trait that overlaps with other dark traits, but still possesses distinctive characteristics. Book and colleagues (Book et al., 2016), showed that sadism correlates more intensely with Machiavellianism and psychopathy than narcissism, confirming previous speculations that it could be a better representative of the Dark Triad (Lee & Ashton, 2005; Međedović & Petrović, 2015). Considering previous empirical findings, Paulhus (2014) emphasized the role of the HEXACO personality model in explaining dark personalities, especially the low end of Honesty-Humility trait, whose relationships with all Dark Triad traits have already been established (Ashton & Lee, 2001). As it turns out, the HEXACO model far outperforms others in explaining the dark structure of personality (Međedović & Petrović, 2015).

When it comes to the "core" of the Dark Tetrad, it correlates with low Honesty-Humility, Emotionality, Agreeableness, and Conscientiousness. The negative relations of Honesty and Agreeableness were obtained for all dark traits, representing the structure nested within the Dark Tetrad. Interestingly, sadism shares a similar pattern of relations with HEXACO model traits as psychopathy, but its strongest predictor is low Emotionality, while for psychopathy it is Honesty-Humility. Sadism was shown to correlate negatively with

Extraversion, probably indicating relatively poor social skills and social withdrawal (Međedović & Petrović, 2015), which is consistent in its relations with social skills as sub-categories of empathy (O'Meara, Davies & Barnes-Holmes, 2004). Data on moderate overlap of dark traits have also been confirmed in studies of juvenile delinquency (Chabrol, Melioli, Van Leeuwen, Rodgers, & Goutaudier, 2015). Moreover, so-called "dark personalities" have elevated levels of suicidal tendencies, while sadism and psychopathy predict suicidal ideation independent of depressive symptoms (Chabrol, van Leeuwen, & Rodgers, 2011).

In the following paragraphs, we will focus on the concepts of psychopathy and sadism separately, as well as past empirical research on these traits. We will also focus on their connection to emotional processes, such as: emotion perception, explicit emotional responses, as well as implicit emotional processing of peaceful and violent content.

Psychopathy

Conceptualization of psychopathy

Psychopathy is a syndrome of traits characterized by interpersonal, affective and behavioral attributes (Hare, 2001): *Interpersonal* - assuming the presence of manipulativeness, arrogance, grandiosity and domination; *Affective* - superficial affect, including a lack of empathy and guilt, as well as a deficit in generation of fear. These two sets of characteristics belong to the so-called Factor 1, and are considered the core traits of psychopathy. In addition, most models also consider *Lifestyle* - a disinhibited lifestyle, impulsiveness, inability to establish long-term emotional relationships (Patrick, Fowles, & Krueger, 2009). On the other hand, the position of Antisociality, the fourth trait that constitutes Factor 2 together with Lifestyle (Hare, 2003), has been largely questioned, with empirical findings suggesting that it is a potential behavioral consequence of psychopathy rather than its inherent quality (Međedović, Petrović, Kujačić, Đorić, & Savić, 2015; Skeem & Cooke, 2010). In this regard, psychopathy has long been studied in the context of crime, as a significant predictor of criminal relapse Leistico, Salekin, DeCoster, & Rogers, 2008). In addition, it is associated with various aspects of socially undesirable behavior: instrumental and reactive aggression (Blais, Solodukhin, & Forth, 2014), delinquent behavior (Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009; Vaughn, Newhill, DeLisi, Beaver & Howard, 2008), and even problematic behavior within an institution (Campbell, French, & Gendreau, 2009). Together with Machiavellianism and narcissism (and sadism), psychopathy is also studied as an indispensable element of the Dark Triad (Paulhus & Williams, 2002) and the Dark Tetrad of personality (Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009). Fearlessness, lack of empathy and flattened affect are the shared commonalities of this group (Dinić, Wertag, Tomašević, & Sokolovska, 2020; Marcus, Preszler, & Zeigler-Hill, 2018; Paulhus, 2014).

The perspective of this trait has somewhat shifted over time - from investigating it in context of penal institutions to addressing it as the concept of *successful psychopathy*. This way, researchers reconsidered an older assumption of the potential adaptive value of this trait (Lilienfled, 1998), whether it be to successfully avoid the consequences of criminal behavior, or adapt to emerging environmental conditions in general (Međedović, 2015). These shifts, together with questionable status of Antisociality, resulted in development of novel models: one such model, developed by Daniel Boduszek and collaborators, is used as framework in this dissertation (Boduszek, Debowska, Dhingra, & DeLisi, 2016). The Psychopathic Personality Traits Model (and scale) consists of four psychopathy traits (Boduszek, Debowska, & Willmott, 2018): *1. Affective responsiveness* – this trait is similar to Hare's callous affect and is generally considered a core psychopathic feature; it represents a lack of affective empathy and ability to emotionally resonate to other people's emotional states. Individuals high in this trait are emotionally detached and are indifferent to feelings of others; 2*. Cognitive responsiveness* – the trait that encompasses inability to cognitively understand and create mental representations of other people's emotional states and processes. However, the status of this trait has been questioned, because data show that the lack of cognitive empathy is actually a correlate, and not an integral psychopathic trait (Međedović, Bulut, Savić, & Đuričić, 2018); *3. Interpersonal manipulation* – aspect comprising psychopathic features such as dishonesty, superficial charm, arrogance and grandiosity; *4. Egocentricity* – the aspect which represents self-centeredness, proclivity of only focusing on oneself, and personal needs and interests.

This model reflects components of prior conceptualizations of psychopathy, such as Hare's Factor 1 (2001) or Levenson's primary psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995). The authors tried to overcome the problems in previous models, primarily by eliminating Hare's Factor 2 traits, Antisociality and Lifestyle (impulsiveness). This factor was shown to have poor generalizability and questionable differential predictive validity (Boduszek & Debowska, 2016). The PPTS measure clearly differentiates core psychopathy from Antisocial personality disorder as defined by DSM (American Psychiatric Association, 2013; Boduszek & Debowska, 2016). Additionally, authors also solved the debate on (un)successful psychopathy, by removing Factor 2, and leaving Factor 1, which generally has the greater adaptive potentials of the two (Jonason & Webster 2012; Međedović, 2019; Međedović, 2015). Finally, they also introduced a factor specifically capturing egocentricity, which was not measured as a separate trait before. That way, its predictive capabilities can be precisely studied, for example in relation to cognitive responsiveness and recognizing emotions of other people, or their reduced affectivity. They created a measure that is not contaminated by behavioral outcomes, and can be used in forensic and general population (Boduszek, Debowska, Dhingra & DeLisi, 2016).

Research on subclinical psychopathy

In this section, we give a brief overview of contemporary psychopathy research in non-clinical and non-forensic samples in order to offer the reader a context of nomological

network of subclinical psychopathy. Most of the studies in this area use self-report measures (for review see Hall & Benning, 2006; Lilienfeld, Fowler, & Patrick, 2006; Tsang, Salekin, Coffey, & Cox, 2018), unlike the ones used in prison and clinical samples (Psychopathy Checklist-Revised, PCL-R; Hare, 2003). In some instances, psychopathy was studied independently, and sometimes as a part of the Dark Triad measures (Paulhus, & Jones, 2015). One issue with measuring psychopathy as integral part of the Dark Triad/Tetrad is that a heterogeneous constellation of traits is reduced to a single score. These measures have lesser ability to detect effects of psychopathy due to lowered representativity, while also generating heterogeneity in the data, since subscales of psychopathy within different Dark measures differ to a great extent (e.g. SD3, Jones & Paulhus, 2014; Dirty Dozen, Jonason & Webster, 2010).

Relatively recent meta-analysis by Muris and colleagues singles out different categories of psychopathy correlates based on average effect sizes (from highest to lowest): *1. Aggression and delinquency* - bullying and violence; 2. *Interpersonal problems* - dominance and entitlement; *3. Sex related issues* - promiscuous behavior, sexual fantasies, sexual abuse; *4. Antisocial tactics* - deceit and negative humor; *5. Socioemotional deficits* - emphatic deficits and deficient emotional intelligence; 6. *Morality issues* - moral disengagement and immoral attitudes (Muris, Merckelbach, Otgaar, & Meijer, 2017).

Psychopathic individuals are prone to bullying other individuals in person (Baughman, Dearing, Giammarco, & Vernon, 2012; van Geel, Goemans, Toprak, & Vedder, 2017) and in cyber space (Goodboy & Martin, 2015), as well as undermining group work and interactions (Scherer, Baysinger, Zolynsky, & LeBreton, 2013). In line with that, they use aggressive humor and ridicule others in order to harm them (Međedović & Bulut, 2017; Proyer, Flisch, Tschupp, Platt, & Ruch, 2012), and are generally more aggressive (Crawley & Martin, 2006). They observe others as weaker and vulnerable (Black, Woodworth, & Porter, 2014), and are perceived by acquaintances as prone to risky behaviors, such as academic dishonesty, drug use and legal troubles (Marcus, Robinson, & Eichenbaum, 2019). Indeed, they are less concerned with social desirability (Kowalski, Rogoza, Vernon, & Schermer, 2018), they more frequently engage in scholastic cheating (Williams, Nathanson, & Paulhus, 2010), they take unnecessary and persistent financial risks (Jones, 2014), they cheat in conditions of both low and high risk of punishment (Jones & Paulhus, 2017), and are more often involved in criminal and driving misconducts, as well as drug abuse (Azizli et al., 2016).

Individuals with pronounced subclinical psychopathy engage in promiscuous sexual behaviors, coercive sexual strategies, and exhibit controlling behaviors (Williams, Spidel, & Paulhus, 2005). They exhibit psychological and physical abuse towards their romantic partners (Carton & Egan, 2017). They are drawn to violent and anti-social media, such as violent movies, violent sports and pornography (Williams, McAndrew, Learn, Harms, & Paulhus, 2001); they are more likely to engage in deviant sexual behavior, including sexual assault, and exhibit sadistic tendencies (Williams, Cooper, Howell, Yuille, & Paulhus, 2009). They also prefer short-term mating strategies (Jonason, Luevano, & Adams, 2012) and pursue mate poaching behaviors (Kardum, Hudek-Knezevic, Schmitt, & Grundler, 2015). Subclinical psychopathy is linked to frequent lying to a romantic partner resulting in a positive affect (Baughman, Jonason, Lyons, & Vernon, 2014), more frequent lying in

general, with the intention to dominate and potentially sexually exploit (Jonason, Lyons, Baughman, & Vernon, 2014).

Furthermore, psychopathy is associated with a tendency of making utilitarian moral judgements (although results are ambiguous, for review see Deruelle & Wicker, 2013; Djeriouat & Trémolière, 2014; Kahane, Everett, Earp, Farias, & Savulescu, 2015; Karandikar, Kapoor, Fernandes, & Jonason, 2019), and utilitarian choices (Deruelle & Wicker, 2013). Psychopaths with reduced affective-interpersonal capacities are also able to make these decisions with less difficulty (Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012). Some authors claim this is probably due to higher tolerance to perform harmful actions (Patil, 2015). Besides that, psychopathy is associated with certain socially relevant attitudes, such as: negative attitudes towards immigrants and seeing them as a realistic threat (threat to economy and societal order) (Međedović & Bulut, 2017), conservative political attitudes (Lilienfeld, Latzman, Watts, Smith, & Dutton, 2014), racially motivated attitudes and desire of joining racist organizations (Jones, 2013), and negative beliefs about the world and advocating violence (Međedović & Knežević, 2018).

As mentioned prior, one research domain is focused on subclinical psychopathy in corporate contexts, sometimes calling it successful psychopathy or corporate psychopathy. This field of research studies several mentioned aspects of psychopathic functioning. In that sense, we can either observe effects on psychopathic individuals themselves, as well as their effect on others. For example, it has been shown that psychopaths hold higher-risk occupations and managerial positions (Babiak, Hare, & McLaren, 2006; Lilienfeld et al., 2014), and are more successful in the workplace, salary and bonus-wise (Pavlić, & Međedović, 2019). On the other hand, psychopathy relates to weaker job performance and counterproductive work behavior operationalized via subjective criteria, such as co-worker ratings, and objective criteria, such as number of complaints (Forsyth, Banks, & McDaniel, 2012). These discrepancies in findings are explained primarily by different conceptualizations of subclinical psychopathy (Pavlić & Međedović, 2019). When observing effects psychopathic individuals have *on others* in their environment, the data pinpoint to mostly negative outcomes (Smith & Lilienfeld, 2013). For example, psychopathy is positively associated with careerism, chasing career by any means necessary (Chiaburu, Muñoz, & Gardner, 2013). Psychopaths are more prone to making unethical decisions by disengaging internal moral standards (Stevens, Deuling, & Armenakis, 2012), as well as using hard tactics such as threats to get their way (Jonason, Slomski, & Partyka, 2012). Corporate psychopaths tend to have unethical leadership styles and encourage similar behaviors in their employees (Boddy, 2014), while negatively affecting their well-being and job satisfaction (Mathieu, Neumann, Hare, & Babiak, 2014). However, recent meta-analytic findings show that psychopathy generally holds weak positive relations with leadership emergence, and weak negative correlations with perceived effectiveness of the leader (Landay, Harms, & Credé, 2019).

Authors, such as Klaus Scherer, define emotion-related skills and abilities under emotional competence (construct similar to emotional intelligence), a broad term representing capacity and competence in using emotional mechanisms (Scherer, 2007). He points out four aspects of emotional competence: emotional production, response preparation, regulation, and communication (Scherer, 2009). According to him, individual differences in emotion perception and production (and their mentioned sub-domains), result in a different level of adaptation to environment. More precisely, individuals with suboptimal competencies would have trouble conveying and receiving important social cues about behavioral intention during social interaction, as well as predicting behavioral responses. So far, psychopathy has been primarily associated with two sub-competencies of communication - perception (identification) and recognition of emotional expressions, and, to some extent, emotional responsiveness and production. There are three perspectives when it comes to explaining psychopathic emotional deficits (Brook, Brieman, & Kosson, 2013; Kosson, Vitacco, Swogger, & Steuerwald, 2016). The first one claims that psychopaths have a *general deficit in cognitive abilities* – deficits in attention and inhibition (Dadds, Masry, Wimalaweera, & Guastella, 2008; Hiatt & Newman, 2006), or general mental ability (Olderbak, Mokros, Nitschke, Habermeyer, & Wilhelm, 2018) that then reflect in emotional deficits. The second one assumes that psychopaths have *general emotional deficits*, i.e. issues in experiencing and processing emotions in general (Cleckley, 1941; Dawel, O'Kearney, McKone, & Palermo, 2012). Finally, the third one claims that psychopathic individuals have only *specific emotional deficits*, some including weak fear responses, and at the same time trouble recognizing and understanding sadness and fear (Blair, 2005) or other particular emotions, such as disgust (Kosson, Suchy, Mayer, & Libby, 2002). Nevertheless, one should note that reviews show that neither of the perspectives is unequivocally supported by empirical evidence, and there are certainly moderating factors to be considered, such as stimulus complexity, attention, and perceptual load (Baskin-Sommers, Curtin, & Newman, 2013; Brook et al., 2013).

Broad emotion-related constructs and psychopathy. Individuals with pronounced psychopathy suffer from certain socioemotional deficits, and these deficits are addressed using different constructs and conceptualizations. For example, the construct associated with this trait is *emotional intelligence.* It encompasses abilities for intra- and interpersonal emotion recognition and regulation, which contribute to enhanced everyday functioning (Salovey & Grewal, 2005). Meta-analytic study by Megías and colleagues (2018), in which the majority of sample studies came from the general population, showed that lower emotional intelligence is (moderately) associated with pronounced psychopathic traits (as previously obtained on inmates, e.g. Malterer, Glass, & Newman, 2008). Furthermore, *empathy* represents a part of emotional intelligence, but is primarily studied as an independent construct, especially in regards to dark traits. Empathy is most often viewed as a two-dimensional construct. First aspect is *affective/emotional empathy*, which includes empathic concern and ability to emotionally resonate and share emotional state of another (rudimentary system, requiring perception-action coupling, Preston & de Waal, 2002), whereas *cognitive empathy* assumes ability of taking perspective of another, attribute

mental states and understand them (a more complex system, requiring awareness and inputs from long-term memory, Brook & Kosson, 2013). The existence of these systems was confirmed on behavioral and neuroanatomical bases (Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). Cognitive empathy is further differentiated into inference of *emotional states*, and more complex inference of *beliefs and intentions* (Brook & Kosson, 2013). Empathy is also defined through its *functional* interrelated components, which have to act in synergy to result in an empathic response (Decety & Jackson, 2004): *affective sharing* (response to another person and their emotional state), *self-other awareness* (recognizing similarity between self and other but separating the two), and *regulatory mechanisms* (mental flexibility for perspective taking and self-regulating). In all, empathy enables us to make predictions about psychology and behavior of other individuals (and environmental context), and is probably underlying cooperative and altruistic behaviors (de Vignemont & Singer, 2006). Interestingly, authors do have different stances on *emotion recognition* as aspect of empathy: while some claim it belongs to cognitive empathy (Brook & Kosson, 2013; Wai & Tiliopoulos, 2012), others suggest it belongs to affective empathy (Besel & Yuille, 2010; Dhingra & Boduszek, 2013; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009; Wai & Tiliopoulos, 2012).

Subclinical psychopathy is associated with *global empathic deficits* (Ali & Chamorro-Premuzic, 2010; Jonason & Krause, 2013). So far, psychopathy has mostly been linked with diminished affective empathy. Studies investigating relations of dark traits and empathy using image-based empathy measures showed psychopathy has strongest negative associations with *affective empathy* out of all dark traits, but no relations with *cognitive empathy* were found (Oliver, Neufeld, Dziobek, & Mitchell, 2016; Wai & Tiliopoulos, 2012). Such findings were confirmed on adult, as well as youth community samples (Jones, Happé, Gilbert, Burnett, & Viding, 2010; Mullins-Nelson, Salekin, & Leistico, 2006). On the other hand, data on psychopathy and cognitive empathy are still not clear. Some studies did register the relationship with reduced cognitive empathy using self-report measures (Pajevic, Vukosavljevic-Gvozden, Stevanovic, & Neumann, 2018), whereas some obtained this result on inmates, using simulation of interpersonal interaction (Brook & Kosson, 2013). When discussing these studies, we also have to consider the way empathy is operationalized, and the samples used. Some of these studies which also included certain forms of emotion perception and emotional responsiveness will be corroborated further.

Emotion perception and recognition in psychopathy. Successful *emotion perception* (identification) and recognition are important prerequisites for social interaction (Keltner & Haidt, 1999), and are considered by many a key element of empathy, necessary for regulating social interactions and cooperative behavior (De Waal, 2008). In everyday experience and interactions, emotion identification and recognition happen simultaneously with picking up other cues from the environment. These abilities are shown to be efficient even with increased cognitive load (Tracy & Robins, 2008). Research on *emotion recognition* in psychopathy is numerous and points to certain empathic deficits (Shamay-Tsoory, Harari, Aharon-Peretz, & Levkovitz, 2010), as well as a general deficit in emotion recognition in psychopathic convicts, which is even more pronounced when observing facial expressions of lower intensity (Hastings, Tangney, & Stuewig, 2008). It is also present in the assessment of dynamic emotional expressions with integrated vocal aspects, especially in the case of negatively valenced emotions (Brook & Kosson, 2013); at the

individual trait level, Interpersonal and Lifestyle traits are associated with a deficit in the recognition of positively valenced emotions, while Affective and Antisociality traits with negatively valenced emotions. It is these deficiencies in perceiving and experiencing aversive emotions that are considered an underlying mechanism for risk-taking and potential violation of social norms (Berkout, Gross, & Kellum, 2013).

Individuals with pronounced psychopathic traits are characterized by deficit in recognition of *fear* (Dolan & Fullam, 2006) and *sadness* (Wilson, Juodis, & Porter, 2011). However, these characteristics seem to be independent of criminality: they occur both in the criminal and general population (Iria, Barbosa, & Paixao, 2012; Marsh & Blair, 2008), and among members of both sexes (Hastings et al. 2008; Seara-Cardoso, Dolberg, Neumann, Roiser, & Viding, 2013). In this regard, persons with pronounced psychopathic traits mistakenly evaluate brief facial expressions of anger, sadness, surprise or neutral as joy, while categorizing fear as anger, which can certainly contribute to the weaker inhibition of aggressive behavior (Eisenbarth, et al., 2008). Empirical studies also include samples of children, showing that those with pronounced psychopathic traits have a difficulty recognizing sad and frightened emotional expressions (Stevens, Charman, & Blair, 2001). Furthermore, children with these traits require more time to recognize such expressions. In the case of the greater degree of sadness or fear, the likelihood of error is significantly higher (Blair, Colledge, & Mitchell, 2001). Insensitivity to fear signals also manifests on automatic level in children with superficial affect (Sylvers, Brennan, & Lilienfeld, 2011). There are some indications that affective and interpersonal factor of psychopathy (so called Factor 1 - callousness, i.e. lack of empathy and guilt, superficial charm), might play a greater role in deficit to detect or recognize fear, besides having impact on deficiency in other emotional expressions (Dawel et al., 2012).

Psychopathy is associated with impaired recognition of positively valenced emotions, i.e. *joy* (Hastings, Tangney, & Stuewig, 2008; Pham & Philippot, 2010), with accompanying lower subjective arousal (Eisenbarth et al., 2008) and poorer brain responses to such facial expressions than non-psychopaths (Deeley et al., 2006). Additionally, some authors report deficits in recognizing the emotion of disgust (Waage, 2008). These findings indicate potential presence of a general deficit in emotion recognition, which is confirmed by certain meta-studies (Dawel et al., 2012; Wilson et al., 2011).

However, the discussion on psychopathic deficit in emotion perception and recognition deficits is far from over. On one hand, a study by Olderbak et al. (2018) conducted on both inmates and non-inmates, indicates that deficit in emotion perception in psychopathic individuals can entirely be explained by deficit in general mental ability (Olderbak et al., 2018). On the other hand, a recent set of studies indicated that psychopathic traits (measured by PCL-R) are principally not associated with general nor specific deficits in emotion recognition in a student (Kosson et al., 2019) and offender sample (Beussink, Chi, Walsh, Riser, & Kosson, 2020), indicating that effects obtained in prior studies are probably artifacts arising from usage of emotion recognition tests that differ in discriminating power.

Emotional responses in psychopathy. Another important aspect of emotional functioning besides ability to recognize emotions is the *emotional response* to different types of stimuli. Within this area of research, it is common to use different types of visual or verbal material that activate the so-called appetitive (pleasant motivational states) or defensive (aversive, unpleasant motivational states) action systems in relation to specific emotions (Bradley, Codispoti, Cuthbert, & Lang, 2001). Additionally, a related domain is *emotional information processing,* a term we adopted from Steuerwald and Kosson (2000). This domain encompasses a broader number of themes where emotion and cognition intertwine. Simply put, it represents the effect of emotional stimuli on different aspects of cognitive processing, starting from emotion recognition (which we singled out as a separate topic), responding to emotionally saturated words (lexical decision), effect of emotional information on memory recall, aversive conditioning, and even implicit associations. Findings coming from these different approaches are summarized to give a more cohesive understanding of psychopathic emotional experience (for a more detailed review of the methods see Brook, Brieman, & Kosson, 2013).

Specifics of emotional experience in psychopathy have been discovered even at the level of *everyday baseline affect*. Del Gaizo and Falkenbach (2008) showed primary psychopathy (callousness, shallow affect, glibness, manipulativeness) correlates with lowered general negative affect (measured by PANAS), while secondary psychopathy (impulsiveness, absence of long-term goals, parasitic lifestyle, hostility) correlates with increased negative affect. Similarly, Hare's Factor 1 of psychopathy is associated with increased positive affect, while Factor 2 with increased negative affect (Hicks, Markon, Patrick, Krueger, & Newman, 2004, as mentioned in Del Gaizo & Falkenbach, 2008). However, one of the crucial characteristics of psychopathy is the deficit in generating emotions of fear and sadness (Hare, 2003). The emotion of fear, and therefore the conditioning that involves this emotion, helps predict potential threats or unpleasant outcomes, leading to their avoidance (LeDoux, 2003). Today, the so-called Integrated Emotional System is most commonly used in explaining empirical findings on emotional deficits in psychopathy (Blair, 2005). This model focuses on the deficit in recognizing emotional expressions of sadness and fear, and assumes that persons with pronounced psychopathic traits have a reduced ability to process signs of distress (which, by default, would cause the observer to have an aversive reaction) and lowered ability of experiencing fear (Blair, 2005). This leads to reduced moral reasoning, leading to potentially harmful and violent behavior (Marsh & Cardinale, 2012). Thus, this version of the model integrates two area of our interest: emotion perception/recognition and emotional experience.

Indeed, psychopathic individuals exhibit reduced subjective arousal when observing almost all of emotional expressions, especially in the case of anger and disgust (Eisenbarth et al., 2008). They are also characterized by a poorer *electrodermal autonomic response* to signs of distress, e.g. crying (Blair, Jones, Clark, & Smith, 1997). This is supported by studies showing that adolescents with higher scores of psychopathy report lower intensity and lower frequency of emotion of fear than non-psychopaths, as well as absence of significant changes in subjective sympathetic arousal in fear-inducing situations, compared to ones that induce other negative emotions (Marsh et al., 2011). The presence of Blair's system (2005) is also supported by findings on deficits in passive avoidance of stimuli that

increase the likelihood of punishment, and the difficulty of forming associations between stimulus and punishment (Blair et al., 2004). Furthermore, it is supported by neural findings of reduced activation of limbic structures, primarily the amygdala (Kiehl et al., 2001), and its diminished volume (Tiihonen et al., 2000).

The findings also show weakened *aversive conditioning* (unpleasant odor as unconditional and a neutral facial expression as a conditional stimulus) in psychopaths compared to the control group, although the reactions (startle reflex, psychogalvanic reflex, etc.) to the unconditioned stimulus were of the same intensity in both groups. This suggests that processing of aversive stimuli itself is not a problem, but an emotional association around the stimulus, and the related deficient interaction of limbic subcortical and cortical structures (Flor, Birbaumer, Hermann, Ziegler, & Patrick, 2002). Later findings showed the same deficit in the use of *electric shock* as the unconditional stimulus: persons with heightened psychopathy, even if they learn the association between stimuli, do so without processing their emotional significance (Rothemund et al., 2012). Also important are findings that psychopathic convicts with a pronounced Affective trait exhibit the poorest ability of fear conditioning (Veit et al., 2013), which is related to impaired activation of the limbic-prefrontal circuit: the amygdala, orbitofrontal cortex, insula, and anterior cingulate gyrus (Birbaumer et al., 2005; Müller et al., 2003). The authors hypothesize that this dissociation between cognitive and emotional processing is at the root of the missing anticipation of aversive stimuli. Difficulty of integrating emotion and cognition in psychopathic individuals also agrees with data on deficient recognition of emotional expressions, related to reciprocal reduction in functional connectivity of the left amygdala and prefrontal cortex (Contreras-Rodríguez et al., 2014).

The fear-generated *startle reflex* paradigm has also been used to study emotional processing in psychopathy; a study by Levenston and colleagues (2000) compared psychopaths and non-psychopaths in assessing categories of neutral, pleasant (erotic or arousing) and unpleasant photographs (violence or threat to self). The premise is that the startle reflex to a sudden sound (like white noise when viewing visual stimuli) involves attention and emotional processes; in the case of display of pleasant and aversive stimuli (relative to neutral), this reflex is first inhibited (due to focusing attention on significant stimuli), and in the next step of processing aversive stimuli, the protective system is activated, i.e. intensified blinking. Thus, it has been hypothesized that inhibition of the startle reflex to a sudden sound when observing aversive stimuli in psychopaths actually represents a deficiency of this defense system (Levenston et al., 2000). This study indicated an increased level of tolerance for aversive stimuli in psychopaths: they inhibit startle reflex when observing scenes of violence, suggesting that their response to stimuli is primarily orientational in nature (rather than emotionally defensive). On the other hand, the finding of weaker potentiation while observing a threat indicates a slower transition from the orientation phase to the defense phase. Based on these findings, the authors conclude that deficits in psychopathy are not only limited to identifying and observing the distress of others, but also include reaction to potential threats and low fear. This reduced responsiveness to distressing stimuli (e.g. crying) is a significant correlate of heightened proactive aggression in psychopaths, a relationship already visible in children (Kimonis, Frick, Fazekas, & Loney, 2006), and adults (Reidy, Zeichner, & Foster, 2009).

Due to the specific relation of psychopathic traits with violence, some studies focus on *subjective emotional responses* to different types of violent stimuli. Experimental study by Pham and collogues compared psychopathic and non-psychopathic inmates, and found no difference in subjective appraisal of emotion-inducing film stimuli (on basic emotions) between these groups; psychopaths did have diminished self-reported bodily sensations to these stimuli, although this was not registered with objective physiological measures (Pham, Philippot, & Rime, 2000). However, there are indications that stimuli in this study were not discriminative enough in terms of fear and anger, which is very important when studying psychopathy. Some studies show that psychopathic inmates rate aversive and violent images as less unpleasant, whereas pleasant content as more pleasant (Levenston, Patrick, Bradley, & Lang, 2000). Data obtained on non-forensic samples, with emotional responses averaged based on valence, showed relations of psychopathy with increased positive emotions to violent images, and increased negative emotions to peaceful images, indicating an aberrant emotional profile (Međedović, 2017). When using video stimuli, callous-unemotional individuals (shallow affect, lack of empathy and guilt) exhibit reduced subjective valence response to both violent and positive (comedy) videos, respectively, as well as reduced facial electromyography (Fanti, Panayiotou, Lombardo, & Kyranides, 2016), confirming deficit in generating positive emotions. It is very probable that different psychopathic traits have different links with response to violence, and that this deficit extends beyond negatively valenced stimuli. Also, in these studies it would be important to account for shared variance between psychopathy and sadism, which we focus on in the present study.

Finally, one of interesting paradigms for studying psychopathic emotional processes in context of violence uses *implicit affective associations* to violent stimuli. In this context, although affective (emotional) associations are studied, they are still considered specific aspects of beliefs or attitudes. The now famous Implicit Association Task (IAT) is based on the premise that the associations between concepts are stronger if the given responses are faster. More specifically, associations between target-concepts and evaluative dimension (Lazarević & Orlić, 2015). In a seminal study by Gray and colleagues (2003), they used the implicit associations paradigm and showed that homicidal psychopathic offenders have diminished unpleasant responses to violence in comparison to non-psychopathic. In this study, the IAT stimuli were words from pleasant/unpleasant category, and words from violent/peaceful category, while psychopathy was measured via ratings (PCL-R). They interpreted this result with murderers' deviant beliefs about violence, while claiming that it does not stem from impulsivity or poor decision making (Gray, MacCulloch, Smith, Morris, & Snowden, 2003). Further, the same group of authors showed that these deficits are primarily associated with Factor 1, consisted of *interpersonal traits* - manipulativeness, arrogance, grandiosity, and *affective traits* - superficial affect, lack of empathy, callousness (Snowden, Gray, Smith, Morris, & MacCulloch, 2004). It is assumed that such a pattern of implicit cognitions on violence allows these individuals to engage in it without feeling negative emotions and distress (Snowden & Gray, 2010). On the other hand, some findings indicate that positive implicit attitudes towards violence correlate with the *antisocial trait* of psychopathy. These were obtained on a more heterogeneous group of offenders with multiple psychiatric diagnoses, including antisocial personality disorder (Zwets et al., 2015). Conversely, some studies showed no correlation whatsoever. For example,

Međedović (2017) showed that none of the self-reported psychopathy traits correlate with affective implicit association scores in a sample of convicts. Besides considering the difference in data collection (rating vs. self-report), this author gave a very important suggestion: unlike his study, previous ones did not into account trait sadism, which shares notable amount of variance with psychopathy. In his study, sadism was significantly predicted by IAT scores. This finding represents a very important basis for the assumptions in our study, and will be corroborated further in the context of sadism, and its differences from psychopathy.

Finally, existing literature suggests that psychopathic individuals do not have a reduced anger response. On the contrary, a majority of studies show their anger response might be intact (Lobbestael, Arntz, Cima, & Chakhssi, 2009; Steuerwald, Brown, Mneimne, & Kosson, 2017; Marsh et al., 2011), or more intense (Hicks & Patrick, 2006). For instance, psychopaths have increased reactivity of the electrodermal response to angry faces relative to distressed faces (Blair et al., 1997). Additionally, by studying reactions to interpersonal conflicts, Reidy et al. (2013) showed that experience of anger depends on the type of psychopathic trait. While individuals high on Factor 1 react with decreased anger, ones high on Factor 2 have increased anger response. Studies on psychopathic convicts, which used the lexical decision task, pointed to a deficit in processing of emotionally saturated words and their use in decision making (Lorenz & Newman, 2002). More specifically, they showed association between Factor 2 (antisociality and impulsiveness) and facilitated processing of "angry" words, and Factor 1 (manipulativeness and shallow affect) with impaired processing of "sad" words (Reidy, Zeichner, Hunnicutt-Ferguson, & Lilienfeld, 2008). The latter was linked with proactive aggression (Reidy et al., 2009). These findings altogether show different nature of these traits with experience and processing of anger. While antisocial and impulsive individuals seem to be more prone to angry reactions and have facilitated processing of anger, emotionally detached and manipulative ones have lowered or intact anger response, but problem with processing sad stimuli.

In summary, broad literature indicates that psychopathic individuals lack the ability to empathize, mainly have trouble perceiving or recognizing fear (but other emotions too), while also having reduced fear response and trouble processing fear and distress-related stimuli; this pattern of inability to recognize the same emotion one is unable to feel, confirms the lack of empathizing ability (Marsh, 2013). In contrast, the sadism trait, which primarily shares callousness with psychopathy, is hypothesized to be associated with preserved, or even increased ability of emotion perception/recognition. Moreover, it is additionally characterized with increased positive emotions to suffering of others (Kirsch & Becker, 2007).

Sadism

Conceptualization of sadism

In contemporary literature, sadism is defined as enjoyment in humiliation of others, as well as the long-term intentional infliction of physical, sexual or physical suffering, for the sake of one's own pleasure and establishing dominance (O'Meara, Davies, & Hammond, 2011). Historically, sadism was first investigated in the context of *sexual sadism*, in convicted and clinical populations (Eher et al., 2016), and its presence measured primarily via criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM), as sexual deviation, and then as sexual paraphilia (Beech, Miner, & Thornton, 2016). However, the superiority of certain behavioral indicators over clinical diagnosis of sexual sadism has been demonstrated in predicting relapse in sexual and violent offenses (Kingston, Seto, Firestone, & Bradford, 2010), as well as the absence of differences between sexually sadistic and non-sadistic offenders in criminal history, self-reports, and phallometric data (Marshall, Kennedy, & Yates, 2002). In addition, the problem with such a concept of sadism is illustrated by the fact that reliable measures are still being developed (Marshall & Kennedy, 2003), and that there is a high percentage of overlap between sexual sadism and sadistic personality disorder (Berger, Berner, Bolterauer, Gutierrez, & Berger, 1999). *Sadistic personality disorde*r is another form of this concept studied in clinical and forensic populations; however, it did not 'survive' the fourth revision of the DSM (American Psychiatric Association, 2000), primarily due to potential legal abuse and justification of cruel behavior, but also its low prevalence (Millon et al, 2004). All this pointed to a definite need for a different conceptualization and operationalization of sadism.

The research of Chabrol and colleagues (2009) was particularly significant for this field of study, being the first to examine and obtain moderate relationships of sadism (.27-.37) with psychopathy, narcissism, and Machiavellianism. This led the authors to conclude that these are independent constructs with a moderate overlap, and to propose the concept of the *Dark Tetrad* of personality for the first time (Chabrol et al., 2009). These researchers also confirmed the dimensional nature of this construct and its presence in the general population (O'Meara et al., 2011). However, unlike the usual conceptualization of sadism, where emphasis has been placed on *instrumental motivation* and establishing dominance (O'Meara et al., 2011; Chabrol et al., 2011), some authors emphasize *appetitive motivation*, where the tendency to hurt and humiliate another is an end in itself (Buckels, 2012). This tendency to enjoy inflicting pain on others and deriving pleasure from it is a feature which differentiates sadism from other dark traits (Paulhus & Jones, 2015). In order to clearly separate the *subclinical concept* and operationalization of sadism from previous ones, and introduce sadism as a characteristic of a normal personality, some authors also use the term *everyday sadism* (Buckels, 2013). In this dissertation the term sadist will be used exclusively in the context of individuals with heightened scores on the trait of sadism, and most often in the general population, unless otherwise indicated.

Research on subclinical sadism

Subclinical studies of sadism associate this trait with various forms of malevolent interpersonal behavior, primarily with tendency to engage in behaviors harmful to others, whether psychological and verbal, or physical. This is usually labeled as core or direct sadism (Paulhus & Jones, 2015; O'Meara, Davies, & Hammond, 2011). Another form of this trait is *vicarious sadism,* sadism "by proxy", a tendency to live through sadistic experiences indirectly, by observation. This can be done by engaging in symbolic violence, such as watching horror movies, violent sports, or playing violent video games. Sadism is associated with numerous forms of malicious behavior. It predicts critiquing others for their failure using indirect-ironic or direct criticisms, as well as using ironic praise after their success (Tortoriello, Hart, & Richardson, 2019). Similarly, sadism is linked to usage of cynicism and aggressive humor (Međedović & Bulut, 2017). Moreover, in specific situations, such as communication with a person in mourning, sadists observe mourners' reactions as being funny, feel entitled to getting something for their time and effort invested in that interaction, and express more Schadenfreude - enjoyment in witnessing other's misfortunes (Lee, 2019). Everyday sadism also predicts hostile femininity in women, which includes using strategies as gossiping and social rejection towards other females (Russell & King, 2017).

Sadism has been further studied in digital context and *trolling*, the act of deliberately making cynical comments and starting conflicts on the internet (Kircaburun, Jonason, & Griffiths, 2018); even in specific cyber environments, such as online dating platforms (Duncan & March, 2019; March, Grieve, Marrington, & Jonason, 2017). Sadism has the strongest relationships of all the dark traits with time spent trolling, and the intensity of pleasure derived from trolling (Buckels, Trapnell, & Paulhus, 2014; Craker & March, 2016). Sadistic individuals are more likely engage in *cyber stalking* of current intimate partners, as well as former and potential ones (Smoker & March, 2017). In sadists, trolling is obviously associated with pleasure, and when pleasure is statistically controlled, this association decreases by half. Sadism is a successful predictor of *cyberbullying*, in addition to marginally significant narcissism and psychopathy, and the only predictor of physical violence when controlling for other dark and Big Five traits (van Geel, Goemans, Toprak, & Vedder, 2016). A similar idea of using certain "channels" to satisfy one's own vicious intentions has led researchers into studying the connection of sadism and violent video game play. These studies showed unique stable associations of physical (vs. verbal) sadism with time spent playing this type of games, which makes sense given that digital scenarios involve primarily the use of physical violence (Greitemeyer, 2015). This finding was also confirmed longitudinally - not only that these individuals play violent video games more often, repeated exposure to these games predicts sadism over long periods of time, further indicating their mutual reinforcement (Greitemeyer & Sagioglou, 2017). Sadism is also linked to fascination with weapons and sadists are shown to use violent game play as means to channel it (Gonzalez & Greitemeyer, 2018).

Although sadism has proven associations with self-reported physical aggression and revenge-seeking (Chester & DeWall, 2018), there is a growing number of studies using paradigms and experimental tasks with one major overlapping feature: *inflicting pain or damage to a victim*, by administering painful stimuli, noise or other means. For example, sadism, operationalized through a faster reaction time to "joyful" words after depicting violent images in a *lexical decision task*, increases the likelihood of proactive aggression (Reidy, Zeichner, & Seibert, 2011), but it is also a predictor of reactive aggression expressed via the intensity of white noise inflicted on another individual (Buckels, Jones, & Paulhus, 2013). Study by Buckels and colleagues (2013) showed that it is the only dark trait which positively predicts the intensity of investing to actively punish an innocent opponent: only persons with elevated sadism trait invest extra effort and resources (in this case, performing tedious tasks) in order to harm the opponent, even when there is no specific reason for revenge. In their extensive study, Chester, DeWall, and Enjaian (2019) obtained interesting findings on relations of sadism and aggression using several different paradigms (administering aversive noise, hot sauce allocation to another individual, showing horrifying images, and pins to voodoo dolls representing symbolical way to harm a human). Even when controlling for other dark traits and trait aggression, sadism had positive association with aggressive behaviors across all the mentioned paradigms. It can not only be linked to reactive retaliatory form of aggression, but also to proactive aggression towards innocent victims (in line with Buckels et al., 2013). Such findings once again indicate that sadism has a specific "quality" that sets it apart from other dark traits: an intrinsic tendency to inflict pain or harm on innocent victims, appetitive in nature and highly independent of external stimuli. Consistent with this is the finding that only persons with elevated sadism engage in antisocial punishment in the common goods game after explicit existential threat (priming by death-related questions) (Pfattheicher & Schindler, 2015; Pfattheicher, Keller, & Knezevic, 2017). Sadism also predicts the choice of tasks that involve inflicting pain on non-human species (such as bugs), independently of other dark traits (Buckels, Jones, & Paulhus, 2013).

A topic that is rarely addressed is the link between *delinquency* and sadistic traits in non-clinical samples. Chabrol et al. (2009) showed that sadism, in addition to psychopathy, is an independent predictor of self-reported delinquent behavior in young men (brawl, drunkenness at school, carrying a cold weapon). Additionally, core sadism is the strongest predictor of *vandalism* (destroying objects for pleasure) out of all dark traits (Pfattheicher, Keller, & Knezevic, 2019). Sadism is associated with self-reported *sexual coercion* (Klann, 2017). Moreover, its physical aspect is associated with Rape Myth Acceptance, i.e. inaccurate *beliefs about rape* (e.g. victim blaming), as well as history of *sexual assault perpetration*; on the other hand, vicarious sadism is associated with increased mistrust and hostility towards women in male national samples (Russell & King, 2016). This trait is also linked with broader social attitudes and beliefs, such as positive attitudes towards dangerous social groups (Dinić, Bulut Allred, Petrović, & Wertag, 2020), anti-egalitarian views and support of hierarchical social organization as aspects of social dominance (Zeigler-Hill et al., 2020).

Subclinical sadism is associated with certain *phenomena akin to clinical*. For example, studies point to a relationship between sadism and suicidal tendencies within the youth population (Chabrol et al., 2011): even when controlling for other

psychopathological and familial variables (presence of depression, substance abuse, borderline personality traits, attachment), sadism has a unique contribution to self-reported suicidality, and is significantly correlated with increased suicidality in people with severe depressive symptoms. Additionally, sadism has moderate correlation with psychosis proneness (schizotypy/disintegration), a disposition towards psychotic-like experiences, while sadistic aberrant emotional responses in sadism (positive emotions to violence and reduced positive emotions to peaceful stimuli) resemble parathymic emotional profile (Međedović, 2017).

The mentioned studies show that subclinical sadism represents a valid psychological construct, reflected in different forms of aberrant behavior, which all comprise elements of hurting others. However, a crucial topic is how this trait relates to emotional processes, and whether these play an integral role in reinforcing sadistic tendencies.

Emotional processes in sadism

Previous research on emotion identification and emotional experiences in sadists is still rare, and not as narrowly focused as is the case with psychopathy. Previous studies conducted in the context of sexual sadism offer very interesting findings that could help gain insight into emotional reactivity and emotion recognition in sadistic individuals, and help generate ideas for future research (Kirsch & Becker, 2007; Mokros, Osterheider, Hucker, & Nitschke, 2011). In the case of sadism, perceiving emotions of others (or perceiving individuals in pain) and internal emotional response to those emotions are often intertwined; studies that specifically measure success in identifying and recognizing emotions are rare. Furthermore, some of the findings (e.g. ones obtained in forensic context) should be taken with a grain of salt because of the nature of the sample and the conceptualization of the trait (Kirsch & Becker, 2007).

Emotion perception and recognition in sadism. One of the supposed mechanisms underlying affective deficits in sexual sadism in addition to poorly generated *emotional responses* is perception and *recognition of emotions* - sadists may lack the ability to empathize with other people, but there are some indications they are able to perceive their own negative emotions (Burgess, Hartman, Ressler, Douglas, & McCormack, 1986), and are even successful in processing and perceiving emotions of others, with the goal of achieving greater success in inflicting pain and harm on another (Warren, Hazelwood, & Dietz, 1996). For example, rapists with pronounced psychopathic traits (and potentially sadistic ones) are different from non-psychopathic rapists when it comes to emotional responses; it is possible that persons who lack the ability to experience intense emotions engage in instrumental sexual violence (Brown & Forth, 1997). However, we do have to be cautious when making extrapolations to the general population. One newer study, conducted on general population, showed an inverse association of psychopathy and sadism with performance in emotion recognition. Moreover, when controlling for the shared variance,

sadism was the only significant predictor (Pajevic, Vukosavljevic-Gvozden, Stevanovic, & Neumann, 2018). In this study, the authors used the famous The Reading the Mind in the Eyes test as emotion recognition task; in fact, some researchers have recommended its usage for emotion recognition instead of using it to measure the ability to represent mental states, as many have done before (Oakley, Brewer, Bird, & Catmur, 2016). However, this task is considered somewhat limited in its psychometric characteristics when used in normal adult population, such as poor internal consistency and homogeneity (Olderbak et al., 2015). Nevertheless, this study is in line with the fact that both sadism and psychopathy are negatively associated with accuracy in perceiving traits of other people during first encounters, i.e. they have negative effect on interpersonal assessment of other people (Rogers, Le, Buckels, Kim, & Biesanz, 2018). Sadism is frequently studied in relation to *perceiving and estimating pain and distress* in others, and the resulting *subjective experience*. Very recent findings by Buckels and colleagues showed that both sadism and psychopathy are negatively associated with the perceived pain intensity (observing and rating photographs of people in physical or emotional suffering), meaning that they underestimate the intensity of observed pain (Buckels, Trapnell, Andjelovic, & Paulhus, 2019). However, the fact that sadists downplay pain of others is very interesting, since some previous findings indicate they might do just the opposite – overestimate it. Certain neuropsychological findings show that sadists overestimate others' pain intensity: the activity of the left amygdala (presumed reward center) is increased in sexual sadists when observing the image of pain sufferers, and there is a tendency to overestimate the intensity of pain experienced by those persons (compared to non-sadists), indicating increased sensitivity to the pain of others (Harenski, Thornton, Harenski, Decety, & Kiehl, 2012). This is in line with O'Meara and colleagues' (2011) assumption that sadists are likely to have a cognitive empathetic ability to understand their victim's internal state, but they lack the appropriate emotional response to the pain and suffering of others (O'Meara, Davies, & Hammond. 2011). We do have to consider a very important fact - the findings that show that sadists underestimate the pain come from the general population, whereas the one indicating they overestimate it comes from a clinical sample, albeit stricter method.

Emotional responses in sadism. Certain data indicate that sadism is not associated with any aspect of self-reported emotional dysregulation: rejection of emotional responses, difficulty in controlling impulses, limited access to strategies for emotional regulation, and lack of emotional clarity (Zeigler-Hill & Vonk, 2015), suggesting that enjoying others' suffering may not come from awareness of their own emotions and their regulation, but a specific pattern of responses to suffering and violence. In that vein, previously mentioned study by Buckels and colleagues showed that sadism is positively associated with pleasure felt from observing the pain of other people. The same study showed that sadists underestimate the pain of others *because* it is pleasurable for them, maybe as a form of rationalization (Buckels et al., 2019). The findings on positive responses to pain of others are in line with the study by Međedović (2017), showing increased positive responses to observing images depicting violent interactions. More specifically, this study showed that sadistic individuals do have a specific pattern of reactions to the affective states of others and violent and nonviolent scenes - when observing stimuli depicting nonviolent or peaceful social interactions, they report reduced positive emotions. Moreover, when observing violent stimuli, they report an increased intensity of positive emotions

(Međedović, 2017). The authors also provide a new potential explanation for the underlying mechanisms, incorporating the relationships of violence with the Behavioral Activation System (BAS) into sadism research. This construct comes from the Reinforcement Sensitivity Theory, and has been used in explaining findings on psychopathy (Wallace, Malterer, & Newman, 2009). The aforementioned results on positive reactions to violent stimuli support the findings of on the core characteristic of sadism: enjoyment in the suffering of others.

Previous studies have successfully identified some of sadism's *behavioral manifestations*: it successfully predicts the choice of tasks that involve inflicting pain on other living beings (using the bug-killing paradigm), independently of other dark traits (Buckels, Jones, & Paulhus, 2013). What makes these findings even more interesting is that individuals with pronounced sadism had a lower level of positive emotions than non-sadists *after* the task – specifically those who opted for tasks that did not involve killing, suggesting that they probably regretted their decisions. On the other hand, sadistic "bug killers" reported significantly higher levels of satisfaction (than sadists non-bug killers), which increased with the number of bugs killed. It is probable that sadists enjoy engaging in cruel activities, which they evidently find rewarding, to offset the low baseline level of positive affect (Buckels et al., 2013). The previously mentioned study by Chester et al. (2019) gave additional insights into sadism and expression of aggressive behavior and pleasure by studying it across several paradigms (e.g. noise blasting). Their findings were that, *during* the aggressive act, sadism was positively related with pleasure, especially when it was perceived that the victim was suffering due to that act (compared to no victim suffering). There was one finding that contradicts Buckels et al. (2013): sadism was not associated with increased positive, but with increased negative affect *after* the aggressive act. Since the authors controlled for the general negative affect, it cannot be said that this result stems from sadists generally experiencing more intense negative emotions. Comparing it with the "bug-crushing" study, the authors suggested that the differences in findings stem from the type of targets used in these studies: in their study the targets were human, while the former used bugs. Nevertheless, based on their general results, these authors support the assumption that sadistic individuals perceive aggression itself as a potential mood-improving mechanism, due to its awarding nature (Chester & DeWall, 2017). These studies jointly show that sadists are very willing to make an effort for the sake of their own pleasure, that sadistic tendencies are probably being reinforced through the pleasurable violent episodes (Chester, Lynam, Milich, & DeWall, 2018), and that they probably utilize rationalization mechanisms to justify their behavior (Buckels et al., 2019; Trémolière & Djeriouat, 2016).

As a part of this research, we conducted two studies with the aim of examining various aspects of the emotional processes potentially associated with psychopathy and sadism traits. The aim of the first study was to examine the relationships between psychopathy and sadism with success in identifying emotional expressions. Additionally, it also aimed to examine the relationship between these traits and the explicit emotional experience of dynamic stimuli. Further, their relationship with implicit emotional processing of static stimuli. Finally, in order to examine the pattern of emotional functioning of individuals with pronounced psychopathy and sadism, the second study will include the day reconstruction method and will deal with the connection of these traits

with the characteristics of everyday life situations in which people find themselves, as well as the accompanying emotional experience of these situations.

Study 1: psychopathy, sadism and emotional processes

The current studies indicate there is a certain overlap of the other dark traits and sadism, but that they are nevertheless independent constructs (Međedović & Petrović, 2015; Paulhus, 2014). In fact, all the dark traits share a common feature: callousness i.e. the absence of empathy. It seems that this is a core feature of the Dark Tetrad, although it manifests itself in different ways in different dark traits (Paulhus, 2014). This assumption is consistent with the observations of Milon and his associates (2004) that insensitivity and the lack of empathy are at the core of antisocial, sadistic and narcissistic personalities. Accordingly, dark personalities, including sadism, had been recently shown to project onto areas of the Interpersonal Circumplex (circular configuration determined by two orthogonal dimensions: dominant-submissive and friendly-hostile) representing cold and callous interpersonal style (Southard, Noser, Pollock, Mercer, & Zeigler-Hill, 2015). Similarly, the obtained correlations between psychopathy and sadism point to certain common characteristics of these constructs, such as the willingness to inflict injuries and the emotional indifference to the suffering of others, but they are not sufficient for sadism to be exclusively encompassed by psychopathic traits (Mokros et al., 2011). This is partially supported by the finding that psychopathy and sadism independently predict violent behavior and proactive aggression in convict (Robertson & Knight, 2014) and general population (Reidy et al., 2011). More precisely, the correlation between these two constructs comes primarily from the relation of sadism with Interpersonal and Lifestyle traits. This is expected, since sadism itself should possess certain manipulative characteristics used for domination and maltreatment of others (Robertson & Knight, 2014). So far, the authors were primarily concerned with the comparison of psychopaths and sexual sadists, suggesting that the difference between them comes from certain aspects of emotional processes (Mokros et al., 2011). Namely, people with a pronounced psychopathy not only have a problem in identifying emotions, but also have a reduced psychophysiological response to these emotions in others (von Borrieset al., 2012). On the other hand, people with pronounced sexual sadism should not have a deficit in recognizing emotions, but could also be characterized by increased sensitivity to situations and scenes that cause the fear and suffering of others (Mokros et al., 2011).

Previous research on emotion perception and recognition has been largely concerned with the topic of psychopathy, and emotional processes associated with it (Dawel et al., 2012), while the research of subclinical sadism in the general population is

only at its infancy. There are some indications that subclinical sadism and psychopathy negatively relate to accuracy in perceiving traits of other people during realistic first encounters (Rogers et al., 2018) and recognition of complex emotional states (Pajevic, et al., 2018). However, studies on pain perception in others yield ambiguous results (Buckels, et al., 2019; Harenski, et al., 2012). Certain methodological specificities and conceptualization of emotion perception or recognition measures might be a factor leading to different results (Beussink et al., 2020; Kosson et al., 2019; Olderbak, 2018).

The important conceptual framework for our study is given by Hildebrandt and colleagues (2012), who distinguish four domains of *face-related processing* relevant for the field of individual differences: face perception, face recognition, emotional expression perception, and emotional expression. They differentiate the process of perceiving emotions versus memorizing them, and face perception and facial emotion perception (emotional expression). Our research used tasks focused on measuring emotion perception and face perception. The authors further differentiate between speed (promptness in perceiving and identifying emotions) and accuracy measures (precision in perceiving and identifying emotions), based on the empirical models in ability (Carrol, 1993). Authors place emotion-processing and face-processing abilities within constructs of emotional and social intelligence (Mayer, Roberts, & Barsade, 2008), while hoping that this framework contributes in improving methodological rigor in these domains (Wilhelm et al., 2014). So far, empirical data show that these abilities are highly overlapping. Emotion perception is primarily determined by face identity perception and general cognitive abilities, and emotion identification abilities do overlap across different emotions (Hildebrandt, Sommer, Schacht, & Wilhelm, 2015). However, there is a certain amount of variance in emotion perception which is emotion-specific, and useful in the context of our study. There is also evidence that the ability to successfully perceive certain specific emotions is weakly correlated, making this ability multidimensional (Matsumoto et al., 2000; O'Sullivan & Ekman, 2004). However, studies also indicate that the aspects of this ability are based on valence – i.e. perceiving and recognizing positive and negative emotions (Schlegel, Grandjean, & Scherer, 2012). This is especially important when studying psychopathic and sadistic traits, since they are shown to relate to (in) sensitivity to negative affect.

It is likely that there is a different underlying motivation in the basis of instrumental aggression in psychopaths and sadists: although these "dark personalities" share emotional insensitivity, the psychopath causes damage to other individuals because of their reduced possibility of experiencing fear and sadness (Hare, 2003), poorer recognition of the negative emotional states of the victim and the inflicted damage (Kirsch & Becker, 2007) or to simply fulfill a personal goal (Hare & Neumann, 2009). Contrarily, a sadist causes such effects because the activity itself gives him pleasure, and is positively reinforced (Buckels et al., 2013). Indications of the emotional profile of persons with pronounced sadistic tendencies have so far been obtained mostly in the forensic setting (Harenski et al., 2012). However, subclinical sadism indeed possesses additional specificity in the domain of positive emotions: not only that violent stimuli trigger positive emotional experience, nonviolent and peaceful stimuli actually reduce it (Međedović, 2017).

Some insights we also get from implicit measures, albeit with different results. On one hand, when only psychopathy was measured, its connection with weaker negative

associations with violence was obtained (Snowden, Gray, Smith, Morris, & MacCulloch, 2004), that is, specifically with Interpersonal and Lifestyle, but not Antisocial traits. On the other hand, some studies have not detected this relationship, but have obtained the relation of sadism and positive affective associations with violence (Međedović, 2017). Besides differences in data collection, discrepancies in the results are explained with the fact that latter study included sadism, whereas the latter one did. It is very possible that the obtained relations may stem from shared variance of sadism and psychopathy (Međedović, 2017). For this reason, further replication and extension of emotional processes in sadism, is necessary, and the data obtained in this research will hopefully offer additional insights into this topic.

In order to study *explicit emotional responses*, it is important to have insights into the best possible type of stimuli used to achieve this. The findings show that the stimuli content plays an important role when studying emotional experience. For example, scenes depicting accidents, mutilation, attacks on humans are more quickly and more consistently categorized as unpleasant (compared to stimuli depicting sports, adventure, illness, etc.), while scenes with families and romance as pleasant (Calvo & Avero, 2009). It was also shown there is a higher reactivity of the amygdala to the stimuli of frightened or threatening facial expressions. Moreover, these stimuli induce stronger autonomous reactions such as the skin conductivity in caparison to ones depicting threatening or intimidating scenes and objects, whether natural (snakes, sharks) or artificial (pistols, car accidents, explosions). This suggests a potentially higher biological significance of these stimuli, especially in social interaction (Hariri, Tessitore, Mattay, Fera, & Weinberger, 2002). On the other hand, there are findings showing that an induced emotional response is stronger for emotional scenes than isolated emotional expressions (Thom et al., 2014). For this reason, our studies used stimuli presenting different types of interpersonal interactions that integrated the emotional expressions of the participants. So far, a limited number of previous studies dealt with the presentation of dynamic stimuli to psychopathic respondents, while in the case of sadism such studies do not exist. The purpose of testing emotional responses to dynamic stimuli is their greater ecological validity in the initiation of physiological reactions, which are reduced in psychopathic individuals when observing emotionally saturated stimuli (Marsh et al., 2011), and these deficits are particularly evident in the high-complexity stimuli (Sadeh & Verona, 2012). They were also detected in studies of the recognition of emotions in dynamic stimuli (Brook & Kosson, 2013), with a accompanying reduced hemodynamic response to the regions in charge of supervising and predicting the consequences of their behavior, integration of emotional learning into the decision-making process (orbitofrontal and ventromedial prefrontal cortex), and regions for face processing (inferior occipital gyrus, fusiform gyrus) (Decety, Skelly, Yoder, & Kieh, 2014). Moreover, unlike static stimuli, dynamic ones have a better ability to trigger emotional reactions, as they include information on the human movement (Atkinson, Dittrich, Gemmell, & Young, 2004). We assume that this type of stimuli would be more successful in the induction of emotional experience. Moreover, that it will help register individual differences in emotional responses to affectively saturated stimuli in people with expressed psychopathic and sadistic traits. That way, we establish an emotional profile of these individuals. One reflected in a differing conation to cause distress in others –

pleasure-seeking motivation in sadistic individuals, in contrast to goal-oriented motivation in psychopathic individuals (Bulut, 2017; Trémolière & Djeriouat, 2016).

The present study addresses the several aspects of emotional processes relevant for psychopathy and sadism: emotion perception, emotional responses to violent dynamic stimuli, and implicit emotional processing. These were previously studied primarily in psychopathic individuals. However, to this day, empirical literature does not offer a deeper understanding of the specific "emotional profile" of sadists, and potential differences between the two dark traits in this domain. Furthermore, although not explicitly covered in our hypotheses, we also explore what we deem to be deeper amoral tendencies (that might represent even more brutal traits), and their relation with the abovementioned processes.

Research goals

In accordance with the above, the first study has a general goal of exploring certain emotional processes that are presumably related to the psychopathy and sadism traits. As these processes can potentially be expressed differently in individuals with these traits. Thus, the first study of this research has the following objectives:

Emotion perception

1. Examine the association of psychopathy and sadism with the accuracy in perceiving emotional expressions;
2. Examine the association of psychopathy and sadism with the speed of perceiving emotional expressions;

Explicit emotional experience of dynamic stimuli

3. Examine the association of psychopathy and sadism with positive emotional responses to violent and peaceful dynamic stimuli;
4. Examine the association of psychopathy and sadism with negative emotional responses to violent and peaceful dynamic stimuli;

Implicit emotional processing of static stimuli

5. Examine the association of psychopathy and sadism with implicit emotional processing of static stimuli.

Research hypotheses

Based on the theoretical assumptions and results of previous studies, we assume that individuals with pronounced psychopathy and sadism traits will generally show lower emotional reactivity. Also, psychopathy will be negatively linked to the recognition of negative emotions, but not with a positive response to violence. On the other hand, in sadism, different pattern of correlations is expected: it will be positively linked to the recognition of negative emotions, as well as the positive emotional response to violence.

Emotion perception

H1. Psychopathy will correlate negatively with perception accuracy of negative emotions, while sadism will correlate positively (Dolan & Fullam, 2006; Harenski et al., 2012; Wilson et al., 2011).

Explicit emotional responses to dynamic stimuli

Even though previous studies did obtain significant relations with psychopathy (Međedović, 2015), we speculate lack of relations, due to different measures used (not containing antisocial tendencies), and the fact they are less contaminated by sadism:

H2. Sadism will positively correlate with positive emotional responses to violent stimuli and negative responses to non-violent stimuli (incongruent emotional experience), whereas psychopathy will not have any significant correlations.

H3. Sadism will negatively correlate with the negative emotional responses to violent, and positive responses to non-violent stimuli (congruent emotional experience), while in psychopathy there will be no significant correlations.

Emotional processing of static stimuli

H4. Sadism will positively correlate with the reaction time of pairing positive emotions and non-violent stimuli, as well as negative emotions and violent stimuli (congruent stimuli), whereas psychopathy will not have any significant correlations (Međedović, 2017). Previous studies in prisoners point to ambiguous findings -

those in which this relationship was obtained used the rating form of psychopathy measure, but did not measure sadism (Snowden et al., 2004), while those who used both the self-reported psychopathy and sadism did not get this association (Međedović, 2017). This research will use a scale deprived of items closely related to antisocial behavior, and we assume that this will make a difference in the relations of these measures.

H5. Sadism will negatively correlate with the reaction time of pairing of positive emotions and violent stimuli, as well as negative emotions and non-violent stimuli (incongruent stimuli) (Međedović, 2017), whereas psychopathy will not have any significant correlations.

METHOD

Before the study was conducted, we obtained the written approval from the Ethics board of Faculty of Philosophy, University of Belgrade.

Sample

The sample consisted of 235 undergraduate students, of both sexes (72.3% female; M_{age} = 21.46, SD = 2.93). One part of the sample consisted of psychology students and was collected through the courses *Psychology of Individual differences* and *Psychometrics* for course credits. In order to obtain more participants, we gathered an additional sample of psychology students from Singidunum University and University of Nikšić, and non-psychology students of University of Belgrade. Based on previous studies of sadism and psychopathy traits, we expected the variability of both traits in the student sample (Buckels, 2013; Međedović, 2017).

Variables

Variables in our study include ones obtained through self-report measures (predictors) and ones obtained through tasks (criteria):

Dark traits

1. Self-reported psychopathy – operationalized through Psychopathic Personality Traits Scale (general score and specific traits)
2. Self-reported sadism – operationalized through Short Sadistic Impulse Scale, Varieties of Sadistic Tendencies, and Sadism subscale from Amorality questionnaire AMRL-9
3. Self-reported Brutality – operationalized through subscales from Amorality questionnaire AMRL-9

Emotion perception

4. The proportion of correct responses in identification of positive emotions
5. The proportion of correct responses in identification of negative emotions
6. The proportion of correct responses in identification of specific emotions
7. The average speed of identification of positive emotions
8. The average speed of identification of negative emotions
9. The average speed of identification of specific emotions

Explicit emotional responses to dynamic stimuli

10. Self-reported explicit positive emotional responses to violent dynamic stimuli
11. Self-reported explicit negative emotional responses to violent dynamic stimuli
12. Self-reported explicit positive emotional responses to non-violent dynamic stimuli
13. Self-reported explicit negative emotional responses to non-violent dynamic stimuli

Emotional processing of static stimuli

14. Reaction times of associative pairing between violent stimuli and pleasant affective dimension (incongruent pairing)
15. Reaction times of associative pairing between violent stimuli and unpleasant affective dimension (congruent pairing)
16. Reaction times of associative pairing between peaceful stimuli and pleasant affective dimension (congruent pairing)
17. Reaction times of associative pairing between peaceful stimuli and unpleasant affective dimension (incongruent pairing)

Measures

Self-report measures

Within this group of measures, we used instruments for measuring psychopathy and sadism traits. So far, not many studies have used several measures of sadism. Our motivation for the use of multiple measures in this case comes from the fact we are investigating a phenomenon with low frequency in the general population, even in comparison with psychopathy. Consequently, these instruments should capture a greater range of individual differences on our sub-clinical sample, and help us check if the effects are replicated using different measures:

1. *Psychopathic Personality Traits Scale* (PPTS; Boduszek, Debowska, Dhingra, & DeLisi, 2016). A self-assessment measure of psychopathic traits within the forensic and general population. Comprises 20 items, five per each psychopathy factor: *1. Affective responsiveness* - low empathy and emotional superficiality (higher scores represent greater deficits); 2. *Cognitive responsiveness* - the ability to mentally represent and understand the emotional state of others (higher scores represent greater deficits); *3. Interpersonal manipulation* - superficial charm, grandiosity, propensity to deceive; *4. Egocentricity* - a focus on one's own interests, beliefs and attitudes. Presence or absence of a trait is obtained by giving a response of 0, representing the answer "I disagree", or 1, which denotes the answer "I agree". As mentioned before, this relatively new instrument in the measurement of psychopathy was chosen due to the special attention its authors devoted to the exclusion of criminal, that is, antisocial

behavioral tendencies from measures of psychopathy. The scale was already used in Serbian language, with subscales showing decent reliabilities (Međedović, Bulut, Savić, & Đuričić, 2018).

2. *Short Sadistic Impulse Scale* – (SSIS O'Meara, Davies, & Hammond, 2011). A short form of Sadistic Attitudes and Behaviors Scale (SABS; Davies, & Hand, 2003; O'Meara, Davies, & Barnes-Holmes, 2004), which measures tendency towards sadistic attitudes and behavior in the general population. It is a unidimensional scale, with 10 cumulative items, with a binary response format "I agree" or "I disagree". However, for the purpose of our study, we have used standard 5-point Likert scale. The scale in this format of responding has shown decent reliability in a Serbian sample before (α=.81; Međedović & Bulut, 2017). This scale is also called "the hurting scale" because its items focus on hurting characteristics of sadism and the pleasure derived from it.
3. *Varieties of Sadistic Tendencies* (VAST; Paulhus & Jones, 2015; Paulhus, Jones, Dutton, & Klonsky, 2011). The five-point scale (1 - completely disagree, 5 - completely agree) containing 16 items, measures predisposition to sadistic behavior, which also approaches sadism as a sub-clinical phenomenon. Unlike the *Short Sadistic Impulse Scale*, this scale gives separate scores of direct or true (pleasure in actively inflicting suffering on others physically or verbally) and vicarious sadism (pleasure in passive observation of someone else's suffering) (Paulhus & Jones, 2014).
4. *Amorality questionnaire AMRL-9* (Knežević, Radović & Peruničić, 2008). An instrument that measures dispositions towards different forms of amoral behavior, using three separate modalities, with corresponding narrow traits: 1. Impulsivity-driven amorality (impulsivity, hedonism, laziness); 2. Frustration-driven amorality (Projection of amoral impulses, Machiavellianism, Resentment); 3. Brutality-driven amorality (Sadism, Brutal hedonism, Brutal modulation of resentment and Passive amorality). The scales from the two latter superior factors of this instrument are theoretically closest to the concept of sadism. In our study, we used a 40-item version of this scale. Unlike the previous ones, this instrument contains items formulated to measure deep amoral domains, so we expected that it would be especially beneficial in capturing a wider range of individual differences, especially in the context of emotional processes. Using these scales, we derived the measure of Brutality.

Tasks

This group includes tasks that measure the accuracy and speed of identification and recognition of emotional expressions, as well as the task of implicit affective associations, as well as explicit emotional experience of violent and non-violent stimuli, which we used as criteria measures:

1. *Identification of emotion expressions from composite faces* (Wilhelm et al., 2014). In order to avoid celling effect in this task, authors used more complex stimuli. A total of 72 composite stimuli in task are made up of a combination of four male and four female faces, so the upper part of the stimulus contains one, and the lower a second facial

expression of emotion (for example, the upper part of the face expresses anger, and the lower sadness). The task involves the classification of facial expressions and takes place in 72 experimental trials: each composite face is shown after the fixation cross, with the words "TOP" and "BOTTOM" as a guide to a respondent which part of a facial expression needs to be classified, by clicking on the name of one of the emotions whose names are presented below the stimulus: happiness, surprise, anger, fear, sadness, disgust. The interstimulus interval, i.e. the interval between each attempt to classify the stimulus and the next display of the fixation cross screen is 500 milliseconds. The total duration of the task is 10 minutes. The correct answer is pre-determined, depending on whether the lower or upper part of the face is looked at (for example, if the participant is instructed to look at the bottom part of the face, the correct answer could be sadness, Figure 1). The final scores on this task include the overall accuracy of the classification (the proportion of correct responses), and the accuracy of the classification for each emotion. The final score is the total accuracy of recognizing emotional expressions across the series of 72 trials; however, the most relevant score for this study is the specific accuracy within each category of emotions (the square frequency of the exact classifications divided by the product of the number of stimuli used in each category of emotions and the total frequency of choice for this category of emotions), based on which we calculated the scores for accuracy of identification of positive and negative emotions. Additionally, we calculated the Alpha reliability for each category of emotions (Wilhelm et al., 2014).

Figure 1. An example of the display in Serbian for Identification of emotion expressions from composite faces task (top example with surprise as correct response for the top of the face).

2. *Identification speed of emotional expressions* (Wilhelm et al., 2014). This task is intended to measure the speed of visual search of emotional expression of a particular category. In this case, the authors used simple stimuli (one expression per stimulus), in order to control for the task difficulty. Respondents are simultaneously shown a targeted emotional expression and three alternative emotional expressions (uniformly polarized) and the label of a particular emotion; eight faces are used in this task. The participants' assignment is to use the computer keys (arrow-keys) to associate the name of the emotion with the corresponding emotional expression, i.e. select the expression that they consider appropriate. The task contains 48 trials, each of the six categories of emotions occurring eight times, in a quasi-randomized sequence, with interstimuli interval of 1300 milliseconds. The task is without a time limit, with a remark that the respondent should work as quickly and accurately as possible. A successful performance in this task implies correct associating of the emotional expression and its label (i.e. name), as well as the accurate categorization of the label into the correct semantic category. Example of task display is shown in Figure 2. The final score is the overall reaction time, as well as scores for each category of emotions, which provides the ability of calculating the average reaction time within the category of negative and positive emotions. Also, reliability measures were considered.

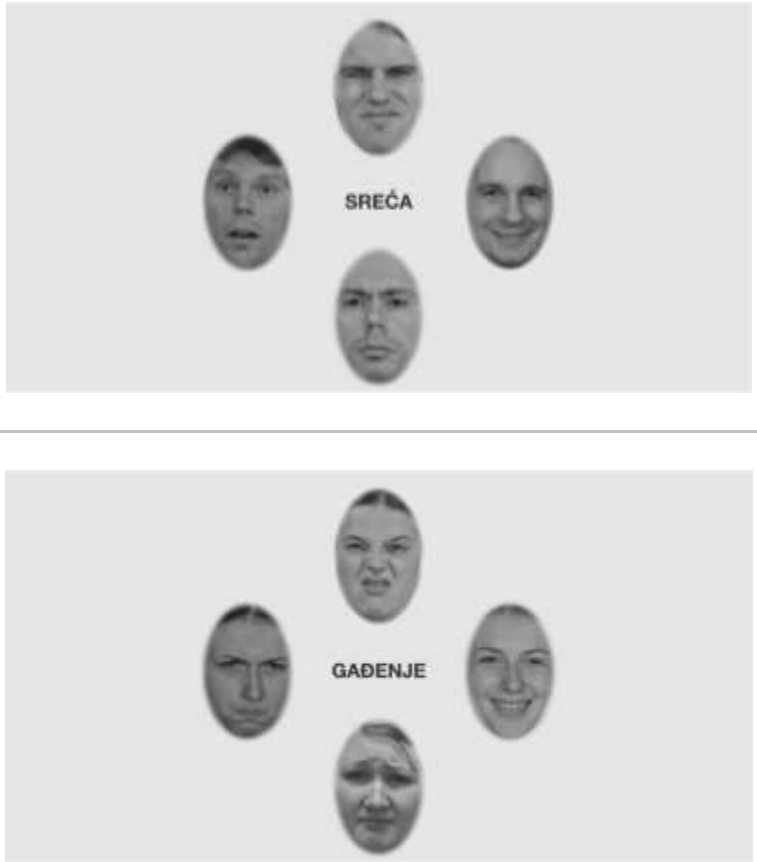


Figure 2. An example of the display in Serbian for Identification speed of emotional expression task (top shows the word joy, and the bottom shows word disgust).

3. *Sequential matching of part–whole faces, with conditions of part and whole* (the authors categorize this task in a wider domain of face perception, hence the acronym *FP1/FP2;* Herzmann, Danthiir, Schacht, Sommer, & Wilhelm, 2008). This task was developed based on the *part-whole recognition effect*, the fact that the part of the face is recognized more successfully as a part of a face than isolated (this effect is not present in object recognition). This task consists of 60 trials, with first 30 trials measuring ability to differentiate facial features (e.g. mouth, nose) in isolation (FP1), and 30 trials measuring ability to differentiate particular feature in context of a whole face (FP2). Trials were balanced based on gender of faces.

Table 1. Part and whole conditions in the Sequential matching of part–whole faces task

Part condition	**Whole condition**
1. Target face	1. Target face
2. Isolated target facial feature + Isolated facial feature from another face	2. Target facial feature (part of a target face) + Feature from another face (part of a target face)
3. Choose the feature belonging to the target	3. Choose the target face

There are two accuracy scores for this task – one for the part condition, and the other for the whole condition. Even though this task does not answer our hypotheses directly, since it uses neutral faces, previous studies show that face perception presents a basis for emotion identification (Calder, 2011; Hildebrandt, Sommer, Schacht, & Wilhelm, 2015). Even though we are not particularly interested in the whole-part effect per se, this task provides a general assessment of face perception ability (especially the whole condition), which plays an important part of ability to perceive and recognize emotions (example of stimuli is shown in Figure 3).

Figure 3. An example of stimuli in Sequential matching of part–whole faces (top row – whole condition, bottom row – part condition).

4. *Explicit emotional experience of dynamic stimuli.* This task was created on the basis of a preliminary study, which served for the selection of dynamic stimuli, video clips that were used in the main study. We used stimuli from the first extensive video base under the Creative Commons license - LIRIS-ACCEDE, composed of scenes from feature films (Dellandré, Chen, Baveye, Sjöberg, & Chamaret, 2016). Based on the pilot study, we selected 10 final scenes that were rated on (Section Preliminary study; links to stimuli in Appendix B). They were evaluated in the main study using 5-point Likert scales on the list of emotions taken from Međedović (2017), taken from PANAS taxonomy (Međedović, 2017; Watson & Clark, 1994). The emotions were: assertiveness, attentiveness, disgust, fear, guilt, joviality, love, pleasure, rage, sadness, serenity, shyness, surprise, tension. The only emotion that was excluded from this list was fatigue, which was shown to have very low loadings even in the original study. In addition, they assessed them on a 5-point Semantic differential scales on two basic dimensions of emotions (Bradley, Codispoti, Cuthbert, & Lang, 2001): *arousal* (level of activity) and *hedonic valence* (pleasantness), as well as degree of perceived violence. This task was not limited in time. Details on preliminary study for stimuli selection can be found in the Results section. Examples of stimuli screenshots are presented in Figure 4.

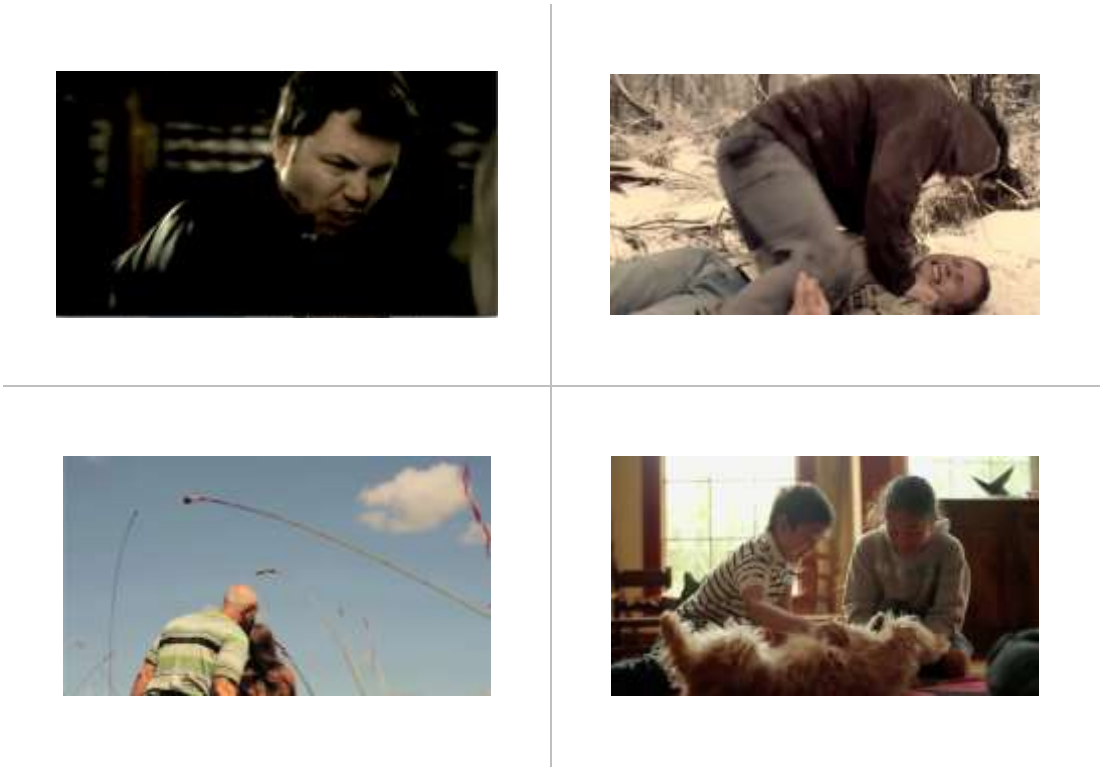


Figure 4. Screenshot examples of video stimuli used in the study: in the top row - violent, in the bottom row - peaceful.

5. *Sorting Paired Features Task* (SPF; Bar-Anan, Nosek, & Vianello, 2009). In the context of this research, the task examined automatic associations on emotionally saturated stimuli by asking the respondents to react as quickly as possible to the presence of

congruent and incongruent pairs of stimuli. The basic assumption of implicit tasks is that, the stronger the association between the stimuli, the faster the reaction of the respondents to them. There are two types of stimuli - four peripheral and two central. Peripheral stimuli are pairs of terms arranged in the corners of the screen (top left, top right, bottom left, bottom right), defined through the dimensions *violent-peaceful* (target category) and *pleasant-unpleasant* (evaluative category). The poles of each dimension have 5 stimuli, 20 stimuli in total. Each pair consists of combinations of terms with different affective meanings (violent-pleasant, violent-unpleasant, peaceful-pleasant, and peaceful-unpleasant). The stimulus pair in the center consists of images and words - visual stimuli that belong to categories violent/peaceful and verbal, which belong to the categories pleasant/unpleasant. Visual stimuli contained five violent scenes (physical abuse, injuries) and five non-violent scenes (handling, grilling). Photos were in color, with a uniform number of people shown in the interaction. Verbal were represented by words that are pleasant (e.g. joy, love, happiness) and unpleasant emotions (e.g. grief, fear, guilt). Both visual and verbal stimuli were taken from previously published study (Međedović, 2017). The task was displayed on the computer via the online platform Total Assessment. It consisted of 5 blocks, each consisting of 62 trials (310 trials in total). Each pair of stimuli remained on the screen until the moment of exact categorization, and the new pair of target stimuli appeared 300ms after the correct categorization. In this version of the task, the locations of the category labels were kept constant. The key measure used was the reaction time, calculated as the time between the occurrence of the target stimulus and the correct answer, regardless of whether the respondent initially wrongly responded. We took only reaction time of 400-5000ms into account, while reaction times lower than 400ms were excluded (Bar-Anan, Nosek, & Vianello, 2009). Lower reaction time means stronger associative relationships between congruent or incongruent stimuli. One of the reasons for using SPF instead of the IAT task, is the absence of independent blocks and the resulting reduction of effects of practice or distraction (Nosek et al., 2005; Bar-Anan, Nosek, & Vianello, 2009).

Figure 5. An example of visual stimuli used in the study:
in the top row - violent, in the bottom row - peaceful images (taken from Međedović, 2015).

Figure 6. An example of stimuli combinations in the SPF task: in the top row – violent-unpleasant (left), violent-pleasant (right), in the bottom row – peaceful-pleasant (left), peaceful-unpleasant (right).

Procedure

Respondents completed all questionnaires and tasks at home, online, via the *Total Assessment* software platform. All the participants were given informed consent prior to proceeding to the study. It gave them information about the context and the general purpose and type instruments used in the study. Also, they were informed about how their data will be stored, shared, and their anonymity preserved. In order to preserve participants' anonymity, as well as to facilitate data integration, respondents only used their personalized passwords that were generated in systematic way. Participants were presented with explicit questionnaires and tasks first, and the implicit task was done afterwards, since it has been shown that implicit measures are less susceptible to faking (Steffens, 2004).

Part of the sample filled out the questionnaires and tasks as an obligatory part of the Individual Differences and Psychometrics courses, and the rest for course credits. The rest of the sample was awarded by a randomized draw. The award pool consisted of electronic

devices, books, and monetary gift vouchers, and feedbacks on personality profiles. After completing the study, participants received an email with the detailed debrief on the study.

Control variables

Basic demographic data about the participants was collected as control variables: 1. Gender; 2. Age (expressed in number of years); 3. Current level of education (with categories: completed elementary school, secondary school in progress, completed secondary school, university in progress, completed university, master and above).

Preliminary study: selection of dynamic stimuli

Research goals

The goal of this preliminary study was creating a unique set of video stimuli for purpose of studying explicit emotional experience. Previous studies have mostly used famous feature films (e.g. Hewig et al., 2005), and some have even shown that such films, although successful in eliciting certain levels of emotions, are less successful than photographs (Uhrig et al., 2016). It has also been shown that repeated exposure (which is present in commercial films) reduces perceived negativity and attentiveness to threatening stimuli (Reber, Schwarz, & Winkielman, 2004), potentially affecting the reactions induced by such videos. For that reason, we decided to select a new stimuli set, using lesser known feature films.

Stimuli

The LIRIS-ACCEDE database comprises video excerpts from feature films shared under Creative Commons licenses, intended for affective video content analysis (the list of movies used can be found on the webpage https://liris-accede.ec-lyon.fr/database.php). The original database comprises several sub-databases. In our study, we used stimuli from two of them in order to achieve greater variability of stimuli: *MediaEval 2015 Affective Impact of Movies* collection from discrete LIRIS-ACCEDE part comprised of 9800 stimuli, and *MediaEval 2016 Emotional Impact of Movies collection* (Global Annotation subtask) comprised of 1200 stimuli. The additional description of the database can be found in Mediaeval publications (Sjöberg et al., 2015; Dellandrea, Chen, Baveye, Sjoberg & Chamaret, 2016).

Method

First stage – narrowing down the original database. In this stage, a research group of 10 members rated stimuli according to level of *depicted violence* and *familiarity* (whether the video was seen before). They also inspected the content of all videos. This activity was crucial and its purpose was to filter out the videos that do not fit the criteria we set: excerpts had to be unfamiliar, depicting individuals in social interaction (preferably two individuals), in color, depicting realistic scenes which would be plausible in real life (since we used feature films). We also payed attention to previously collected data on these stimuli. However, for the specific needs of our research, we needed to carefully choose the final set, while keeping in mind the ethical considerations of presenting such stimuli. The excerpts that were excluded belonged to categories of animated movies, comedy movies, and movies with surreal elements. We excluded excerpts of lower quality with loud background music, ones containing conversation, as well as multiple excerpts belonging to the same movie (thus probably affecting familiarity). The ratings for these excerpts made by the research group were sorted in descending order, first based on familiarity, then degree of depicted valence. The stimuli that had average level of familiarity above 1 were excluded, since our goal was to present stimuli that were novel to participants. This was not hard to achieve since most of the excerpts are from less known movies (full list and frames from stimuli can be found in Appendix A).

Second stage – creating the final stimuli set. In this stage of the study, we used the refined set of 30 stimuli, consisting of 11 excerpts with highest rated degree of violence and 19 rated as least violent (with each excerpt lasting between 8 to 12 seconds). The discrepancy in the number of violent versus non-violent stimuli from each group stemmed from difficulty to select videos with elements of violence from the database. The same visual filter was applied to all the videos. They were then uploaded to YouTube and from there embedded to Google Forms, platform for online data collection. They were shown in quasi-randomized order. The sample consisted of 54 undergraduate students attending University of Belgrade (40 females; $M_{age=}21.43$, SD=3.84), gathered by snowballing technique. After viewing each excerpt, participants rated them on 5-point Likert scales on *basic emotions* (happiness, fear, anger, disgust, sadness), and 5-point Semantic differential scales on *valence* (pleasant-unpleasant), *arousal* (calming-arousing), and the *degree of violence* (peaceful-violent). The emotion of surprise was excluded in order to shorten the list of emotions, since we estimated that it would be strongly associated with arousal (Alvarado, 1997), and is not regarded as emotion that is difficult to elicit (Levenson, 2003).

Results

The following figures show the average ratings for the ten final stimuli (For additional descriptives see Appendix A, and for the links to videos Appendix B). The Figure 7 represents the levels of violence, pleasure, and arousal for each of the ten stimuli. The stimuli were sorted based on degree of perceived violence for easy observation. As it can be seen, the stimuli with highest ratings of violence also have higher ratings on arousal. However, they have lowest ratings on valence – they are rated as least pleasant. The

opposite pattern occurred for least violent stimuli. Based on this pattern, we categorized stimuli into *violent* or *peaceful* in future analyses.

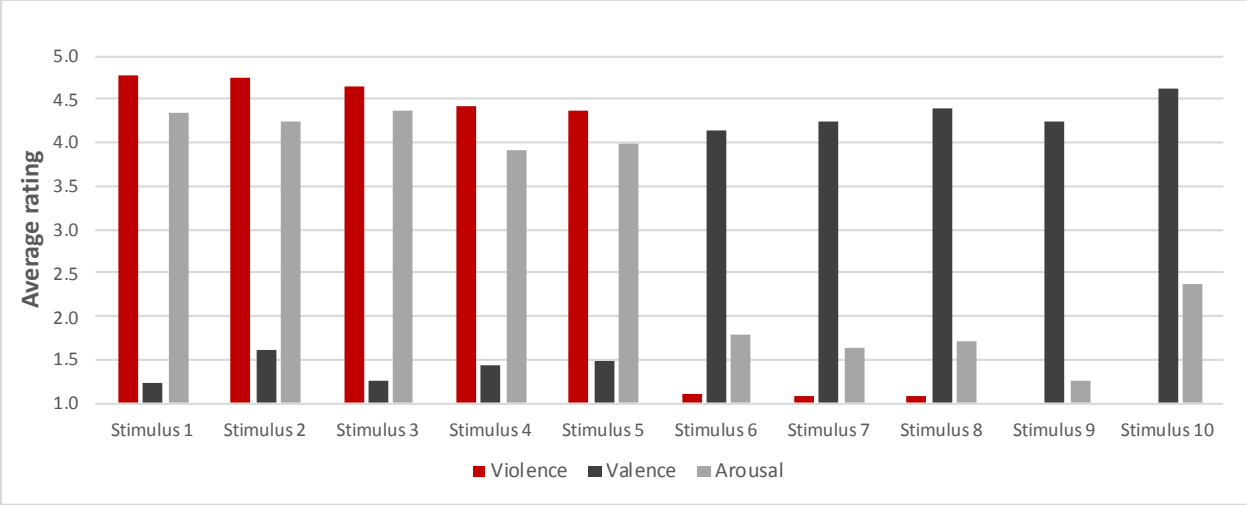


Figure 7. Average ratings of ten stimuli on basic dimensions of emotions

The Figure 8 represents average ratings on basic emotions in response to stimuli - anger, fear, sadness, disgust, and joy. The violent stimuli were rated as higher on anger, fear, sadness, and disgust. Whereas, peaceful stimuli were rated higher on joy. The stimuli generally have just moderate average ratings regardless of emotion (up to 3.5), meaning that they do not elicit very intense emotions. Furthermore, the emotional "profile" of violent stimuli is more heterogeneous. However, this preliminary analysis helped us establish stimuli representing violent and peaceful categories, with diverse levels of basic emotions amongst those categories (less for peaceful stimuli). This is especially important when it comes to estimate of disgust, which can often confound with violence (if the videos contain blood, gore, etc.). Obtaining different reactions for two groups of stimuli is expected, since it is well established that the content of stimuli matters in emotional responding, and that emotionally pleasant and unpleasant visual scenes induce different levels of emotional responses (Calvo, & Avero, 2009; Calvo, Gutiérrez-García, & del Líbano, 2015).

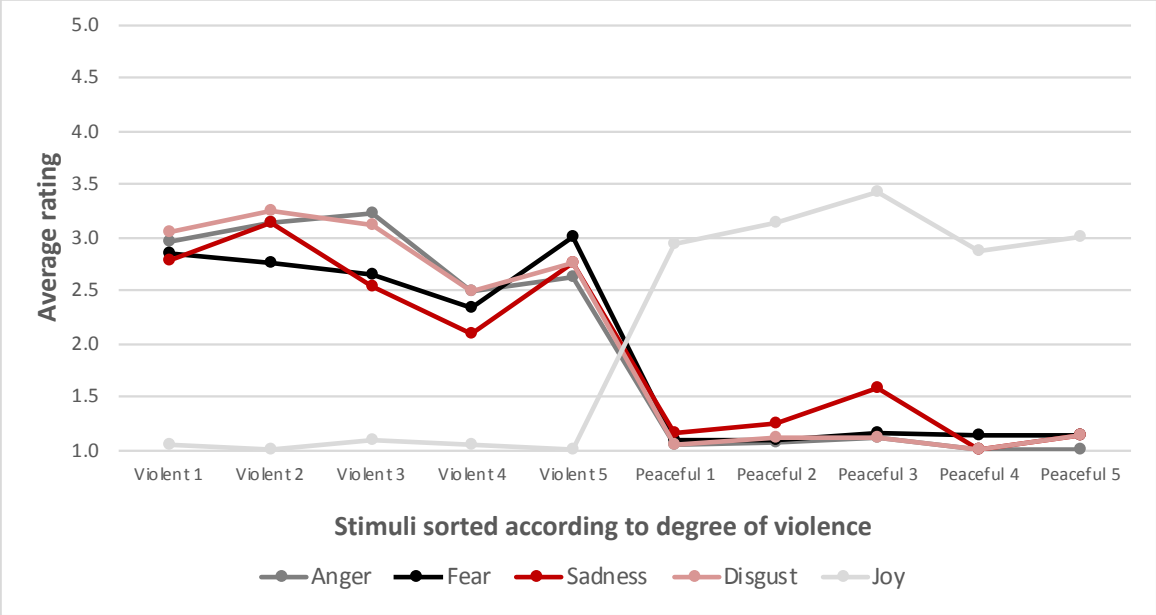


Figure 8. Basic emotional profile of the ten dynamic stimuli

Data transformation and scoring

Data processing included transformation and preparation of data, as well as the outlier analysis. For this purpose, we primarily used statistical package SPSS Statistics 24. All the inversely coded items were recoded. Before the main analyses, all measures deviating from normal distribution (as indicated by Kolmogorov-Smirnov and Shapiro Wilk statistics) were normalized via Rankit's algorithm, which was proven to be most suitable for smaller samples sizes (Soloman & Sawilowsky, 2009).

When it comes to the speed measures of emotion perception tasks, we observed univariate distributions for all the participants. Response latencies shorter than 200ms were set to missing (0.08% out of 42,300 data points), and the rest of the reaction times were winsorized as recommended by the authors – reaction times that were above mean + 3.5 SD were set to mean + 3.5 SD, until there was no more data point above this value (Wilhelm et al., 2014). This was done for all the tasks separately. For tasks Identification of emotion expressions from composite faces and Identification speed of emotional expressions (speed of visual search), we calculated several scores: *overall accuracy* across all 72 and 48 trials (proportion of correct responses: total number of correct responses divided by total number of trials), *emotion-specific accuracies* (proportion of correct responses: total number of correct responses for a particular emotion divided by number of trials consisting of that emotion), as well as *accuracy for negative* emotions (disgust, sadness, anger, fear, and surprise). We also calculated *average reaction time* (in milliseconds) for all the above-mentioned categories, as well as inverted average latencies, that indicate the number of trials processed per second (1000 divided by reaction time).

This procedure minimizes potential effect of outliers and results in scores that are relatively normally distributed (Ratcliff, 1993; Whelan, 2008; Hildebrandt, Schacht, Sommer, & Wilhelm, 2012). In the case of the third task, Sequential matching of part–whole faces, with conditions of part and whole, we calculated separate *accuracy* and *speed* scores for part and whole conditions. For accuracy data, we inspected bivariate distributions using bagplots (Rousseeuw, Ruts, & Tukey, 1999). In order to do this, we used an open source platform using R code (Wessa, 2017). We set the outliers to missing, and then used Expectation-Maximization Algorithm to replace them. Little's Missing Completely at Random (MCAR) Test was insignificant, indicating that data were missing completely at random.

The outlier analysis was done specifically for Sorting paired features task. Outliers with reaction times under 400ms (and above 5000ms) were eliminated. Using an algorithm for this task (Wagner, 2019), we calculated four scores, based on response times for four pairings of stimuli: violent – pleasant, violent – unpleasant, peaceful – pleasant, violent – unpleasant. The results of this task were presented on a sample of 226 participants. For the main analysis, we conducted a log transformation of reaction times, based on the recommendations by the authors of the task (Bar-Anan, Nosek, & Vianello, 2009).

RESULTS

We first present our preliminary analyses, followed by descriptive statistics, measures of the central tendency and dispersion for each of the variables. We further include data on scale reliabilities and correlations between the measures. Finally, we present our tested hypotheses using regression analysis and canonical correlation analysis.

The results of preliminary analyses

Explicit emotional responses to peaceful and violent stimuli

The structure of explicit emotional responses to dynamic stimuli

To obtain the latent structure in the basis of emotional responses to stimuli, we first transposed and restructured the database containing estimates of 235 participants for 10 stimuli (each was assessed on 15 descriptors). Then we applied Maximum Likelihood extraction with Promax rotation and fixed factor solution of two factors (Međedović, 2017), as seen in Table 2. The first factor represented negative affect (with Eigenvalue of 9.26 with 66.17% explained variance), with highest positive loadings by Fear (.96), Sadness (.93), Tension (.85), Guilt (.85), Rage (.84). On the other hand, second factor (with Eigenvalue of 1.27 and 9.08% explained variance) comprised positive emotions: Joviality (.89), Assertiveness (.88), Attentiveness (.88), Pleasure (.87), Love (.84). The correlation between the two factors was high (r = -.77).

Table 2. The pattern matrix with loadings on the two factors underlying emotional experience

	Factor	
	Negative	Positive
Fear	.963	
Sadness	.930	
Tension	.846	
Guilt	.846	
Rage	.840	
Disgust	.803	
Surprise	.787	
Joviality		.888
Assertiveness		.877
Attentiveness		.875
Pleasure		.874
Love		.844
Serenity	-.308	.713
Shyness		.649

The loadings bellow 0.3 are omitted.

Based on these results, we further calculated scores on positive and negative emotions for each of the ten stimuli, and average scores for positive and negative emotions for all peaceful, as well as for violent stimuli. These scores were used in the all analyses done in regards to the explicit emotional responses.

Manipulation check of the explicit emotional responses task

We used repeated measures 2 x 2 analysis of variance to test the effects of stimuli type (peaceful-violent) and type of emotions (positive-negative). There was a significant interaction between stimuli type and type of emotions (Wilk's Lambda=.096, $F(1, 233) = 2200.26$, $p < .01$, $\eta p2 = 0.90$. Namely, peaceful stimuli were rated higher on positive (M=3.40, SD=0.68) than negative emotions (M=1.20, SD=0.30), whereas violent stimuli were rated higher on negative (M=3.24, SD=0.75) compared to positive emotions (M=1.20, SD=0.30) (Figure 8). These results indicate a successful differentiation between the stimuli when it comes to emotional experience. However, on average, our stimuli induce moderate levels of emotional responses at best.

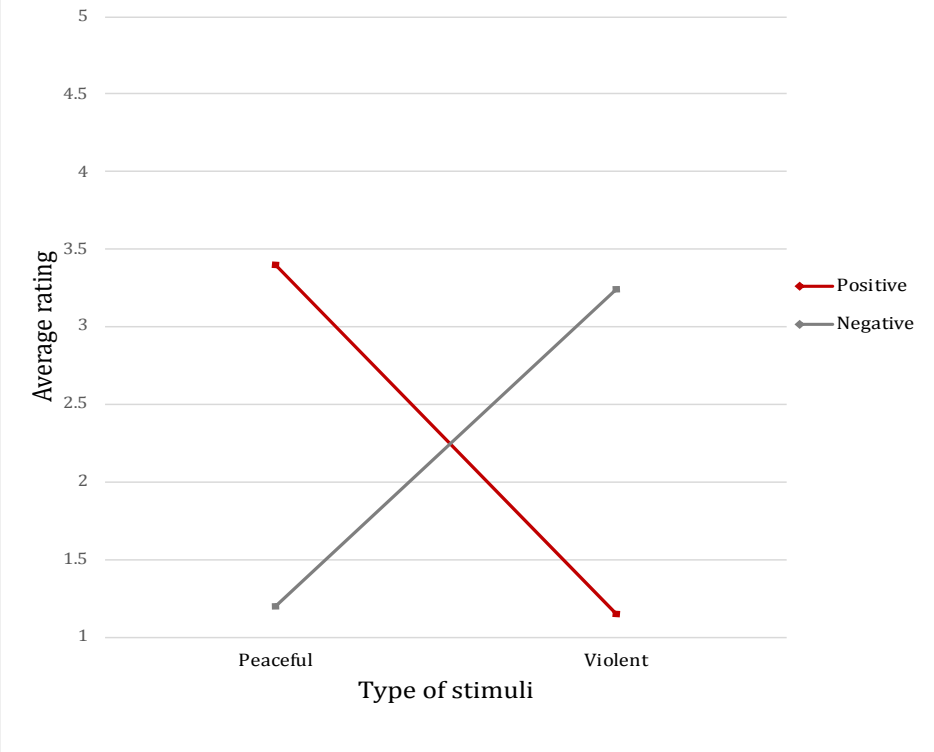


Figure 8. Average ratings for peaceful and violent stimuli on positive and negative emotions

Implicit emotional processing

Manipulation check of the Sorting Paired Features task

To test the whether there are differences between the stimuli on different levels of emotions, we conducted repeated measures 2 x 2 analysis of variance (2 levels of attribute: pleasant/unpleasant and 2 levels of category: peaceful/violent). The analysis showed a significant interaction between attribute and category (Wilk's Lambda=.260, $F(1, 225) = 639.94$, $p < .01$, $\eta_p^2 = 0.75$. Bonferroni correction for multiple comparisons was done, in order to decrease the possibility of type I error.

The interaction stemmed from association peaceful-pleasant (M=1363.17, SD=256.69) being stronger than peaceful-unpleasant (M=1854.45, SD=367.12), and violent-unpleasant (M=1477.17, SD=284.33) stronger than violent-pleasant (M=1850.36, SD=375.75) (smaller response latencies indicating stronger associations). In other words, participants categorized peaceful stimuli faster when associated with pleasant emotions, and in contrast, categorized violent stimuli faster when associated with unpleasant emotions (Figure 9).

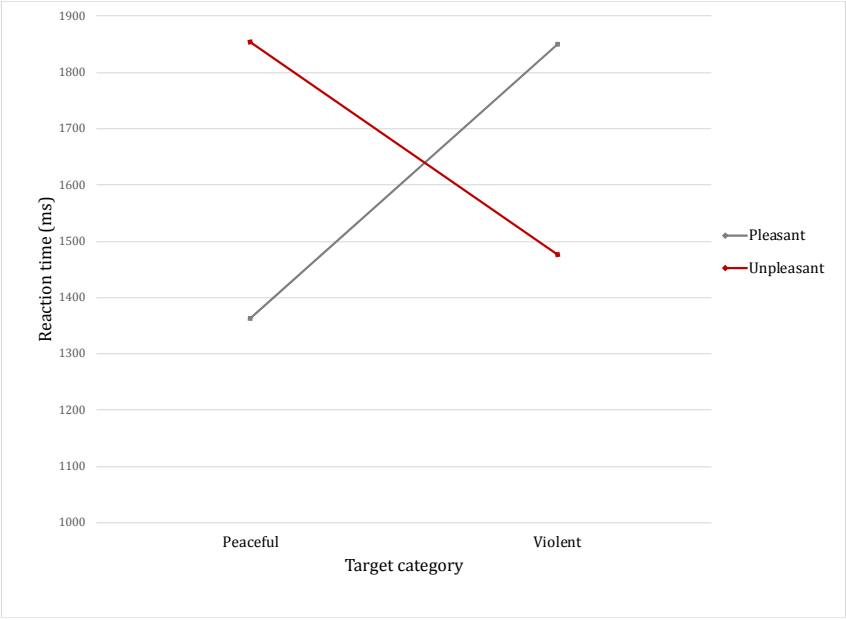


Figure 9. Reaction times for pairing of peaceful and violent stimuli with pleasant and unpleasant emotions

The results of main analyses

Descriptive statistics and metric characteristics of the measures

Self-report measures: sadism, psychopathy, and Amorality

In the following table (Table 3), we present the descriptive statistics, as well as reliabilities of the main self-report measures. When it comes to the sadism scales, all had good reliabilities (.70 to .80). All psychopathy PPTS subscales had suitable reliabilities, except for the Egocentricity scale, with Alpha below 0.60. The two Amorality subscales have varying reliabilities (from .59 to .82). The scale we were most interested in, Amorality induced by Brutality, had very good reliability (.82).

Table 3. Descriptive statistics and reliabilities of self-report measures

	Min	Max	M	SD	Skew	Kurt	α
Sadism SSIS	1.00	3.40	1.39	0.47	1.806	3.477	0.80
Core sadism	1.00	4.11	1.86	0.54	1.169	1.975	0.70
Vicarious sadism	1.00	4.29	1.91	0.69	1.194	.996	0.70
Sadism	1.00	4.00	1.64	0.56	1.312	2.170	0.73
Affective responsiveness	1.00	4.40	1.86	0.73	1.104	.970	0.72
Cognitive responsiveness	1.00	4.17	1.93	0.58	.741	.754	0.72
Interpersonal manipulation	1.00	5.00	2.42	0.86	.841	.538	0.72
Egocentricity	1.00	4.80	2.53	0.69	.399	.120	0.57
Amorality induced by Frustration	1.00	4.67	2.57	0.75	.341	-.140	0.59
Projection of Amoral impulses	1.00	5.00	2.95	0.96	.091	-.718	0.70
Machiavellianism	1.00	4.50	2.19	0.87	.595	-.389	0.70
Amorality Induced by Brutality	1.00	3.29	1.76	0.50	1.028	.724	0.82
Brutal hedonism	1.00	4.25	1.78	0.59	.945	.945	0.56
Brutal modulation of resentment	1.00	4.00	1.68	0.66	1.269	1.473	0.68
Passive amorality	1.00	4.75	1.95	0.68	.941	1.429	0.69

As stated before, by using Amorality scale, we were primarily interested in adding measure that represents deeper nefarious proclivity. In order to do this, we conducted principal component analysis on items originally belonging to subscales Brutality-driven amorality and Frustration-driven amorality, which, in our opinion, reflect the most brutal

amoral tendencies. However, we excluded the sadism subscale, since we already used it as one of the sadism measures. The analysis indicated one factor with all item loadings above .30 (with 29.94% of explained variance) which we named Brutality in further analyses (see Appendix C for the table with factor item loadings).

Emotion and face perception tasks

In this section, descriptive statistics and reliabilities for tasks Identification of emotion expressions from composite faces (performance accuracy, Table 4) and Visual search of emotional expressions are presented (performance accuracy and speed of correct responses, Table 5). Although we show both accuracy and speed indicators for all tasks, our focus will primarily be on those that are predefined as a measure of interest.

Identification of emotion expressions from composite faces. The reliabilities were highest for overall accuracy, then emotions of happiness and surprise (.73 to .81), whereas lowest for anger and fear (.55 and .60, respectively). This pattern of reliabilities is similar to the one obtained by Wilhelm and colleagues (2014), who also consider the heterogeneity of stimuli (different faces expressing different emotions in the same trial), and small number trials per specific emotion. The reaction times also indicate the general difficulty of this task. In further analysis we used *identification accuracy* as a measure from this task. Our main focus was on *overall accuracy score*, as well as *identification of negative emotions* (fear, sadness, anger, surprise and disgust). Analyses additionally included specific emotion categories. Repeated measures ANOVA showed main effect of emotion category on accuracy [$F(4.61, 1079.16) = 137.68$, $p < 0.001$, $\eta 2 = 0.38$], while post-hoc tests showed significant differences between all emotion categories. In this task, happiness was identified with highest accuracy, followed by anger, surprise, disgust, while sadness and fear were identified with lowest accuracy, respectively. This pattern is very similar to ones shown by authors of the task (happiness, anger, surprise, disgust, fear, and sadness, Wilhelm et al., 2014).

Table 4. Descriptive statistics and reliability of performance accuracy and speed for Identification speed of emotional expressions task

Identification of expressions from composite faces	Accuracy				Speed (RT)			
	M	SD	SE	α	M	SD	SE	α
Overall	.68	.10	.01	.81	3975.71	1267.24	82.67	.94
Negative emotions	.66	.11	.01	.77	4082.71	1304.43	85.09	.92
Anger	.82	.14	.01	.55	3738.36	1466.62	95.67	.82
Fear	.50	.21	.01	.60	4193.57	1484.26	96.82	.56
Sadness	.59	.20	.01	.62	4934.69	1825.97	119.11	.74
Happiness	.85	.18	.01	.76	3352.40	1342.27	87.56	.82
Surprise	.73	.22	.01	.73	3941.75	1400.23	91.34	.78
Disgust	.66	.18	.01	.61	3508.96	1159.39	75.63	.82

Identification speed of emotional expressions task. The average accuracies in this task were very high, especially for happiness and surprise, which were almost at a celling (Table 5). This is expected considering the nature of the task is intended for measuring visual search *speed* of emotional expressions. Reliabilities for overall score and specific emotions are satisfactory, whereas only surprise and disgust have lower reliabilities. Again, it should be noted that there were 8 trials per emotion in this task, which affects the reliability. For this task, further analyses used *average response latency* (for correct responses) as a measure of speed.

Table 5. Descriptive statistics and reliability of performance accuracy and speed for Visual search of emotional expressions task

Visual search of emotional expressions	Accuracy				Speed (RT)			Inverse latency (1000/RT)			
	M	SD	SE	α	M	SD	SE	M	SD	SE	α
Overall	.89	.07	.00	.84	3118.39	952.28	62.25	.34	.09	.01	.89
Negative emotions	.88	.08	.01	.88	3350.19	1043.42	68.21	.32	.09	.01	.88
Anger	.86	.15	.01	.53	3320.49	1128.87	73.80	.33	.10	.01	.73
Fear	.79	.18	.01	.49	3996.11	1381.22	90.49	.27	.08	.01	.80
Sadness	.84	.15	.01	.41	3450.40	1168.11	76.36	.32	.09	.01	.81
Happiness	.96	.07	.00	.65	1938.82	595.99	38.96	.56	.15	.01	.77
Surprise	.94	.10	.01	.56	2938.77	938.33	61.47	.37	.10	.01	.54
Disgust	.92	.10	.01	.52	2967.20	984.28	64.48	.37	.11	.01	.43

Sequential matching of part–whole faces. The reliabilities for accuracies are low, however this is not unusual considering the type of task, the number and heterogeneity of faces used (Table 6). The level of accuracy for the part condition is higher than the whole condition, $t(234)=5.26$, $p<.001$. This result is not in line with the part-whole effect, however, this task has already been shown inadequate in obtaining this effect by its authors (Herzmann, et al., 2008). Nevertheless, it was recommended as a general measure of face perception, which is what we had in mind when using it.

Table 6. Descriptive statistics and reliability of performance accuracy and speed for Sequential matching of part–whole faces task for conditions part and whole

Sequential matching of part–whole faces	**Accuracy**				**Speed**			
	M	SD	SE	α	M	SD	SE	α
Part condition	.77	0.10	0.01	.53	1810.62	481.71	31.42	.95
Whole condition	.73	0.12	0.01	.59	1960.15	642.86	41.94	.78

Explicit emotional responses to dynamic stimuli

In this task, we used four scores (for details, see Preliminary study section), with two congruent (positive emotions to peaceful stimuli and negative emotions to violent stimuli) and two incongruent responses (positive emotions to violent stimuli and negative emotions to peaceful stimuli). As it can be seen from Table 7, reliabilities of our measures are satisfactory, ranging from 0.87 to 91. The average incongruent emotional pattern of responses was expected: average positive emotions to violent stimuli and average negative emotions to peaceful stimuli are very low. On the other hand, congruent responses (positive responses to peaceful and negative to violent stimuli) prompt higher average emotional responses.

Table 7. Descriptive statistics and reliability of explicit emotional responses to violent and peaceful stimuli

Explicit responses	Min	Max	M	SD	SE	α
Positive emotions to violent stimuli	1.00	3.20	1.15	0.27	0.02	0.91
Positive emotions to peaceful stimuli	1.37	4.54	3.40	0.68	0.04	0.89
Negative emotions to violent stimuli	1.00	4.57	3.24	0.75	0.05	0.94
Negative emotions to peaceful stimuli	1.00	3.46	1.20	0.30	0.02	0.87

Implicit emotional processing

As seen in Table 8 showing descriptives from the Sorting Paired Features task, response latencies for *congruent* associations are lower, indicating stronger associations between stimuli and attributes (in this case peaceful-pleasant and violent-unpleasant), whereas response latencies for *incongruent* associations are lower, showing weaker associations (violent-pleasant, peaceful-unpleasant). The internal consistencies for the SPF scores are satisfactory, higher than in previous studies (Gawronski & De Houwer, 2014).

Table 8. Descriptive statistics of untransformed latencies in milliseconds for each Attribute x Category condition in the SPF task

Attribute/category	**Pleasant**			**Unpleasant**		
	M	SD	α	M	SD	α
Peaceful	1363.17	256.69	.78	1854.45	367.12	.83
Violent	1850.36	375.75	.83	1477.17	284.33	.80

Correlations between the measures

In this section we present correlations between the self-report measures, their relations to measures derived from the tasks of explicit emotional responses, emotion perception, and implicit emotional processing. Also, associations between certain tasks are shown. For practical purposes, correlation tables are organized around main variables of interest.

Correlations between the dark trait measures

The following table shows high positive correlations between the two measures of sadism (SSIS Sadism and Core sadism), and moderate relation of these measures with vicarious sadism (Table 9). Almost all PPTS psychopathy subscales correlate moderately amongst themselves, as well as with measures of sadism. Interestingly, Brutality has high associations with Affective aspect of psychopathy measure. The overall pattern of correlations indicates a certain degree of overlapping between the traits, while at the same time confirming their distinctiveness.

Table 9. Intercorrelations of self-report measures of sadism, psychopathy, and Brutality

	1	2	3	4	5	6	7	8
1. Sadism SSIS								
2. Core sadism	.64**							
3. Vicarious sadism	.42**	.42**						
4. Sadism Amorality	.47**	.37**	.43**					
5. Affective responsiveness	.41**	.37**	.36**	.66**				
6. Cognitive responsiveness	.32**	.20**	.22**	.52**	.57**			
7. Interpersonal manipulation	.47**	.54**	.33**	.29**	.24**	0.1		
8. Egocentricity	.38**	.34**	.34**	.46**	.41**	.23**	.38**	
9. Brutality	.52**	.51**	.46**	.73**	.57**	.40**	.33**	.52**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations of emotional responses to dynamic stimuli and implicit emotional associations

In the case of the explicit responses to dynamic stimuli task, the results show significant correlations between different types of responses (Table 10, section a). Correlations are highest between congruent responses (positive emotions to peaceful stimuli and negative emotions to violent), meaning that individuals who experience higher positive emotions when observing peaceful scenes, also experience more intense negative emotions when observing violent scenes. Next in magnitude are the correlations between incongruent responses (positive emotions to violent stimuli and negative emotions to peaceful), indicating that individuals with more intense positive responses to violence also experience heightened negative emotional responses to peaceful scenes. Associations between congruent and incongruent responses are also present, although lower in magnitude. Interestingly, no significant correlations between the measures of explicit emotional responses and the implicit associations task were detected.

Table 10. Intercorrelations between the scores in explicit responses and implicit associations task

	1	2	3	4	5	6	7
a) Explicit responses							
Positive emotions to violent stimuli							
Positive emotions to peaceful stimuli	**.22****						
Negative emotions to violent stimuli	**.14***	**.63****					
Negative emotions to peaceful stimuli	**.32****	**.24****	**.29****				
b) Implicit responses							
Peaceful-unpleasant stimuli	0.01	0.11	0.03	0.03			
Peaceful-pleasant stimuli	0.03	-0.05	-0.05	0.06	**.63****		
Violent-unpleasant stimuli	0.00	0.04	-0.02	0.00	**.65****	**.74****	
Violent-pleasant stimuli	0.00	0.11	0.06	-0.02	**.86****	**.61****	**.68****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

When it comes to the scores of Sorting Paired Features task, the found correlations between them are all significant (Table 10, section b). Unlike the explicit responses task, highest positive correlations were found between responses to incongruent stimuli (peace-unpleasant and violent-pleasant stimuli): stronger associations of peaceful imagery with unpleasant emotions are correlate to stronger associations of violent imagery with pleasant emotions. Correlations between the congruent stimuli (peace-pleasant stimuli and

violent-unpleasant) are slightly lower. Correlations between explicit emotional responses and implicit responses are nonexistent.

Correlations between emotion identification measures and implicit emotional associations

In the Table 11 we presented associations between implicit emotional associations and emotion identification measures. All the correlations between these variables are negative, generally indicating association of higher accuracy in emotion identification with stronger associations implicit associations (i.e. decreased reaction times). Looking at specific emotion categories, individuals more accurate in recognizing fear have stronger incongruent implicit associations: they form stronger associations between unpleasant emotions and peaceful imagery, and pleasant emotions and violent imagery. On the other hand, individuals more successful at recognizing fear and happiness have stronger congruent associations between unpleasant emotions and violent imagery.

Table 11. Correlations between accuracy (and speed) in the two emotion identification tasks and explicit emotional responses to dynamic stimuli

	Peaceful unpleasant		**Peaceful pleasant**		**Violent unpleasant**		**Violent pleasant**	
	accuracy	speed	accuracy	speed	accuracy	speed	accuracy	speed
Overall	**-.18****	.06	**-.16***	.09	**-.25****	.06	**-.16***	.06
Negative	**-.19****	.05	**-.15***	.10	**-.23****	.06	**-.16***	.06
Anger	-.10	.07	-.05	.13	-.09	.09	-.05	.06
Fear	**-.16***	.03	-.09	.07	-.12	.06	**-.13***	.00
Sadness	-.10	.04	-.04	.07	-.13	.03	-.07	.04
Happiness	-.06	.09	-.09	.06	**-.15***	.03	-.06	.02
Surprise	-.07	.04	-.08	.10	**-.17***	.02	.02	.05
Disgust	-.09	.05	-.11	.09	-.09	.12	-.11	.10

Correlations between explicit emotional responses and emotion identification

These measures are not directly related, but a certain degree of correlation is expected. Our data show negative associations between incongruent emotional responses and specific emotion accuracy – individuals with increased positive emotions to violence and increased negative emotions to peaceful stimuli are less accurate in identifying happy facial expressions. Further, there are positive associations between accuracy in identifying

sadness and happiness and congruent responses - individuals more accurate in identifying these emotions also have more intense positive emotions when observing peaceful, and more intense negative emotions when observing multimodal (dynamic) violent stimuli (Table 12). When it comes to speed of visual search of emotional expressions, individuals that are characterized by weaker incongruent responses to stimuli are faster (i.e. have lower reaction times) in spotting anger, sadness, happiness, and surprise. The obtained patterns show there is a link between (ab)normal emotional experience and ability to perceive emotions in others.

Table 12. Correlations between accuracy (and speed) in the two emotion identification tasks and explicit emotional responses to dynamic stimuli

	Positive emotions to violent stimuli		**Positive emotions to peaceful stimuli**		**Negative emotions to violent stimuli**		**Negative emotions to peaceful stimuli**	
	accuracy	speed	accuracy	speed	accuracy	speed	accuracy	speed
Overall	-.07	-.12	.10	-.02	.11	.04	-.10	-.10
Negative	-.08	-.12	.06	-.02	.07	.05	-.11	-.08
Anger	-.09	**-.18****	-.02	-.02	-.02	.02	.06	**-.14***
Fear	.06	-.11	-.04	-.04	-.04	.00	.01	-.05
Sadness	-.04	**-.17****	**.15***	-.07	**.14***	-.02	-.01	**-.16***
Happiness	**-.13***	**-.18****	.12	-.02	**.15***	-.06	**-.14***	**-.28****
Surprise	-.12	**-.14***	.05	.06	.10	.07	-.13	**-.15***
Disgust	-.05	.12	.05	.03	.00	.11	**-.13***	-.10

Correlations of emotion identification accuracy with other measures of emotional processing

Analyses of correlations that include the *face perception* accuracy show several interesting findings (Table 13). Firstly, as expected, we detected significant positive correlation between face and emotion perception accuracy. The same direction of relations was obtained for almost all specific emotions as well, meaning that individuals more accurate in identifying faces are also more accurate in detecting emotional facial expressions. Secondly, there is a specific pattern of emotional responding associated with face perception accuracy: individuals less accurate in detecting face components have more intense negative emotional responses when observing peaceful scenes. Thirdly, individuals less accurate in identifying whole faces have weaker associations (i.e. higher reaction time) between violent imagery and unpleasant emotions.

Table 13. Correlations of face perception accuracy measures with other emotional processes measures

	Part-face accuracy	**Whole-face accuracy**
Whole face accuracy	.42**	
Overall emotion accuracy	.35**	.33**
Specific emotion accuracy		
Anger	**.27****	.08
Fear	**.27****	**.24****
Sadness	**.22****	**.19****
Happiness	**.14***	**.15***
Surprise	**.15***	**.16***
Disgust	**.18****	**.21****
Explicit responses		
Positive emotions to violent stimuli	-.08	.01
Positive emotions to peaceful stimuli	-.07	.03
Negative emotions to violent stimuli	-.07	-.01
Negative emotions to peaceful stimuli	**-.15***	.03
Implicit responses		
Peace-unpleasant stimuli	-.11	-.06
Peace-pleasant stimuli	-.04	-.11
Violent-unpleasant stimuli	-.13	**-.18****
Violent-pleasant stimuli	-.04	-.08

Psychopathy, sadism, and emotion perception

Correlations of sadism, psychopathy, and Brutality with emotion identification accuracy. Table 14 shows negative correlations of psychopathy traits, Affective and Cognitive responsiveness, with overall and negative emotion accuracy, as well as accuracy in detecting surprise. On the other hand, Cognitive responsiveness correlates negatively with recognition of sadness and happiness, whereas Affective responsiveness correlates to disgust recognition accuracy. Core sadism is associated negatively only with accuracy in recognizing happiness. Brutality has similar correlations as psychopathy traits, being associated with overall and negative emotions accuracy, as well as sadness and surprise. Potentially interesting finding (not visible in the table) is that relation of Interpersonal manipulation and sadness accuracy is marginally significant (r=.13, p=.053).

Table 14. Correlations of sadism, psychopathy and Brutality with emotion identification accuracy in the task Identification of emotion expressions from composite faces

Emotion identification accuracy	Overall	Negative	Anger	Fear	Sadness	Happiness	Surprise	Disgust
Sadism SSIS	.04	.06	.06	.03	.01	-.04	.04	.01
Core sadism	-.01	.02	-.07	.06	.00	**-.13***	.00	.02
Vicarious sadism	-.08	-.06	.01	-.09	-.02	-.12	-.08	.03
Sadism Amorality	**-.15***	**-.15***	-0.02	-0.06	-0.09	-0.12	**-.15***	-0.09
Affective responsiveness	**-.19****	**-.20****	-.05	-.10	-.12	-.10	**-.16***	**-.14***
Cognitive responsiveness	**-.17***	**-.16***	-.02	-.02	**-.16***	**-.14***	**-.15***	-.05
Interpersonal manipulation	.03	.06	.02	.01	.13	-.07	-.02	.02
Egocentricity	.00	-.01	.04	-.03	.00	.04	-.06	.05
Brutality	**-.17****	**-.19****	-0.05	-0.12	**-.16***	-0.12	**-.15***	-0.06

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations of sadism, psychopathy, and Brutality with face identification accuracy. The analysis shows only two significant correlations with the scores of face perception task (Table 15). Psychopathic Interpersonal manipulation and Brutality correlate negatively with the accuracy of identification of isolated face parts (eyes, nose, mouth), indicating that the individuals with pronounced traits are less accurate in identifying these facial characteristics.

Table 15. Correlations of sadism, psychopathy and amorality with face identification accuracy in the task Sequential matching of part–whole faces

Face identification accuracy	**Part**	**Whole**
Sadism SSIS	-.07	.01
Core sadism	-.09	-.06
Vicarious sadism	-.01	-.05
Sadism Amorality	-0.09	-0.01
Affective responsiveness	-.05	-.04
Cognitive responsiveness	.01	-.06
Interpersonal manipulation	**-.18****	.01
Egocentricity	-.07	-.04
Brutality	**-.14***	-0.09

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations of sadism, psychopathy, and Brutality with emotion identification speed. Table 16 shows correlations of sadism, psychopathy and Brutality with reaction times of emotion identification speed. Correlations with inverted response latencies are almost identical, therefore we opted to use only simple response latencies (reaction times) in further analysis (inverted response latencies, i.e. processed units per trial are presented in Appendix D). Unlike accuracy, these measures are not of primary interest for us, although they do show there is a general deficit in emotion identification speed in individuals high in sadistic and psychopathic traits (especially Affective and Cognitive aspects).

Table 16. Correlations of sadism, psychopathy and Brutality with face identification speed

Speed of visual search of emotions	**Overall** RT	**Negative** RT	**Anger** RT	**Fear** RT	**Sadness** RT	**Happiness** RT	**Surprise** RT	**Disgust** RT
SSIS	.11	.11	.08	**.19****	0.11	.11	.04	.12
CS	**.16***	**.16***	**.13***	**.19****	**.17***	.10	**.16***	**.18****
VS	**.15***	**.14***	.11	**.20****	.08	**.20****	.11	**.15***
SA	0.1	0.1	0.07	**.16***	0.09	0.1	0.06	0.09
AR	**.14***	**.14***	.12	**.20****	.12	0.1	.09	.10
CR	**.16***	**.16***	.13	**.24****	.09	**.17***	**.15***	**.19****
IM	.12	.12	.12	**.15***	0.1	.10	.10	**.14***
EG	.06	.05	.03	.08	.04	**.14***	.05	.02
BR	0.11	0.11	0.05	**.17****	0.11	0.09	0.09	0.13

Labels: RT – reaction time

SSIS – SSIS sadism, CS – Core sadism, VS – Vicarious sadism, SA-Sadism Amorality; AR - Affective responsiveness, CR - Cognitive responsiveness, IM - Interpersonal manipulation, EG - Egocentricity; BR - Brutality

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Prediction of emotion perception by dark traits

In order to get a deeper insight into relations between the variables, we conducted several regression analyses with sadism, psychopathy, and Brutality as predictors, which are presented in accordance with the number and nature of our criteria. The Enter method was used in all the analyses. As a means to reduce the risk of multicollinearity of using several sadism measures, for regression analyses we decided to use one general measure of sadism. We achieved this by conducting Principal Component Analysis on sadism scales (SSIS, VAST Core sadism, Sadism from Amorality scale) and extracting as the first principal component, with the highest amount of explained variance (Eigenvalue=6.88, 28.69% of explained variance; for factor structure see Appendix E).

The following sections have the same structure as previously mentioned: emotion perception (accuracy and speed), face perception, explicit emotional responses, and implicit emotional associations (responses). Before we conducted these analyses, we considered bivariate correlations and simple linear regressions.

Emotion perception accuracy

In order to investigate the contribution of different traits to emotion perception, we conducted several multiple regression analyses (one per criterion). In the following tables we present the significant functions, including traits (sadism, psychopathy and Brutality) as predictors and emotion identification accuracies as criteria, with added control variables (gender, age, and education).

Overall and negative emotions identification accuracy. As already mentioned before, the scores for overall and negative emotions accuracy are very similar, differing only in the happiness scores. However, for the purpose of our study and our hypotheses, it is important to make this distinction. In the first analysis, we used *overall accuracy* as the criterion, with the significant regression function (R^2=.125, $F(9,225)=3.593$, $p<.001$). Besides gender, sadism and Brutality are significant predictors of overall identification accuracy (Table 17). More specifically, overall accuracy in perceiving emotional expressions is predicted by higher sadism and lower Brutality. As expected, the same pattern is obtained in the case of *negative emotions accuracy*, with a slightly larger amount of explained variance (R^2=.133, $F(9,225)=3.839$, $p<.001$), where it is predicted by increased sadism and decreased Brutality. In other words, individuals with pronounced sadism and lower Brutality are more accurate when identifying negative emotions.

Table 17. Regression analyses with overall and negative emotions identification accuracy set as criteria, and sadism, psychopathy and Brutality as predictors

	Overall identification accuracy				**Negative emotions identification accuracy**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Constant		-.90	.69	-1.30		-.99	.69	-1.44
Gender	**.22**	**.49**	**.16**	**2.97****	**.20**	**.44**	**.16**	**2.71****
Age	.03	.01	.03	.33	.00	.00	.03	-.01
Education	-.02	-.03	.15	-.22	.03	.06	.15	.39
Sadism	**.28**	**.28**	**.10**	**2.90****	**.30**	**.30**	**.10**	**3.08****
Affective responsiveness	-.13	-.14	.09	-1.49	-.15	-.16	.09	-1.71
Cognitive responsiveness	-.06	-.06	.08	-.71	-.03	-.03	.08	-.43
Interpersonal manipulation	.02	.02	.08	.27	.06	.06	.08	.79
Egocentricity	.09	.09	.08	1.12	.07	.07	.08	.90
Brutality	**-.24**	**-.24**	**.09**	**-2.60***	**-.27**	**-.27**	**.09**	**-2.94****

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
* - p< .05; ** - p<.01.

Knowing that Brutality shares relatively high relations with psychopathic traits, we also conducted regressions without this measure. Again, *overall accuracy* was the criterion, with the significant regression function (R^2=.099, F(8,226)=3.105, p<.001). Besides gender, lower Affective responsiveness and higher sadism significantly predicted overall emotion identification accuracy. Further, when it comes to *negative emotions accuracy* (R^2=.100, F(8,226)=3.130, p<.01), results again indicated that lower Affective responsiveness and higher sadism significantly predict negative emotion identification accuracy.

Table 18. Regression analyses with overall and negative emotions identification accuracy set as criteria, and sadism, psychopathy predictors (without Brutality)

	Overall identification accuracy				**Negative emotions identification accuracy**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Constant		-1.10	.70	-1.59	-1.22	.69		-1.75
Gender	**.23**	**.52**	**.17**	**3.16****	**.48**	**.17**	**.22**	**2.91****
Age	.04	.02	.03	0.53	.01	.03	.02	.22
Education	-.01	-.03	.15	-0.17	.06	.15	.03	.43
Sadism	**.18**	**.18**	**.09**	**2.00***	**.18**	**.09**	**.18**	**2.04***
Affective responsiveness	**-.18**	**-.19**	**.09**	**-2.06***	**-.21**	**.09**	**-.21**	**-2.34***
Cognitive responsiveness	-.08	-.08	.08	-0.97	-.06	.08	-.06	-.72
Interpersonal manipulation	.03	.03	.08	0.39	.07	.08	.07	.91
Egocentricity	.03	.03	.08	0.41	.01	.08	.01	.08

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
* - p< .05; ** - p<.01.

Specific emotions identification accuracy. In this section, we show two significant multiple regression analyses, one per criterion: sadness (R^2=.081, F(9,225)=2.195, p<.05) and disgust (R^2=.098, F(9,225)=2.715, p<.01), with the same predictors as in the previous analyses: sadism, psychopathy, and Brutality (Table 19). In the case of anger, fear and surprise identification accuracy, regression functions were not significant.

When predicting *sadness* identification accuracy, psychopathic interpersonal manipulation and Brutality were significant predictors, indicating that the individuals with more pronounced interpersonal manipulation and less pronounced Brutality have higher accuracy in recognizing sadness (Table 19). Finally, when we set *disgust* as the criterion, gender, sadism, and psychopathic affective responsiveness became significant predictors (Table 19). Again, sadism was a positive predictor: more sadistic individuals are also more successful in recognizing disgust. On the other hand, individuals higher on Affective responsiveness trait are less accurate in identifying this emotion.

Table 19. Regression analyses with sadness and disgust identification accuracy set as criteria, and sadism, psychopathy and Brutality as predictors

	Sadness identification accuracy				**Disgust identification accuracy**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Constant		-.46	.70	-.66		-1.79	.69	-2.61
Gender	.08	.17	.17	1.01	**.24**	**.53**	**.16**	**3.26****
Age	-.02	-.01	.03	-.26	.12	.04	.03	1.46
Education	.04	.08	.15	.53	.00	.00	.15	.03
Sadism	.11	.10	.10	1.06	**.26**	**.25**	**.10**	**2.59***
Affective responsiveness	-.02	-.02	.09	-.25	**-.20**	**-.20**	**.09**	**-2.22***
Cognitive responsiveness	-.09	-.09	.08	-1.16	.05	.05	.08	.58
Interpersonal manipulation	**.16**	**.16**	**.08**	**2.05***	-.02	-.02	.08	-.20
Egocentricity	.05	.05	.08	.64	.08	.08	.08	1.06
Brutality	**-.23**	**-.22**	**.09**	**-2.39***	-.08	-.08	.09	-.88

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
* - p< .05; ** - p<.01.

Emotion perception speed (visual search speed)

Finally, we conducted regressions using visual search speed of emotional expressions as criteria. In this case, overall models were significant: overall speed (R^2=.091, F(9,224)=2.505, p<.005), negative emotions speed (R^2=.091, F(9,224)=2.486, p<.005), anger (R^2=.075, F(9,224)=2.028, p<.005), fear (R^2=.132, F(9,223)=3.763, p<.001), with gender being only significant predictor (β=-.15, t=-2.01, p<.05), disgust (R^2=.131, F(9,223)=3.721, p<.001); however, none of the other specific predictors were significant. Regression models for predicting sadness, happiness, surprise by dark traits were not significant. We additionally conducted regressions with face perception accuracy measures as criteria, but none of the models were significant.

Canonical correlations between dark traits and emotion perception measures

For further analyses we decided to use canonical correlation between the sets of variables. This procedure lets us observe relationships between the variables that are mutually independent, and represents an extension of multiple regression analyses (Manly & Alberto, 2016). In the analyses, we considered both standardized weights, structure coefficients (canonical loadings), and canonical cross loadings. As per recommendation by Manly and Alberto (2016), we only interpreted standardized coefficients that make up at least 50% of the largest obtained standardized coefficient (in the canonical variate) for pattern interpretation, and also considered only canonical loadings above 0.30 for structure interpretation.

Psychopathy, sadism, Brutality and emotion perception

Negative emotions identification accuracy. In this canonical correlation analysis, we included negative emotions accuracy and speed on one side, and dark traits on the other. The overall model was significant (Wilks's λ=.703, F(24,782.65) =3.467,p<.001. We obtained one significant canonical correlation (R_c=.321; Wilks's λ=.857, F(12,452) =3.023,p<.001), explaining 14.3% of shared variance between the composites.

Table 20. Canonical coefficients for sets of negative emotions perception scores and dark traits

	Standardized canonical coefficient	r_s	r_s^2 (%)	*Canonical cross-loading*
Negative emotions perception				
Negative emotions accuracy	**-.980**	**-.981**	96.24	-.315
Negative emotions speed	.195	.201	4.04	.065
Dark traits				
Sadism	**-.695**	.07	0.49	.022
Affective responsiveness	**.574**	**.677**	45.83	.218
Cognitive responsiveness	.216	**.569**	32.38	.183
Interpersonal manipulation	-.074	-.117	1.37	-.038
Egocentricity	-.328	.06	0.36	.019
Brutality	**.871**	.63	39.69	.202

Labels: r_s - structure coefficient (canonical loading), r_s^2- squared structure coefficient.
Note: Coefficients greater than .4 are bolded.

The function (i.e. variate) comprises low negative emotions identification accuracy, together with high Affective Responsiveness and Brutality. This could also be interpreted as that individuals with pronounced affective responsiveness and Brutality are being less

accurate in identifying negative emotions. As it can be seen from Table 20, sadism has relatively high contribution to the canonical variate, but its correlation with the variate is almost non-existent. This problem might source from multicollinearity between the dark trait variables. When we look at the cross-loadings, this shows us that the relations of specific dark traits with the opposite variate is low, and highest for Affective responsiveness and Brutality.

Table 21. Redundancy analysis for the canonical functions

Canonical function (variate)	**Variance**	**Redundancy**
Dark traits	.200	.021
Negative emotion identification	.501	.052

Table 21 shows the amount of variance in original variables explained by the sets' own canonical variate (variance), and the amount of variance in original variables explained by the variate of the opposite set (redundancy). As expected, the amount of explained variance is higher for own set, and much lower when explaining the opposite set. There is a very little degree of overlap between negative emotion identification and dark traits, although it might stem from the direction of the dark traits. However, we do consider the fact that the emotion identification set comprised a significantly lower number of variables.

Specific emotions identification accuracy. In this analysis, we obtained one significant canonical correlation (R_c=.383; Wilks's λ=.660, F(72,1176) =1.296,p<.05), explaining 14.70% of variance. The Table 22 shows standardized canonical coefficients, structure coefficients and canonical cross-loadings. The functions are composed primarily of slower identification of fear on one, and pronounced vicarious sadism and cognitive responsiveness on the other.

Table 22. Canonical coefficients for sets of specific emotions perception scores and dark traits

	Standardized canonical coefficient	r_s	r_s^2 (%)	*Canonical cross loading*
Specific emotion accuracy				
Anger	.001	.190	3.61	.071
Fear	.054	.204	4.16	.078
Sadness	.363	**.510**	26.01	.196
Happiness	.283	**.490**	24.01	.186
Surprise	.20	**.490**	24.01	.188
Disgust	.280	.315	9.92	.121
Specific emotion speed				
Anger	.249	-.356	12.67	-.136
Fear	**-.815**	**-.626**	39.19	-.24
Sadness	**.446**	-.331	10.96	-.127
Happiness	-.009	-.359	12.89	-.138
Surprise	-.036	-.349	12.18	-.134
Disgust	**-.371**	**-.517**	26.73	-.198
Dark traits				
Sadism	.160	**-.437**	19.10	-.168
Affective responsiveness	-.236	**-.704**	49.56	-.270
Cognitive responsiveness	**-.634**	**-.853**	72.76	-.327
Interpersonal manipulation	-.117	-.165	2.72	-.063
Egocentricity	**.400**	-.107	1.14	-.041
Brutality	**-.570**	**-.680**	46.24	-.261

Labels: r_s - structure coefficient, r_s^2 - squared structure coefficient.
Note: Coefficients greater than .4 are bolded.

The Table 23 shows the variance and redundancy for the obtained functions. The redundancy index shows a very low degree of overlapping in variance of dark traits and emotion perception sets. However, this index is smaller for emotion perception measures indicating potential direction of influence from emotion perception to dark traits.

Table 23. Variance and redundancy for the canonical functions

Canonical function	**Variance**	**Redundancy**
Dark traits	.319	.047
Emotion perception	.172	.025

Psychopathy, sadism, and explicit emotional responses to dynamic stimuli

Correlations of sadism, psychopathy, Brutality with explicit emotional responses

The Table 24 shows bivariate correlations between our main self-report measures and emotional responses to dynamic stimuli. Both measures of direct sadism (SSIS sadism and core sadism) are positively associated with incongruent emotional responses: higher sadism is associated with higher positive emotions to violent stimuli, as well as negative emotions to peaceful stimuli. The opposite pattern of correlations was obtained for sadism and congruent responses: the higher the sadism trait, the less intense are positive emotions to peaceful stimuli and negative emotions to violent stimuli. Vicarious sadism correlates negatively with incongruent emotional responses.

A very similar pattern of correlations was obtained for PPTS psychopathy domains Affective responsiveness, Cognitive responsiveness, as well as Brutality as an aspect of Amorality. Furthermore, psychopathic Interpersonal manipulation correlates positively only with negative emotional responses to peaceful stimuli.

Table 24. Correlations of sadism, psychopathy and Brutality with explicit emotional responses

	Positive emotions to violent stimuli	Positive emotions to peaceful stimuli	Negative emotions to violent stimuli	Negative emotions to peaceful stimuli
Sadism SSIS	**.22****	**-.20****	**-.21****	**.17***
Core sadism	**.22****	-.11	**-.22****	**.19****
Vicarious sadism	**.13***	-.05	**-.19****	.07
Sadism Amorality	0.07	**-.22****	**-.36****	0.12
Affective responsiveness	.08	**-.24****	**-.33****	.11
Cognitive responsiveness	-.05	**-.30****	**-.32****	.00
Interpersonal manipulation	**.19****	.01	-.04	**.23****
Egocentricity	**.14***	-.03	-.08	**.13***
Brutality	**.19****	**-.14***	**-.27****	**.19****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Prediction of explicit emotional responses by dark traits

In this case we conducted four multiple regression analyses (one per each criterion), with explicit responses set as criteria, and psychopathy traits, sadism, and Brutality as predictors, with added control variables (gender, age, and education).

Table 25. Multiple regression analyses with explicit emotional responses set as criteria, and sadism, psychopathy traits and Brutality set as predictors

	Positive emotions to violent stimuli				**Positive emotions to peaceful stimuli**				**Negative emotions to violent stimuli**				**Negative emotions to peaceful stimuli**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Con		.82	.62	1.31		.23	.70	.325		-.60	.69	-.87		.03	.69	.05
Gen	-.06	-.13	.15	-.85	-.04	-.08	.17	-.49	.08	.19	.16	1.15	.06	.14	.16	.84
Age	**-.17**	**-.05**	**.03**	**-2.12***	.06	.02	.03	.70	.14	.05	.03	1.75	-.03	-.01	.03	-.40
Edu	.08	.14	.13	1.08	-.06	-.12	.15	-.83	-.10	-.18	.15	-1.25	.00	-.01	.15	-.03
SA	**.19**	**.17**	**.09**	**1.93***	-.15	-.15	.10	-1.57	-.11	-.11	.10	-1.13	.09	.08	.10	.86
AR	-.03	-.03	.08	-.36	-.11	-.11	.09	-1.17	-.13	-.13	.09	-1.45	.02	.02	.09	.16
CR	-.14	-.13	.07	-1.78	**-.21**	**-.22**	**.08**	**-2.68****	**-.16**	**-.16**	**.08**	**-1.99***	-.08	-.08	.08	-.99
IM	.04	.03	.07	.49	.04	.04	.08	.52	.03	.03	.08	.42	**.16**	**.15**	**.08**	**2.02***
EG	.02	.02	.07	.29	.07	.07	.08	.93	.08	.08	.08	1.10	-.03	-.03	.08	-.37
BR	.09	.08	.08	.99	.05	.05	.10	.48	-.09	-.09	.09	-.94	.14	.13	.09	1.40

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
Con-constant; Gen-gender, Edu-education; SA-sadism; AR - Affective responsiveness, CR - Cognitive responsiveness, IM - Interpersonal manipulation, EG - Egocentricity; BR – Brutality
* - p< .05; ** - p<.01.

Positive emotions to violent stimuli. In the first multiple regression, the criterion was the degree of positive emotional response to violent stimuli (R^2=.101, F(9,224)=2.810, p<.01). In this case, significant predictors are age and sadism (Table 25). This result indicates that younger individuals and ones with pronounced core sadistic traits are characterized by increased positive emotions to violent dynamic stimuli.

Positive emotions to peaceful stimuli. In the second regression, the criterion was the degree of positive emotional response to peaceful stimuli (R^2=.103, F(9,224)=2.844, p<.01), with psychopathic Cognitive responsiveness being a sole negative predictor (Table 25). More precisely, individuals higher in psychopathic cognitive responsiveness have lower positive emotional reactions to peaceful scenes.

Negative emotions to violent stimuli. In the third regression analysis, the criterion was the degree of negative emotional response to violent stimuli (R^2=.150, F(9,224)=3.879, p<.001), and the model explained larger percentage of variance in these responses in comparison to the others. Again, psychopathic Cognitive responsiveness is the only (negative) predictor, showing that the individuals with pronounced psychopathic cognitive responsiveness are characterized by weaker negative emotions when observing violent stimuli (Table 25).

Negative emotions to peaceful stimuli. In the fourth regression, the criterion was the degree of negative emotional response to peaceful stimuli (R^2=.076, F(9,224)=2.042, p<.05). In this case, psychopathic interpersonal manipulation is a significant positive predictor of negative emotions to peaceful stimuli: the higher the interpersonal manipulation, the more intense are the negative responses to peaceful stimuli.

Canonical correlations between dark traits and explicit emotional responses

In this canonical correlation analysis, we included measures of dark traits (sadism, psychopathy, Brutality) and four types of explicit emotional responses. The full model was statistically significant (Wilks's λ=.703, F(24,782.65) =3.467,p<.001), explaining 29.7% of variance shared by the sets of variables. We obtained one statistically significant canonical correlation (R_c=.474; Wilks's λ=.703, F(24,782.65)= 3.467,p<.001), explaining 22.5% of variance shared by the variable sets.

Table 26. Canonical coefficients for sets of explicit emotional responses and dark traits

	Standardized canonical coefficient	r_s	r_s^2 (%)	*Cross loadings*
Explicit emotional responses				
Positive emotions to violent stimuli	.33	**.42**	.18	.20
Positive emotions to peaceful stimuli	-.16	**-.48**	.23	-.23
Negative emotions to violent stimuli	**-.79**	**-.70**	.49	-.33
Negative emotions to peaceful stimuli	**.54**	**-.42**	.18	.20
Dark traits				
Sadism	**.50**	**.89**	.79	.42
Affective responsiveness	.27	**.75**	.56	.36
Cognitive responsiveness	.11	**.54**	.29	.26
Interpersonal manipulation	.12	**.50**	.25	.24
Egocentricity	-.21	**.40**	.16	.19
Brutality	.38	**.84**	.71	.40

Labels: r_s - structure coefficient (canonical loading), r_s^2 - squared structure coefficient.
Note: Coefficients greater than .4 are bolded.

In the Table 26, we see that the cross-loadings have smaller values than the canonical loadings, indicating that all the variables in the set measure their own latent score better than the opposite variate. The canonical function is primarily constituted of weak negative emotions to violent stimuli and intense negative emotions to peaceful stimuli on one side, and pronounced sadism on the other. Brutality also shows certain contribution to the variate, but has high correlation with the canonical variate. Affective responsiveness also has a high correlation with the variate, even though its contribution to prediction is relatively low. This is probably due to multicollinearity among the dark traits. Our previous analysis showed that Brutality and sadism share high positive correlation

(r=.66), while Brutality also has notable relations with psychopathy traits (ranging from r=.33 to r=.57), which might contribute to the problem of multicollinearity. For that reason, we also conducted the canonical correlation without this measure, in order to focus on the role of specific psychopathy traits in canonical functions. In the second canonical correlation analysis, we included measures of dark traits (sadism, psychopathy) and four types of explicit emotional responses. We again obtained one significant canonical correlation (R_c=.459, Wilks's λ=.725, F(20,747) =3.807,p<.001), this time explaining 21% of variance shared by the sets of variables. In this case, Sadism and Affective Responsiveness contributed more to the variate (standard canonical coefficient of .68 and .36, respectively), while maintaining high correlation with the variate. This result is expected since the measure of Brutality has highest correlations with Affective Responsiveness (r=.57), indicating common features that these constructs measure. In our case, the fact that Affective responsiveness builds the canonical function is of primary importance, since it represents a specific feature of psychopathy. In other words, it seems that individuals high on sadism (and somewhat Affective responsiveness) have atypical emotional profile - they react to violence with decreased negative emotions, and, to a lesser degree, with increased negative emotions to peaceful scenes.

Table 27. Redundancy analysis for the canonical functions

Canonical function (variate)	**Variance**	**Redundancy**
Dark traits	.461	.104
Explicit emotional responses	.270	.061

The Table 27 shows the amount of variance in original variables explained by the sets' own canonical variate (variance), and the amount of variance in original variables explained by the variate of the opposite set (redundancy). As expected, the variance explained by own set is larger both in the case of dark traits and emotional responses. However, the variance and redundancy are larger in the case of dark traits. The redundancy between the two domains is present but not particularly high, indicating that there is a slight overlap between them. The redundancy is lower for emotional responses, potentially indicating that the overlap stems from the direction of explicit emotional responses.

Brutality: additional analyses

In order to determine whether our assumptions that Brutality represents the expression of the most brutal tendencies, different from psychopathy (and even maybe sadism), with incremental validity in prediction of emotional responses, we did additional analyses into relations between these measures. We conducted hierarchical regressions to see if Brutality predicts emotional responses above and beyond psychopathy and sadism (Table 28).

Table 28. Hierarchical regression analyses with explicit emotional responses set as criteria, and sadism, psychopathy (first model), and Brutality (second model)

	Positive emotions to violent stimuli				**Positive emotions to peaceful stimuli**				**Negative emotions to violent stimuli**				**Negative emotions to peaceful stimuli**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Model 1																
Constant		.92	.08	11.74		4.04	.20	20.42		4.10	.22	19.02		.91	.09	10.37
Psychopathy	**.19**	**.10**	**.04**	**2.96****	**-.21**	**-.29**	**.09**	**-3.31****	**-.26**	**-.39**	**.10**	**-4.10****	**.22**	**.13**	**.04**	**3.41****
Sadism	**.17**	**.05**	**.02**	**2.62****	-.10	-.07	.04	-1.54	**-.14**	**-.10**	**.05**	**-2.19***	.07	.02	.02	1.09
		R^2=.063				R^2=.054				R^2=.085				R^2=.052		
Model 2																
Constant		0.99	0.11	9.28		3.87	0.27	14.33		3.78	.29	12.91		1.00	.12	8.36
Psychopathy	0.13	0.07	0.05	1.46	-0.16	-0.21	0.12	-1.76	-.16	-.25	.13	-1.87	.15	.09	.05	1.71
Sadism	**0.14**	**0.04**	**0.02**	**2.10***	-0.08	-0.05	0.05	-1.10	-.10	-.08	.05	-1.48	.04	.01	.02	.62
Brutality	0.09	0.02	0.03	0.99	-0.09	-0.06	0.06	-0.93	-.14	-.11	.07	-1.61	.10	.03	.03	1.11
		R^2=.067				R^2=.058				R^2=.096				R^2=.057		

Labels: Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
* - p< .05; ** - p<.01.

When predicting *positive emotions to violent stimuli,* in the first step, the significant predictors were sadism and psychopathy (R^2=.063, F(2,231)=6.655, p<.01). Adding Brutality in the second step did not significantly contribute to the percentage of explained variance (no significant change in F statistic). In the second conducted regression, the criterion was the degree of *positive emotional response to peaceful stimuli* (R^2=.054, F(2,231)=7.794, p<.01), with psychopathy as significant predictor. Again, adding Brutality did not significantly contribute to the level of explained variance in emotional responses by the model. In the third regression analysis, the criterion was the degree of *negative emotional response to violent stimuli* (R^2=.085, F(2,231)=10.780, p<.01), with psychopathy and sadism as significant predictors, while the model with added Brutality did not significantly add to the variance in responses. In the fourth regression, the criterion was the degree of *negative emotional response to peaceful stimuli* (R^2=.052, F(2,231)=6.387, p<.01), with psychopathy as a significant predictor. In conclusion, Brutality did not predict emotional responses above and beyond psychopathy and sadism, contrary to our initial assumptions.

Psychopathy, sadism, and implicit emotional processing

Correlations of sadism, psychopathy and Brutality with implicit emotional associations

Results indicate negative correlation of SSIS Sadism scale and psychopathic Egocentricity with response time to violent-pleasant stimuli (Table 29). More precisely, individuals with pronounced sadism, as well as the ones with pronounced egocentricity, have stronger associations (i.e. shorter reaction time) between violent imagery and terms representing pleasant emotions. However, it was expected that the scores on implicit measure would have at least low correlation with the measure of explicit emotional responses, which was not the case. More importantly, the fact that only two correlations were obtained sparks a question on the robustness of relationship between this implicit measure and dark traits.

Table 29. Correlations of sadism, psychopathy and Brutality with reaction times in Sorting Paired Features task

	Peaceful unpleasant	**Peaceful pleasant**	**Violent unpleasant**	**Violent pleasant**
Sadism SSIS	-.09	-.02	-.03	**-.14***
Core sadism	-.07	.02	.03	-.09
Vicarious sadism	.02	.04	.10	-.03
Sadism Amorality	.04	.01	.07	-.06
Affective responsiveness	.00	-.01	.07	-.02
Cognitive responsiveness	-.02	-.06	.06	-.05
Interpersonal manipulation	-.08	-.06	-.03	-.11
Egocentricity	-.09	-.03	-.01	**-.15***
Brutality	.05	.06	.05	-.03

In order to further examine the relationship between traits and implicit responses, we conducted four regression analyses, with implicit associations scores set as criteria, while psychopathy, sadism, and Brutality were set as predictors (Table 30).

Peaceful-unpleasant associations. In the first regression, the criterion was the reaction time of pairing peaceful stimuli and unpleasant emotions (R^2=.078, F(9,215)=2.034, p<.05). Besides age being a positive predictor, Brutality was as well, meaning that the older individuals and the ones with pronounced Brutality have weaker implicit associations between violence and pleasant emotions (i.e. longer reaction times).

Peaceful-pleasant associations. In the second regression, the set criterion was the reaction time of pairing peaceful stimuli and pleasant emotions. However the model was marginally significant (R^2=.073, F(9,215)=1.881, p=.056), and we will take that into account. When it comes to this score, it is positively predicted both by increased age and Brutality.

Table 30. Multiple regression analyses with implicit association scores set as predictors, and psychopathy, sadism and Brutality as criterion variables

	Peaceful unpleasant				**Peaceful pleasant**				**Violent unpleasant**				**Violent pleasant**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Con		3.13	.06	50.44		3.01	.05	56.24		3.06	.06	53.49		1538.22	273.38	5.63
Gen	.06	.01	.02	.80	-.03	-.01	.01	-.38	-.04	-.01	.01	-.45	.03	25.62	65.67	.39
Age	**.27**	**.01**	**.00**	**3.11****	**.24**	**.01**	**.00**	**2.77***	**.27**	**.01**	**.00**	**3.15****	**.25**	**31.28**	**10.78**	**2.90****
Edu	-.15	-.02	.01	-1.86	-.08	-.01	.01	-1.02	-.15	-.02	.01	-1.80	-.14	-97.08	57.23	-1.70
SA	-.15	-.01	.01	-1.51	-.09	-.01	.01	-.84	-.11	-.01	.01	-1.06	-.18	-67.63	37.94	-1.78
AR	.06	.01	.01	.61	.03	.00	.01	.33	.05	.00	.01	.51	.07	28.40	36.22	.78
CR	-.06	-.01	.01	-.70	-.13	-.01	.01	-1.56	.01	.00	.01	.13	-.09	-35.07	31.73	-1.11
IM	-.05	.00	.01	-.64	-.10	-.01	.01	-1.21	-.07	-.01	.01	-.90	-.02	-9.12	30.20	-.30
EG	-.11	-.01	.01	-1.36	-.06	-.01	.01	-.78	-.05	.00	.01	-.65	**-.17**	**-66.35**	**31.54**	**-2.10***
BR	**.24**	**.02**	**.01**	**2.48***	**.21**	**.02**	**.01**	**2.18***	.14	.01	.01	1.44	**.20**	**74.41**	**36.72**	**2.03***

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
Con-constant; Gen-gender, Edu-education; SA-sadism; AR - Affective responsiveness, CR - Cognitive responsiveness, IM - Interpersonal manipulation, EG - Egocentricity; BR – Brutality
* - p< .05; ** - p<.01.

Violent-unpleasant associations. In the third regression, the criterion was the reaction time when pairing violent stimuli and unpleasant emotions (R^2=.075, F(9,215)=1.939, p<.05). In this case, age was the only significant predictor, with increase in age predicting increased reaction time of stimuli pairing (i.e. weaker associations between violence and unpleasant emotions).

Violent-pleasant associations. In the fourth regression, the criterion was reaction time when pairing violent stimuli with pleasant emotions (R^2=.088, F(9,215)=2.314, p<.05). Once again, age and Brutality are positive predictors: the older the individual, and the higher in Brutality, the higher the reaction time of pairing (i.e. the weaker the association

between violence and pleasure). Additionally, psychopathic Egocentricity represents a negative predictor of this score: individuals with pronounced egocentricity have lower reaction times when pairing violent imagery and pleasant emotions, meaning that they have stronger implicit associations between these concepts.

We also conducted canonical correlation analysis with these sets of measures, however we did not obtain any significant canonical correlations.

Subsequent analyses: prediction of dark traits with emotional processes

So as to precisely determine the different emotional profile in psychopathy and sadism, we opted for regression analyses, but using a different analytical approach. Namely, we already know that psychopathy and sadism share high level of variance, going even up to 60 or 70 percent (Trémolière & Djeriouat, 2016). In further regression analyses we decided to enter traits (psychopathy and sadism) as criteria, and emotional processes as criterion measures (Table 31). In our case, this seemed like an additional analytical approach – to predict broader and more complex construct such as personality traits based on the narrower phenomena such as emotional processes (emotion identification or emotional responses). This time, we used both general measure of sadism (used in previous sections), and general measure of psychopathy, derived as the average of PPTS items. Since we know that they share certain characteristics (lack of empathy, callousness), those characteristics are what comprises the joint variance of these traits; sadism is more likely to contain psychopathic elements, but also some additional features. So, in order to isolate the different emotional processes that sadistic and psychopathic individuals are characterized by, we needed to focus on the variance that is unique to these traits. Hence, we conducted a linear regression with sadism set as the criterion and psychopathy set as the predictor (β=.73, t=16.46, p<.01), and extracted the standardized residuals (the variance of sadism that psychopathy does not predict). This score was further used as the measure of sadism in the regression analyses.

Table 31. Multiple regression analyses with emotion-related measures as predictors, and psychopathy and unique sadism variance as criteria

	Psychopathy				**Sadism (unique)**			
	β	*B*	*SE*	*t*	*β*	*B*	*SE*	*t*
Constant		1.46	2.27	.65		.41	5.05	.08
Gender	**-.31**	**-.34**	**.07**	**-4.65****	**-.22**	**-.51**	**.16**	**-3.11****
Age	.05	.01	.01	.63	-.13	-.05	.03	-1.51
Education	-.03	-.03	.07	-.38	-.08	-.15	.15	-.97
Negative emotions accuracy	.00	.00	.03	-.01	**.21**	**.22**	**.07**	**3.13**
Negative emotions speed	.08	.04	.03	1.35	.04	.04	.07	.57
Positive emotions to violent stimuli	.08	.04	.04	1.19	**.15**	**.18**	**.08**	**2.12***
Positive emotions to peaceful stimuli	-.11	-.06	.04	-1.44	-.04	-.04	.09	-.48
Negative emotions to violent stimuli	**-.20**	**-.10**	**.04**	**-2.52***	-.11	-.11	.09	-1.23

Negative emotions to peaceful stimuli	**.22**	**0.12**	**.04**	**3.41****	.06	.07	.08	.84
Peaceful-unpleasant stimuli associations	.17	.98	.68	1.44	.02	.29	1.52	.19
Peaceful-pleasant stimuli associations	**-.24**	**-1.63**	**.63**	**-2.57****	.07	1.00	1.41	.71
Violent-unpleasant stimuli associations	.19	1.19	.62	1.92	-.04	-.56	1.38	-.41
Violent-pleasant stimuli associations	**-.25**	**.0003**	**.0002**	**-2.04***	-.04	.0001	.0004	-.33

Labels: *β*-standardized beta value, *B*-unstandardized beta value, *SE*-standard error, t-t test statistic
* - p< .05; ** - p<.01.

When we set psychopathy as the criterion, it was explained above the level of chance (R^2=.283, F(13,209)=6.343, p<.001), and there were several independent predictors. Psychopathy was predicted by reduced negative emotions to violent scenes, and increased negative emotions to peaceful scenes. In other words, individuals with pronounced psychopathy have an aberrant emotional profile characterized by difficulty in generating negative emotions in the appropriate contexts.

When it comes to implicit scores, psychopathy was predicted by a faster pairing of peaceful stimuli and pleasant emotions, and a faster pairing of violent stimuli and pleasant emotions. More specifically, individuals with pronounced psychopathic traits associate both peaceful and violent stimuli with pleasant emotions more strongly. Interestingly, pairing of violent-unpleasant stimuli was approaching significance (p=.056). Here we did obtain an unexpected finding. It is expected that psychopathy relates to incongruent responses, however not to stronger association of pleasant emotions with peaceful stimuli. With this in mind, we checked relationships between our SPF logarithmic scores and the general measure of psychopathy (Table 32). The only variable that actually shows relationship with general psychopathy score is reaction time of associating violent stimuli and pleasant emotions. As seen in Table 10, the intercorrelations of SPF scores are very high, which is anticipated based on authors' claims (Bar-Anan et al., 2009; Teige-Mocigemba, Klauer, & Sherman, 2016). This leads us to the assumption that the presence of collinearity between predictors probably resulted in several of them being (marginally) significant. In order to check whether this is just an artifact, we conducted simple linear regressions predicting general psychopathy with SPF scores. In this case, the only significant model was the one with reaction time of associating violent and pleasant stimuli (R^2=.018, F(1,223)=4.185, p<.05): lower reaction times predict higher psychopathy scores, meaning that individuals with pronounced psychopathy have stronger associations of pleasant emotions and violence (β=-.136, t=-2.046, p<.05). This indeed confirms notion of SPF authors that the scores of the task should be analyzed together, but also that it is very hard to detangle the nuances when using separate scores (Bar-Anan et al., 2009).

Table 32. Correlations between general psychopathy score and implicit scores

	General psychopathy
	r
Peaceful-unpleasant stimuli associations	-0.065
Peaceful-pleasant stimuli associations	-0.068

Violent-unpleasant stimuli associations	-0.001
Violent-pleasant stimuli associations	**-.136***

* - p< .05; ** - p<.01.

In predicting unique variance of sadism, negative emotions accuracy and positive emotions to violent stimuli were significant predictors (R^2=.157, F(13,209)=2.988, p<.001). More specifically, individuals with pronounced sadism are more accurate in identifying negative emotions in general, and also express increased positive emotions to violence. In the case of sadism, implicit scores were not significant in prediction.

Gender was significant predictor in both models, indicating that it has a significant contribution to prediction of these traits. In all, these results do indicate different emotional profiles in pronounced psychopathic and sadistic traits.

DISCUSSION

The present study had one general goal - to investigate characteristics of emotional processes that underlie differences in psychopathy and sadism. We covered several aspects of these processes, and the discussion follows the structure used in presenting the results and posed hypotheses – we first give a brief discussion of findings on relations between the measures, then we discuss psychopathy and sadism (and Brutality) in relation to emotion perception; next, relations of these traits with explicit emotional responses to violent and peaceful dynamic stimuli; finally, their relations with implicit emotional associations. We will also discuss shortcomings and potential future directions in studying our topic. Despite the risk of being redundant, we first discuss specific independent relations obtained for psychopathy, sadism and Brutality with measures of emotional processes independently (based on simple correlations), then we discuss their broader relations (based on regressions and canonical correlation analyses). This will give the reader a detailed insight into trait specificities first, and then a broader understanding which directly addresses our goals and hypotheses.

The relationship between dark traits

As previously stated, all dark traits have certain degree of overlap, although they represent independent constructs. The obtained correlations between measured dark traits are expected to be mostly in line with previous studies. First, core measures of sadism show solid concurrent validity, sharing strong correlations (r=.64), which confirms previous finding on relations between SSIS and VAST core sadism (Buckels & Paulhus, 2012). Moreover, they correlate moderately with vicarious sadism (r=.42). This is expected since these are two distinct forms of sadism. Unlike core or direct, vicarious sadism represents an "observer" form of sadism, more passive and indirect in nature, expressed through activities that involve elements of pleasure in others' suffering (horror movies, video games, violent sports). This form of sadism has even been associated with different behavioral correlates, such as passive forms of violence (e.g. hostility towards women), whereas direct sadism relates to direct and active violence (Russell & King, 2016).

When it comes to psychopathy PPTS scales, almost all had significant positive correlations. The highest ones being between Affective and Cognitive responsiveness. We replicated previous finding that Cognitive responsiveness and Interpersonal manipulation share no significant correlation, but we did obtain its (weak) relation to Egocentricity. This somewhat supports the claim that Cognitive responsiveness might not be an integral part of psychopathy, but its important correlate (Međedović et al., 2018).

Finally, PPTS scale of psychopathy wasn't used together with sadism before, so our study offers new insights of its relations with two established sadism measures. All obtained correlations indicate a certain degree of overlap, but low enough to support the

claim they are separate constructs. The highest associations were found between Interpersonal manipulation (superficial charm, grandiosity, deceitfulness) and Affective responsiveness (lack of empathy, shallow affect) with both core sadism scores. These psychopathic traits are considered to be the core psychopathic features (Debowska, Boduszek, Dhingra & DeLisi, 2016). Interpersonal manipulation is shown to have the highest overlap with sadism in previous studies (Robertson & Knight, 2014). It shares highest correlations with core sadism measures (.54 with VAST core sadism and .47 with SSIS). This is justified, since it is expected both psychopaths and sadists have a tendency towards manipulativeness, albeit for potentially different reasons. This once again goes to show that sadistic and psychopathic individuals share certain general characteristics – intentional or careless hurting of other individuals requires empathic deficit and disregard of others, but also a certain level of dishonesty. This is in accordance with the fact that people with pronounced sadism and psychopathy also share low Honesty-Humility and Agreeableness in personality domain: they are characterized by manipulativeness and feeling of self-importance, as well as malice, animosity and distrust of others (Book et al., 2016).

The status of Brutality. We also had some expectations regarding factor of Brutality. Based on its content, we expected that Brutality would represent more extreme forms of amoral tendencies, and go above and beyond sadism and psychopathy in explaining variance in emotional processes. However, our assumptions were only partially supported. Brutality shares notable amount of variance with other (dark) traits. On the other hand, it does seem to significantly predict certain aspects of emotional profile above and beyond sadism and psychopathy. Interestingly, Brutality shares the same magnitude of correlations with Affective responsiveness, as two measures of sadism do amongst themselves (r=.64). Moreover, Brutality has higher correlations with this trait of psychopathy than do any other scales of psychopathy itself. This finding is in line with those showing that all Amorality factors correlate strongly with low emotional reactivity as an aspect of affective empathy (but much less with cognitive empathy, Vukosavljević-Gvozden, Opačić, & Peruničić-Mladenović, 2015). Additionally, it is also associated with psychopathic egocentricity and core sadism to the same degree (r=.52), whereas correlations with interpersonal manipulation are the lowest (r=.33). Our study shows that Brutality can be used as a reliable and valid measure of dark traits, with predictive power, however, not in the way we first intended to use it. Our results indicate that Brutality represents a conglomerate of traits overlapping with sadism, but especially affective feature of psychopathy. It appears that it is not a trait representing even deeper malevolent tendencies, which was our original thought.

Emotion perception in context of psychopathy and sadism

Our main goal was to investigate general relations of psychopathy and sadism with the ability to identify emotions. Emotion perception (identification) has mostly been studied in the context of psychopathy (for review see Marsh, 2013), and majority of empirical or theoretical work regarding sadism was mostly done on forensic population (Harenski et al., 2012), or using methods that might be less reliable for this purpose (Pajevic et al., 2018). We were primarily interested in negative emotions, because psychopathy was associated with low ability in this domain in large body of empirical studies (Dawel et al., 2012), and sadism is expected to be linked to perceiving these emotions (Mokros et al., 2011). This particular pattern of emotional processing has important practical implications. One of behavioral outcomes of psychopathy is inability, or decreased ability to recognize negative emotions in other individuals potentially leads to ignoring or harming them (Kirsch & Becker, 2007). On the other hand, a behavioral outcome stemming from more successful emotion perception in sadists would result in greater intentional damage to others. Besides accuracy measures which are standardly used in psychopathy research, we also included visual search speed of emotional expressions. This measure represents aspect of face and emotion cognition empirically different from accuracy (Hildebrandt, Schacht, Sommer, & Wilhelm, 2012). It is an ability to swiftly identify emotional expression, and in our task, detect it among other emotions. Therefore, being able to identify emotions does not indicate one would do it quickly. Speedy emotion detection enables us to make timely predictions about the flow of interpersonal interactions, act faster in brief encounters, and makes it easier to achieve personal objectives (Hildebrandt et al., 2012). We first discuss separate relations of psychopathy and sadism with emotion perception, then we integrate the findings to discuss them as underlying difference between these constructs.

Psychopathy and emotion perception

We predicted psychopathy will be negatively related to accuracy in emotion perception (H1). Our results generally confirm presence of emotion identification deficit in psychopathy. In the case of psychopathy traits, both Affective and Cognitive responsiveness are linked to lower precision in detecting negative emotions and emotions overall (note that this score contains only one positive emotion category), as well as slower times in identification. More detailed analysis revealed that psychopathic traits relate differently to emotion-specific deficits. This suggests that psychopathy should be treated as a constellation of traits, rather than a unitary construct, and that its traits have different relationships with aspects of emotional processing (Dawel et al., 2012). Moreover, it agrees

with the fact that that this deficit is broader in nature and also covers deficits in detecting happiness (Hastings et al., 2008; Pham & Philippot, 2010). Prior studies most consistently showed that the major deficit in psychopathy is in fear recognition (Marsh, 2013) and sadness (Wilson et al., 2011). However, recent meta-analyses show that this deficit is present across multiple emotions (Dawel et al., 2012). As mentioned prior, following Wilhelm (2014) and colleagues' approach, we differentiate between tasks and measures of emotion perception accuracy and speed. Although it has been assumed that differences in methodology are a factor in differing relations of psychopathy and task scores (Kosson et al., 2019), it was also shown that task difficulty is not a moderator in this relationship (Dawel et al., 2012). Most of those studies use accuracy of detection or recognition. In contrast, we also included speed of visual search of emotional expressions among other emotions. Speed measures are regularly used in the field of emotion perception (De Sonneville et al., 2002; Wells, Gillespie, & Rotshtein, 2016); they reflect the rapidness of decisions on emotional expressions (while accuracy measures reflect correctness, Wilhelm et al., 2014), and help us navigate quickly through social situations and infer other people's intentions (Hildebrandt et al., 2012). Therefore, slower visual speed portrays poorer performance in detecting emotional expressions that may appear in everyday situations and interactions.

Next, we address *fear*, emotion which is an emotion difficult to detect and is recognized the slowest even in non-psychopathic individuals (Wells, Gillespie, & Rotshtein, 2016). According to Blair's Violence Inhibition Mechanism (1995) or Integrated Emotional System (Blair, 2005), inability of psychopathic individuals to experience and detect fear and sadness in others leads to inability to inhibit immoral behavior which endangers others. Our data showed association of Affective responsiveness, Cognitive responsiveness, and Interpersonal manipulation with slower detection of *fear*. On the other hand, based on our measures of accuracy, psychopathic traits do not seem to play significant negative role in detecting fearful expressions. So far, a number of studies showed that psychopathic traits are associated with fear identification deficits, both in general and criminal population, and psychopathic youth (Blair et al., 2001; Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009; Iria, Barbosa, & Paixao, 2012; Dolan & Fullam, 2006; Marsh & Blair, 2008; Montagne et al., 2005). However, some studies suggest lack of this relationship (e.g. Hansen et al., 2008). One reason for us not confirming this deficit using accuracy measure could be the general task difficulty in detecting fear. Wilhelm et. al (2014) show fear is one of the emotions with lowest recognizability in Identification of emotional expressions from composite faces task. We also confirmed this in our sample. The fact that this emotion is on average hardest to recognize could make this task less sensitive for capturing nuance in emotion perception ability in student population, where psychopathic traits are expressed somewhat differently from other samples. A large number of previous studies used clinical or forensic samples in studying emotion perception and recognition. In their meta-analysis, Dawel et al. (2012) comprised a total of 16 studies that explored facial cues recognition in psychopathy. Out of those, only four used community sample, while the rest used forensic or clinical samples. These authors also made a strong claim for account of sources of confounding, one of them being sample source. However, there are meta-analyses showing there is no difference between community and forensic samples in terms of emotion recognition deficits, but there is effect of type of responding. Studies where participants give verbal response (saying the name of the emotion aloud) report greater

deficits in fear recognition, when compared to ones using nonverbal responding (pressing a button), which is used in our task (Wilson et al., 2011). In addition, whether a specific deficit is detected also depends on type of stimuli. For example, studies using morphing tasks (slow introduction of emotion from neutral face) register deficits more consistently than ones just using static stimuli (such as our stimuli); more specifically, they consistently show deficits of either fear or sadness, which is often not the case with static stimuli (Brook et al., 2013).

So far, deficit in recognizing *sadness* was confirmed in male inmates (Hastings et al. 2008), female inmates (Eisenbarth, Alpers, Segrè, Calogero & Angrilli, 2008), non-criminal psychopaths (Iria et al., 2012), children (Woodworth & Waschbusch, 2008), and adolescents (Fairchild et al., 2009), although there are some that did not register it (e.g. Glass & Newman, 2006). In general, this psychopathic deficit is thought to be present, but seemingly less pervasive compared to emotion of fear (Marsh, 2013). We registered a weaker sadness detecting accuracy in individuals with lack of Cognitive responsiveness, that is, ones having difficulty understanding and mentally representing other people's emotional states. In that regard, we join the number of studies confirming this psychopathic deficit, and partially confirms Blair's Integrated Emotional System model proposition that psychopaths have issues in recognizing sadness and fear (Blair, 2005).

Our results on *anger* perception reflect the literature, as we did not obtain any relations between psychopathic traits and anger. Although there are some meta-analyses pointing to opposite pattern (e.g. Wilson, Juodis, & Porter, 2011), meta-analytic studies generally show anger recognition seems to be unaffected in antisocial (Marsh & Blair, 2008) and psychopathic individuals (Dawel et al., 2012). These discrepancies are explained by application of different statistical criteria. For instance, while Wilson et al. (2011) used looser alpha levels and fixed-effects that can result in inflated elevated Type I errors, Dawel and colleagues (2012) tested this against stricter alpha and random-effects. They showed that a weak relationship between psychopathy and anger detection deficit is established when a more liberal criteria is applied. They concluded that, even there might be a deficit in anger (and disgust) detection, it is not as pervasive as in other emotions (Dawel et al., 2012). Such findings are in line with overall role of angry emotional responding, which mostly point out that it is intact in psychopathic individuals, especially when antisocial traits are excluded (Marsh, 2013).

The present study also confirms association of psychopathy with deficit in detecting *disgust* (Kosson et al., 2002). Hansen et al. (2008) looked at the level of specific psychopathy traits, and showed that psychopathic *manipulative and grandiose interpersonal style* relates to lower accuracy in recognizing disgust, while *impulsive lifestyle and irresponsibility*, as well as *antisociality* relates to higher accuracy. Similarly, our results confirm the initial assumption of these authors, showing that individuals higher in Affective responsiveness (and Cognitive responsiveness) are less accurate in detecting disgust; moreover, ones high on Interpersonal manipulation are slower in detecting this emotion, suggesting these individuals might not have an extreme deficit, but rather milder form that makes visual search of disgust expressions more difficult.

A small number of previous studies established a link of psychopathy and deficient detection and recognition of *happiness* or *joy* (Hastings et al., 2008; Wilson et al., 2011), and our data corroborated this finding to a certain extent, as we detected weaker identification accuracy and slower visual search in trait Cognitive responsiveness, and slower speed in

pronounced Egocentricity. There are several potential explanations for this finding. Certain meta-analyses show happiness was probably underreported in relation to psychopathy due to frequent ceiling effect and range restriction in happiness detection in the studies (Dawel et al., 2012). In fact, an effect of "happy face advantage" represents regular faster and more accurate recognition of emotional expression of happiness (Kirita & Endo, 1995; Leppänen, Tenhunen, & Hietanen, 2003; Hansen et al., 2008; Wells et al., 2016). Psychopathic Egocentricity, a tendency to focus on one's own personal needs and interests, and having grandiose self, could involve a special disinterest towards joy of other individuals. Our measure reflects the speed of visual search of expressed happiness among other emotions, which is slower in these individuals. On the other hand, higher scorers on Cognitive responsiveness are generally expected to have trouble with accuracy, since this trait represents psychopathic deficit to comprehend and represent emotional states of others (Boduszek et al., 2016). Our findings confirm the notion that, although emotion perception deficits in psychopathy are mainly expressed through negative emotions, they are indeed broader (Dawel et al., 2012).

As is the case with happiness, *surprise* is emotion that is less frequently observed together with psychopathic traits, and patterns of their relations are equivocal (Kosson et al., 2002). We detected lower accuracy in identifying surprise in individuals with pronounced Affective responsiveness and Cognitive responsiveness, while the latter also relates to slower detection speed. Some previous studies showed impaired surprise recognition in psychopathic versus non-psychopathic adolescents (Fairchild et al., 2009). Such results were confirmed meta-analytically, not only for facial, but also vocal expressions (Dawel et al., 2012). What is more interesting, the general psychopathy score in our study was linked only to decreased surprise identification accuracy (Appendix F).

Even though Brutality in this context was not the part of research hypotheses, this measure, derived from Amorality scales, had similar pattern and intensity of relations as did psychopathy traits, and was negatively linked to sadness, surprise identification accuracy, as well as overall, and negative emotions accuracy. These relationships were confirmed through regression analyses, where Brutality was negative predictor of sadness identification accuracy, overall accuracy, and negative emotions accuracy. Furthermore, Brutality relates only to slower detection of fear, which is obviously a feature common to all the dark traits. However, this construct is the only one besides psychopathic Interpersonal manipulation to associate with weaker face perception ability. These findings prove validity and usefulness Amorality scales in the context of emotion perception.

In conclusion, our findings generally echo the literature by showing different associations of psychopathic traits with difficulties in identifying emotional expressions. These are primarily traits that represent lack of cognitive and affective empathy. Our results confirm the notion that psychopathy is primarily characterized by deficient perception of negative emotions, but also broader spectrum of emotions. Our canonical correlation analysis showed that higher accuracy in detecting happiness, sadness and disgust, as well as faster identification of fear and disgust relates to lower Cognitive responsiveness, Brutality, and Affective responsiveness. We have to note that, given the features of this task, it engages executive functions, especially shifting. Future studies should include certain measures of executive functions to control for potential confoundation.

Our results further open up a discussion about specific relations between affective and cognitive empathy, and their relation to emotion perception. Psychopathic deficits in emotion perception have been previously associated with both cognitive or affective empathy. Furthermore, primary deficit in psychopathy is lowered affectivity, which plays a role in deficient affective empathy, whereas deficits in cognitive empathy are considered secondary, or even not integral part of this construct (Međedović et al., 2018). Thus, it remains to be determined to which domain of empathy this ability actually belongs to, and how it is reflected in psychopaths. Studying profiles with differing levels of Affective versus Cognitive responsiveness would be a useful strategy to address this research problem.

Sadism and emotion perception

Our study's hypothesis was that sadism would be positively associated with negative emotion perception (H1). Our reasoning for such claims comes from the nature of this trait. Sadism, the tendency to enjoy suffering of others, is empirically associated with experiencing pleasure and positive emotions from observing individuals in distress (Međedović, 2017). It was also studied in relation to psychophysiological response to violence, where greater sadism indicated greater sensitivity in estimating other's distress, compared to non-sadistic individuals (Harenski et al., 2012). With that in mind, it would be expected that sadistic individuals fall somewhere on the normal spectrum of perceiving emotions of others. On the other hand, they could also be more sensitive to types of expressed emotions, since their pleasure is tightly linked to other' negative emotions (Trémolière & Djeriouat, 2016). In discussing results, we will first address sadism's relation to overall and negative emotions accuracy, and then its relation to specific emotions. When we observed correlations between the measures, we detected several interesting patterns. Sadism from Amorality scale was associated with weaker general and negative emotions accuracy. One potential reason for this finding is the high overlap between psychopathy scales with Amorality Sadism. In our study, relations between Amorality Sadism and the psychopathy scale most relevant to emotional processes, Affective responsiveness, is relatively high (r=0.66), indicating potential contamination with items measuring psychopathic, rather than sadistic tendencies.

Furthermore, a breakdown of the relations across specific emotions indicated that this relation stems from this scale's association with lower accuracy in detecting the emotion of *surprise*. Surprise is emotion that has a specific status in empirical literature. For example, it is still debated whether it represents mainly positively or negatively valenced emotion (Fontaine, Scherer, Roesch, & Ellsworth, 2007). Moreover, it is even being defined as pre-emotional cognitive state leading to different emotional outcomes, which can be positive or negative, pleasant or unpleasant (Noordewier & Breugelmans, 2013). Following notable studies, we categorized it as a negative emotion (Noordewier & Breugelmans, 2013; Topolinski & Strack, 2015). However, a potential explanation on why

this emotion was recognized less effectively in sadists is that it is experienced as a more positive emotion compared to other emotions categorized as negative. Neuroimaging studies show that left insula, a brain region which usually encodes positive affect (Craig & Craig, 2009), is activated when observing surprised facial expressions (Zhao, Zhao, Zhang, Cui, & Fu, 2017). Therefore, the unclear status of surprise might have had an effect on our results.

We also detected a negative relationship in VAST core sadism and accuracy in perceiving *happiness*. Our focus was primarily on negative emotions and this topic was not addressed in our hypotheses at all. Nevertheless, this is an interesting finding and generally is in line with the conceptualization of sadism. Since the focus of sadistic individuals (i.e. the ones with the pronounced trait) is suffering of others, we would expect that detection of happiness in people's faces is either unrelated with this trait (because of lack of interest and motivation), or negatively related, which is what we registered. Seems that sadistic individuals exhibit an increased disregard for expression of happiness, probably because they do not have any positive benefits from detecting this emotion. Quite the contrary, they probably have negatively valenced emotions or reduced arousal when observing happy facial expressions. Previous studies in psychopathic individuals showed they express decreased emotional response to negative and neutral facial expressions (Eisenbarth, Alpers, Segrè, Calogero, & Angrilli, 2008). In line with that, we could expect the opposite in the case of sadism. This feature of sadistic individuals can also be linked to the fact that sadists have decreased positive response once shown peaceful images that depict happy and smiling people (Međedović, 2017).

We did obtain significant correlations between this visual speed measure and dark traits. Nevertheless, none of the correlation coefficients exceeded 0.20. Interestingly, the only consistent relationship we detected across all sadism scales (and almost all psychopathy scales) is their correlation with slower identification speed of *fear*. In case of SSIS sadism and Sadism from Amorality scale, that was the only significant correlation. We also detected relationship between VAST vicarious sadism and slower reaction times in *happiness*, *fear* and *disgust* detection, while VAST core sadism was associated with slower reaction times across all emotions except happiness. Both of the subscales correlate with general measures: general emotion perception speed and negative emotion perception speed. Sadism scales differ in their scope and the aspects of sadism they predominantly capture. For example, while the VAST sadism scale is broader, albeit neglects the dominating nature of sadistic tendencies, the SSIS items are focused primarily on the "hurting" aspect of sadism and pleasure derived from it. However, this scale does include some indicators of dominance assertion (Dinić, Bulut Allred, Petrović, Wertag, 2020; Plouffe, Saklofske, & Smith, 2017). The VAST scale further differentiates core and vicarious sadism. Although vicarious sadism is conceptually separated from core sadism, their distinctive empirical correlates are still being determined (Buckels, 2018). The broader nature of the VAST scale could be the underlying reason for capturing associations across different emotions. For example, vicarious sadism is linked to a slower detection of emotions of disgust (and fear), depicted in content such as horror movies, which vicarious sadists tend to enjoy (Hanich, 2011).

Emotion perception as basis for distinguishing psychopathy and sadism

Our ultimate goal in this study was to contrast sadism with psychopathy, in regards to emotional processes. As mentioned already, we proposed that psychopathy will correlate negatively with the perception (identification) of negative emotions, whereas sadism will correlate positively (H1). We can say that we partially confirmed this hypothesis. Although we did not specify which psychopathic traits would be involved, we generally did obtain expected results. When we observed *overall perception accuracy*, as well as *negative emotions accuracy*, we determined that individuals with pronounced sadism and lower Brutality are more successful in this task. However, since we showed an intense correlation of Brutality with psychopathic Affective responsiveness, we repeated the same analysis without this trait. As expected, Affective responsiveness became significant in prediction. That way we obtained a profile that determines success in negative emotions accuracy: pronounced sadism and reduced psychopathic Affective responsiveness. When observing broader picture through canonical correlation analysis, the most robust (inverse) relationships established were between negative emotions accuracy, and Affective responsiveness and Brutality on the other side. Lastly, when we integrated all of our measures of emotional functioning in subsequent analyses, superior perception of negative emotions was significantly predicting sadism. However, the reason we claim partial confirmation of this particular hypothesis is that sadism was not generally associated with emotion perception when observing their bivariate correlations, while it was a significant predictor in the regression. This points to a potential suppression effect of this relationship, so our finding, although important, should be taken with caution.

Our findings are in line with emotion perception and recognition studies in psychopathy, confirming the broader deficit in this ability (Dawel et al., 2012). However, our findings go against the small number of studies which introduced sadism as a variable in emotion perception or related tasks. For example, Pajević and colleagues (2018) showed that psychopathy and sadism are related to decreased performance in the Reading the Mind in the Eyes task, but once the shared variance was controlled sadism remained the only significant predictor. We must note several problems in their study which might have led to discrepancies in results. First and foremost, study by Pajević et al. (2018) used a task which is thought to measure inference of complex emotional states and Theory of Mind (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). This concept is closely related to construct of empathy, albeit cannot be equated with perceiving primary emotions, which are generally measured in the field of emotion perception and recognition. In addition to that, this task contains stimuli depicting only eyes. Previous studies clearly point out that certain emotions are better decoded from the eye region or mouth region of the face (Eisenbarth & Alpers, 2011), and this is a potentially confounding factor. The way stimuli are structured and presented also affects results in psychopathy research (Kosson et al., 2019), and could be the reason this study failed to confirm the relevance of psychopathic traits. For instance, instructing young callous participants to focus on the eye region alone improves their success in fear recognition (Dadds et al., 2006). Finally, this task suffers from poor psychometric features when used in general population, such as low internal consistency (Olderbak, et al., 2015), which was also the case in the study by the mentioned

authors (α = 0.51). Furthermore, our data go somewhat against findings by Buckels and collaborators (2019) that individuals higher in psychopathy or sadism underestimate pain intensity when observing physical or emotional suffering. Although observing pain is not the same as perceiving emotions, individuals in pain do convey negative emotional state. It would be expected that sadistic individuals are more "sensitive" to pain of others, that they detect it well and put emphasis on it. In this case, Buckels and colleagues (2019) only used a self-report measure that did not capture objective success in estimation, just subjective impression. In contrast, a methodologically stricter study by Harenski et al. (2012) showed that sadists have increased left amygdala activity when observing images of people in pain (inflicted by others), while this was not the case with non-sadists. Authors speculate that this activation indicates presence of positive affect when observing the stimuli. Sadists compared to non-sadists had greater activation in right temporoparietal junction as a reaction to all the pictures (regardless of pain). They note this is probably due to anticipation of pain-related images. This particular brain region is associated with the process of mentalizing - inferring mental states (Decety & Lamm, 2007, as mentioned in Harenski et al., 2012). Authors concluded that, although sadistic individuals may lack empathy, they are more focused on victims' thoughts and feelings when that is needed to reach their goal. In accordance, sadists also rated images as higher on pain intensity compared to non-sadists, while also having unique activation of left anterior insula. This brain region is involved in subjective experience and awareness of one own's emotions (Damasio et al., 2000, as mentioned in Harenski et al., 2012), suggesting that sadists use their own emotional experience to evaluate pain intensity of others. On the hand, non-sadists had changes in dorsal left anterior insula, involved in cognitive control (Wager & Barrett, 2017, as mentioned in Harenski et al., 2012). It remains unclear what if the causal effect, i.e. whether emotional experience affected the pain intensity ratings or vice versa. While we are aware that findings from sexual offenders cannot easily be extrapolated to general population, core sadistic features are shared by subclinical sadists as well. This study represents a major contribution to investigating sadism, its neural correlates, and relationship with pain observation. Relating to our study, it shows that sadists are "calibrated" to observe cues of negative internal states. These findings are opposing to ones on psychopathy, which show psychopathic individuals with marked callous affect have tendency to avoid emotional expressions depicting pain and embarrassment; the pattern is opposite for antisocial and impulsive traits, which are not our focal point (Kaseweter, Rose, Bednarik, & Woodworth, 2020).

In case of specific emotions accuracy, we obtained interesting results on prediction of *sadness.* Individuals with pronounced interpersonal manipulation and lower Brutality are better at identifying sadness**.** In a way, this finding diverges from what was observed in bivariate relations, where relation between Interpersonal manipulation and sadness accuracy was marginally significant (r=.13, p=.053). Again, this result might be the consequence of relationship suppression. In this instance, adding additional psychopathic traits increased the predictive validity of Interpersonal manipulation. According to Paulhus and colleagues, one of the best ways to improve prediction is "by adding a predictor positively correlated with a current one but having a validity opposite in sign" (Paulhus, Robins, Trzesniewski, & Tracy, 2004, p. 307). This seems to be the case with Interpersonal manipulation, which has positive relationship with all predictors, but opposite sign from

them in terms of prediction. These results build on the data showing psychopathic individuals with pronounced interpersonal manipulation (in this case female) exhibit more sophisticated judgement accuracy of sadness through micro-expressions (Demetrioff, Porter, & Baker, 2017). This might stem from the fact our sample included more females than males, and subclinical female psychopaths are actually ones exhibiting better skills in this domain. Demetrioff et al. (2017) claim that this strategy is predominantly used by female psychopaths for the purposes of manipulation. On the other hand, we included gender as one of the variables in the prediction, and it showed no significant effect. Nonetheless, these findings show that psychopathic traits should be treated differently when it comes to emotion perception indicators.

We also that showed that *disgust* identification accuracy is predicted by increased sadism and decreased Affective responsiveness. Here we corroborated insights from bivariate relationships on psychopathic individuals being prone to worse, while sadistic being prone to better emotion perception. Even with other variables included, psychopathic inability to emotionally resonate appears to be relevant factor when detecting broader emotion such as disgust, a finding obtained previously (Hansen et al., 2008; Kosson et al., 2002). Studies on sadism and disgust perception are scarce, however sadism has been associated with decreased *disgust sensitivity*. Specifically, with two disgust domains: core – aversion towards disease and related stimuli, and animal reminder disgust – aversion towards human's animalistic origin, sex and mortality (Meere & Egan, 2017; for opposing finding see Buckels et al., 2013). These include pathogens, pests, sexual practices, bodily injuries, and perception of death (Olatunji, Haidt, McKay, & David, 2008). Conversely, disgust responding in psychopaths is likely intact (Marsh, 2013). When looking at these findings jointly, we get insights into sadistic and psychopathic disgust profiles: sadistic individuals are more successful in detecting disgust expressions in other people (conveying negative internal state), but might have greater tolerance for disgusting stimuli, whereas psychopaths are less successful, yet with preserved emotional experience of disgust. It is suggested that disgust itself represents more than just a primary human emotion. Nowadays, it is conceptualized as a heterogeneous complex response to different external elicitors (Simpson, Carter, Anthony, & Overton, 2006), or sensory affect (Panksepp, 2007). Disgust sensitivity is segmented into several domains, one of which is moral disgust. People generally show greater disgust to offences like sexual abuse of children (Jones & Fitness, 2008) or breaking social norms, such as one against practicing cannibalism (Gutierrez & Giner-Sorolla, 2007). Moreover, it has been shown that disgust sensitivity has "protective" effect against violence towards strangers, as well as intimate partners (Pond et al., 2012). This pattern could be opposite in sadists, due to their greater threshold for psycho-physical torture and violence, which often contains repulsive elements. Finally, we should bring to attention our previously registered slower detection of disgust in vicarious sadism. Overall, these results are not mutually conflicting. First, our general measure of sadism was derived from core sadism measures, hence did not include vicarious sadism. Second, this trait is conceptually different from core sadism, although they share notable amount of variance (Buckels, 2012; Dinić et al., 2020). These results confirm sadistic features are justifiably treated as separate traits, that have different correlates, even in certain emotional processes.

Even though we established that sadism does carry certain advantage in precisely detecting negative emotions, indications of slower speed in visual search does point to a certain departure from normal. If we consider our starting hypothesis on the relation of sadism and emotion perception, it would make more sense to assume sadists would be more effective and efficient – achieving good results in a timely manner. However, knowing that these measures represent different domains of emotion perception ability, it is not unusual they produce different results. Body of evidence shows that accuracy and speed in face and emotion perception are independent abilities (Hildebrandt, Sommer, Herzmann, & Wilhelm, 2010; Hildebrandt et al., 2012; Wilhelm et al., 2010). One assumption is that accuracy and speed represent different levels of emotion/face perception – when deficits are milder, they are not observed at the level of accuracy, where time for responding is unrestricted, but they are reflected in perception speed, i.e. slower identification times (De Sonneville et al., 2002). In the context of dark traits and our results, it would mean that sadistic individuals do have some difficulties in emotion perception, reflected in slower detection times. In contrast, our data generally show psychopathic traits relate to greater difficulties in perceiving emotional expressions under time restrictions, adding to the existing body of literature on student samples. However, we should also consider that emotion processing speed could be explained by general intelligence. Since this topic still remains uncovered in sadism research, future studies should consider including it when using tasks that are based on perceptual speed.

Explicit emotional responses in context of psychopathy and sadism

Our second goal of the study was to investigate the relationship of psychopathic and sadistic traits and responses to dynamic violent and peaceful stimuli. For this purpose, we set two hypotheses. First, that sadism would positively correlate with positive emotional experience of violent stimuli and negative experience of non-violent stimuli (incongruent emotional experience), whereas psychopathy would not have any significant correlations (H2). Second, that sadism would negatively correlate with the negative emotional experience of violent, and positive experiences of non-violent stimuli (congruent emotional experience), while in psychopathy there would be no significant correlations (H3). Although the assumptions on psychopathy seem counterintuitive and contrasting previous findings (Međedović, 2017), we expected not to obtain such relationships in psychopathy for two reasons. Firstly, we used psychopathy measure which excludes items closely related to antisocial behavior; secondly, it should also be less contaminated with indicators of sadism (e.g. revenge). We decided to average emotional reactions into positive or negative emotions scores, while stimuli were belonging to violent and non-violent categories (selected in the pilot study). We first discuss our findings in relation to psychopathy, then sadism, followed by integrated discussion on explicit emotional responses as basis for distinguishing psychopathy and sadism.

Psychopathy and explicit emotional responses

We were particularly interested in responses to emotionally saturated stimuli, violent and peaceful in their nature. Our main assumptions in regard to psychopathy were that it would not be associated with congruent nor incongruent emotional responses (H2/H3). As mentioned, our motivation for such assumptions was the nature of the scale we used. One reason for such claim is that when this relationship was obtained previously, it was done on measures contaminated with indicators of sadism (Međedović, 2017). As a relatively new scale, PPTS was designed to measure key psychopathic indicators (with antisocial indicators eliminated as well, which are shown to be behavioral consequence of psychopathy, and not its fundamental component). We also used a simpler measure of emotions, based on hedonic tone, which reduces emotional responses to either positive or negative, since our main goal was to observe emotional reaction to violence. Analysis of bivariate correlations proved us wrong. Our results show that there is a consistent pattern between psychopathic traits and emotional responses to violent and peaceful stimuli.

More specifically, we showed that individuals high on psychopathic Affective responsiveness and Cognitive responsiveness have reduced positive emotions to peaceful, while having decreased negative emotions to violent stimuli. These were the strongest relations of all, ranging from .24 to .32 in intensity. Consistent with this are studies that also used video material for emotion induction in psychopaths. For instance, Fanti and colleagues (2016) showed that individuals with pronounced callous-unemotional traits have reduced subjective valence in response to violent videos, but this response is attenuated for positive videos as well (comedy films). They also had similar medial pre-frontal activation and reduced facial electromyography for positive and negative videos, while individuals low on this trait showed greater prefrontal activity to positive videos. The significance of this particular study is showing that psychopathic individuals also have trouble processing positive affect.

We obtained a "mirror image" for two other psychopathy traits, Interpersonal manipulation and Egocentricity, which relate to increased positive emotions to violent stimuli and increased negative emotions to peaceful stimuli. This pattern is consistent with sadistic emotional profile, since psychopathic Interpersonal manipulation does share substantial amount of variance with sadism (Robertson & Knight, 2014). In the study by Međedović (2017), which we used as a reference point, these exact relations were obtained with a unitary score of psychopathy. More precisely, psychopathy was linked with positive emotions to violent pictures and negative emotions to peaceful pictures, which is the effect we recorded using video material.

In his famous theoretical work, Cleckley (1988; originally published in 1941) proposed that psychopathic emotional experience is characterized as deprived of anxiety and nervousness. His descriptions of these constructs were broad and left a lot of room for speculation, influencing a whole field of empirical studies (Schmitt & Newman, 1999). For instance, a study by Lykken (1957) produced the famous low-fear hypothesis, claiming that psychopaths have reduced experience of fear. Idea of psychopathy as deficit in generating emotions of fear and sadness was later corroborated in clinical work by Hare (2003). Coming from cognitive neuroscience perspective, Blair's (1995) early idea was that psychopaths have deficient violence inhibition system, which gets activated by cues of

distress in others (Violence Inhibition Model - VIM), resulting in aversive emotional response to violence which affects moral decision-making. Blair later combined the low-fear hypothesis into Integrated Emotional System model (Blair, 2005), suggesting psychopaths have trouble learning to avoid engagement in instrumental antisocial behavior. This model suggests psychopaths have amygdala dysfunction and dysfunction of orbital or ventrolateral frontal cortex, potentially leading to different psychopathic symptomatology. Previous studies showed reduction in sympathetic fear response in young psychopathic individuals, as well as less frequent experience of fear; on the other hand, self-reported fear was not different from that of the control group (Marsh et al., 2011). Psychopaths indeed have reduced electrodermal autonomic response to cues of distress in others (Blair et al., 1997), and have reduced self-reported bodily sensations while watching emotion-inducing feature films compared to non-psychopaths (Pham et al., 2000). Psychopathic reduced responsiveness to disturbing stimuli was empirically associated with greater proactive aggression in adults (Reidy, Zeichner, & Foster, 2009) and children (Frick, Ray, Thornton, & Kahn, 2014; Kimonis et al., 2006). This clearly points to practical detrimental consequences of psychopathic tendencies, and relevance of deficient emotional functioning in generating violence and damage to others.

Sadism and explicit emotional responses

In case of sadism, we proposed that it would be related with increased positive emotions to violent stimuli and increased negative emotions to peaceful stimuli (H2). Also, to decreased negative emotions to violent, and decreased positive response to peaceful stimuli (H3). We confirmed each of our assumptions. Especially in case of SSIS Sadism, the so-called "hurting" sadism scale, which most consistently correlated with all emotional responses. On the other hand, Amorality Sadism had highest relations with decreased negative emotions to violence. VAST vicarious sadism also had a specific emotional profile (increased positive and decreased negative emotions to violence). This may point to a narrower emotional profile in vicarious sadists, who engage in symbolic sadistic experience, by observing violent content in sports, movies and video games (Paulhus & Jones, 2015). Their emotional profile is exclusively related to responses to violence. This is in line with previous studies, showing vicarious sadists have strongest implicit associations to gory imagery, unlike direct sadists, who prefer to a "practice what you preach" approach (Buckels & Paulhus, 2013). Our study serves as an additional validation of the vicarious sadism measure, as it links it to pleasure of viewing violent content. It was also noticeable that our Amorality-derived measure of Brutality has a very similar pattern of relations with emotional responses as sadism when looking at bivariate relations. However, it had insignificant contribution to prediction of explicit responses to dynamic stimuli when dark traits are present.

We also replicated the findings by Međedović (2017), who studied sadistic emotional responses to violent and peaceful photographs. Thus, we extended his findings to dynamic video material. Our results fit into general concept of sadism as pleasure in

humiliation of others (O'Meara et al., 2011), and experiencing positive emotions in observing others in distress (Buckels et al., 2019). This emotional profile is probably a component in positive reinforcement loop leading to repetition of aggressive and nefarious actions (Chester et al., 2018). Međedović (2017) associated sadistic emotional responses with concepts from Reinforcement sensitivity theory (Gray, 1987): Behavioral Activation System (BAS), which is activated when conditioned and unconditioned rewarding, appetitive, stimuli are present, and Behavioral Inhibition System (BIS), which is activated in conflicting situations, containing both aversive and rewarding stimuli. He proposed that sadism's relation to violence is probably based on Behavioral Activation System, where observing violence results in activation of this system and resulting in positive reinforcement. Buckels (2018) studied general relations of sadism with motivational inhibition/activation systems using Carver and White's scale (1994), and showed that sadism relates to decreased BIS scores, and increased BAS scores. In this operationalization, BIS represents sensitivity to stimuli that have potential to induce anxiety, suggesting that sadistic individuals have lower propensity to react to unpleasant stimuli and punishment. It should be emphasized here that the BIS scale does not measure general affective tone (Carver & White, 1994). In contrast, BAS represents sensitivity to cues of positive stimuli and rewards, and sadism is positively linked two to of its aspects, BAS Drive (focus on pursuing one's goals) and BAS Fun (focus on new rewards and inclination to get them impulsively). Indeed, sadistic motivation is probably organized around pursuing stimuli and goals which are pleasant, a pattern that is further reinforced. All the more, acts that are related to pleasant emotions sadists deem morally acceptable (Buckels, 2018; Trémolière & Djeriouat, 2016).

Our findings on diminished positive emotions of sadistic individuals to peaceful stimuli are a novelty, and were previously shown only by Međedović (2017), who compared sadistic emotional profile to parathymic emotional experience. His study also showed sadism relates to schizotypy or disintegration, tendency towards psychotic-like experiences. It incorporates, among others, presence of flattened affect, avoidance and lack of pleasure from social interaction, depression and dissociative distortions. In addition, sadistic individuals are characterized by heightened negative baseline affect, and lowered positive baseline affect (Chester et al., 2019). This finding corroborates research showing sadists have higher negative baseline affectivity, together with lower positive baseline affectivity (Chester et al., 2019). Along with past results, we confirm that deficits of emotional experience in sadism might be broader than suspected. Besides including positive emotions associating with violent interactions, it also incorporates elements of discomfort in presence of pleasant and normal social interactions.

Explicit emotional responses as a basis for distinguishing psychopathy and sadism

In our analyses we further wanted to investigate the relationship of psychopathy and sadism with different types of emotional experience. For this reason, we conducted several regression analyses using psychopathy and sadism (and Brutality) as predictors of emotional responses. We confirmed sadism as predictor of increased positive emotions to violent stimuli. This relationship proved to be the most robust, as it appeared even in canonical correlations. Further, Cognitive responsiveness predicted decreased positive emotions to peaceful and decreased negative emotions to violent stimuli. This trait had strong relations with canonical function in our canonical analysis, but it was weak in general prediction. We also confirmed the finding from bivariate relations, that Interpersonal manipulation predicts higher negative emotions to depicted peaceful interactions, but this trait also seemed less prominent within canonical function. Canonical analysis produced a "dark" emotional profile: sadistic individuals and ones with pronounced affective psychopathic deficit react to violence with reduced negative emotions, and this is probably a key common feature of these traits - greater tolerance to violence. Mokros et al. (2011) showed that callousness or lack of empathy are the core overlapping features of these traits in their "forensic" form, but this was confirmed in community and student samples (Paulhus, 2014). So, both psychopathy and sadism share readiness to hurt others and accompanying lack of concern for them. Both traits have also been associated with violent tendencies and aggression (Blais et al., 2014; Chabrol et al., 2009; Reidy et al., 2011; Robertson & Knight, 2014). Despite that, psychopathy and sadism differ in certain respects, and it was extremely important to account for their shared variance (Book et al., 2016; Chabrol et al., 2009; Chabrol et al., 2015; Međedović & Petrović, 2015; Paulhus, 2014). We wanted to be even stricter and exclude variance of sadism explained by psychopathy and determine exact emotional profiles characterizing these traits. In our final analysis we also used a different analytical approach, and predicted broader constructs, such as personality traits (general scores), with more specific, such as emotional processes. This was backed by the notion of emotions being one of the internal systems that generate the so called external behavioral or attitudinal syndromes, such as personality traits (Jonason & Sherman, 2020; Sherman, Rauthmann, Brown, Serfass, & Jones, 2015; Sih, Bell, Johnson, & Ziemba, 2004). Indeed, we identified specifics in emotional experience of psychopaths and sadists, albeit the effects we captured are small. Psychopaths exhibit reduced negative emotions to violence, and stronger negative emotions to peaceful interactions. In contrast, sadistic individuals are characterized by intensified positive emotions as response to violent interactions.

Our findings are supported by vast scientific research on emotional functioning in psychopathy. The core feature of psychopathy is aberration in generating negative emotions, especially fear (Blair, 2005; Marsh, 2011). This pattern seems to be just the opposite from emotional responses experienced by non-psychopathic individuals when observing violent or non-violent, pleasant or unpleasant visual material (Calvo & Avero, 2009). Scenes that we used to depict violence usually showed one person in interaction afflicting injury, and one individual in distress being on the receiving end. It has been shown that stimuli depicting affective facial expressions activate stronger emotional

response (Hariri et al., 2002). As is shown in vast scientific literature, and in our study, psychopathic individuals apparently have a complex deficit, which combines deficient responding with negative emotions, and difficulties in perceiving negative emotions (Marsh, 2011). In contrast, sadism is primarily intertwined with pathological positive response to violence. Our study replicated the finding previously obtained on static imagery (Međedović, 2017), and is in accordance with general conceptualization of sadism, both in clinical/forensic and general population (Buckels et al., 2013; Mokros et al., 2011; O'Meara et al., 2011). Kirsch and Becker (2007), as well as Mokros et al. (2011) proposed that affective deficit and behavioral inhibition are in the core of sadistic tendencies. They also suggested that sadism differs from psychopathy in cognitive comprehension of suffering. This notion is confirmed by our study. We also detected specific emotional response pattern (which is probably on crossroads between emotion and cognition) that distinguishes these dark traits. Detected differences between them may be in the root of different motivations for engaging in violence. Sadists experience more pleasure when viewing scenes causing pain in others, they rationalize and approve violent acts which are followed by positive emotions (Buckels et al., 2019; Trémolière & Djeriouat, 2016), and devote themselves to hurting others, thinking this will improve their mood (Chester et al., 2018). On the contrary, psychopathic individuals, besides having trouble identifying negative emotional expressions, have issues experiencing proper pattern of negative emotions, which makes them more prone to inflicting damage on others (Kirsch & Becker, 2007). In conclusion, it seems that sadism really is characterized by an aberrant emotional response pattern, while psychopathy is characterized not by aberrant responses, but by the absence of a normal (or usual) emotional responses.

Implicit emotional associations in context of psychopathy and sadism

In the third part of our study, we examined relations between implicit affective associations and dark traits. Based on the rare previous research done using this paradigm, we had same expectations as with explicit emotional responses. Namely, that sadism will positively correlate with the reaction time of pairing positive emotions and non-violent stimuli, as well as negative emotions and violent stimuli (congruent stimuli), whereas it was assumed psychopathy would not have any significant correlations (H4). Moreover, that sadism will negatively correlate with the reaction time of pairing of positive emotions and violent stimuli, as well as negative emotions and non-violent stimuli (incongruent stimuli), whereas psychopathy would not have any significant correlations (H5). We had the same reasoning for lack of correlations in psychopathy as with explicit responses.

Implicit emotional associations as basis for distinguishing psychopathy and sadism

We only partially confirmed our hypotheses. Correlation analysis on individual scales showed negative link of psychopathic Egocentricity with response time to pairing of violent-pleasant stimuli. Tasks coming from implicit association paradigm, such as Implicit Association Test (IAT, Greenwald, McGhee, & Schwartz, 1998), or Sorting Paired Features Task (SPF, Bar-Anan et al., 2009), rest on the assumption that faster reaction times represent stronger associative relationships between congruent or incongruent stimuli. In other words, individuals with heightened egocentricity have stronger associations (i.e. shorter reaction time) between words representing pleasant emotions and violent imagery. We further conducted regression analyses, and we confirmed sole predicting role of psychopathic Egocentricity in faster pairing of violent images with pleasant emotions. This trait represents self-centeredness, focus on self, own beliefs and interests, and self-love combined incapacity to love others (Boduszek et al., 2018; Boduszek et al., 2019), which was considered one of the central psychopathic traits since earliest conceptualizations of psychopathy (Cleckley, 1941). Egocentricity is associated with violent offending and is a positive predictor of several violence-related phenomena: attitudes towards sexual violence, marked criminal social identity, and proneness to child sexual abuse myths (Boduszek et al., 2016). Existing psychopathy scales, such as PCL-R (Hare, 2003), account for egocentricity in their content, but they do not have a specific facet for measuring it in psychopaths. The PPTS scale is the first of its kind to include a separate subscale specifically capturing this psychopathic feature. Hence, this finding contributes in establishing its validity. It is suggested that, together with lack of affective responsiveness, Egocentricity plays a role in deficient emotion recognition and inference of emotional states (Boduszek et al., 2016). We did not confirm this notion, although this psychopathic feature has strongest relations with lack of Affective responsiveness in our study (r=.41); we did establish specific relations of Egocentricity with specific violence-dependent responses on explicit level: increased positive emotional responses to violence, as well as

negative emotions to peaceful scenes, which is in line with our result on implicit level. Psychopathic self-centeredness seems to be of importance in terms of aberrant emotional response to violence on level of explicit emotional experience, also at the level of implicit cognition. In contrast, psychopathic low empathy and emotional shallowness (i.e. lack of affective responsiveness) plays a role in general emotional superficiality (as response to external stimuli), and in aspects of social cognition, such as emotion perception. Interestingly, our Brutality measure (derived from Amorality) was the most consistent predictor of emotional responses, even though it showed no significant bivariate relations with SPF. This probably suggests the presence of other predictors had effect on their relationship.

In our study, *general psychopathy* was predicted by stronger associations of peaceful stimuli with pleasant emotions, and violent stimuli with pleasant emotions. The latter of the two findings seems counterintuitive, and in fact, this association probably stems from collinearity between predictors. When we observed bivariate relations of psychopathy with SPF scores, it was linked only with faster reaction times in associating violent stimuli and pleasant emotions. The same was the case in simple regressions. As we previously detected very high correlation between these two SPF scores (r=.85), we need to be very careful when analyzing results. One procedural shortcoming on our behalf might be in the root of high relations between SPF scores. In our version of the task, locations of the category labels were not counterbalanced, meaning that the position of descriptors belonging to either pleasant or unpleasant category was the same throughout the whole task. Authors of the task claim that SPF scores need to be analyzed together, since every response to stimuli-label pair can be affected by others (Bar-Anan et al., 2009; Teige-Mocigemba et al., 2016). In that regard, this effect might be magnified in our task. Similar issues occurred in previous studies using IAT. For instance, Zwats et al. (2015), who detected greater positive implicit attitudes towards violence in psychopathic individuals, suggested that violent-pleasant association was probably affected by preference for peaceful stimuli, as they were all constituting elements of IAT D-scores. For these reasons, we will restrict our discussion to psychopathy and faster reaction times associating violent stimuli with pleasant emotions, since this seems to be the most robust finding. Using four different SPF scores, we detected stronger association between violent imagery and pleasant descriptors in psychopathic individuals, which probably stems the mentioned Egocentricity trait. The groundbreaking IAT study by Snowden et al. (2004) showed psychopathic offenders have diminished unpleasant responses to violence (weaker association between unpleasant emotions and violent words) compared to non-psychopathic. In fact, this pattern occurs in Factor 1, comprising interpersonal traits - manipulativeness, grandiosity, arrogance, and affective traits - superficial affect, lack of empathy, callousness (Snowden et al., 2004). Authors suggest that such response to violence makes psychopathic individuals ignorant to distress of others, and more tolerant to violence (Snowden & Gray, 2010). Conversely, study by Međedović (2017) showed no relations between self-reported psychopathy and IAT scores, and this discrepancy in results was justified with using a different format of responding. Zwats et al. (2015) registered greater positive implicit attitudes towards violence in individuals with pronounced antisocial trait of psychopathy. The measure we used excludes this facet, since it is deemed correlate of psychopathy rather than its component (Skeem & Cooke, 2010). However, our results point to similar association, that

psychopathic individuals have positive associations to violence. The fact that psychopaths exhibit positive associations with violence goes hand in hand with their explicit criminal attitudes (Međedović & Kovačević, 2020), and their engagement in proactive and reactive aggression (Reidy et al. 2011; Reidy, Zeichner, Miller, & Martinez, 2007). Although this pattern seems to be more sadistic in nature, psychopathic individuals are prone to exhibit more sadistic proclivities, at least in forensic population (Holt & Strack, 1999; Porter, Woodworth, Earle, Drugge, & Boer, 2003).

Ultimately, we detected that individuals high on sadism, operationalized via SSIS scale, have stronger associations (i.e. shorter reaction time) between words representing pleasant emotions and violent imagery, the same pattern as in Egocentricity. This finding reflects the core nature of sadism, specifically focusing on its hurting aspect, and accompanying enjoyment and pleasure, a central sadistic feature (O'Meara et a., 2011). Our result agrees with the fact sadism independently predicts proactive aggression (Reidy et al., 2011), increased positive attitudes toward dangerous social groups (Dinić et al., 2020), and is the strongest predictor of criminal attitudes of all dark traits, being the only one mediating the relations between support of sport clubs and criminal attitudes (Međedović & Kovačević, 2020).

We later used a *general sadism score*, derived from multiple scales, and some features of SSIS Sadism scale were probably assimilated or lost. We also used general psychopathy score and unique variance of sadism; moreover, we applied a different analytical strategy, where emotion-related variables were set as predictors. In this case, none of the SPF scores were significant predictors of unique variance of sadism. Thus, our result is only limited to a specific measure of sadism, and not generalizable to others. Studies of sadism using implicit paradigm are almost nonexistent. Međedović (2017) was the first to apply the IAT task in sadism research, and concluded sadistic individuals have stronger associations between incongruent stimuli (violent-pleasant, peaceful-unpleasant), and weaker associations of congruent stimuli (violent-unpleasant, peaceful-pleasant). However, it was suspected that relations of sadism and score representing *congruent* associations were actually under a suppression effect, therefore it should be approached with caution. Despite using different implicit measures, we included the same concepts and visual stimuli. On the other hand, we did use different self-report measures of sadism and psychopathy that were administered to a different sample (non-criminal in our case). We did replicate the most prominent finding of this study, but only with one measure of sadism. It should be noted that a big difference between ours and all previous studies using implicit methodology is the sample. All of the mentioned research was conducted in forensic context, while ours is the first study on a student sample. We registered the presence of atypical implicit cognition pattern at the level of bivariate relations. However, the lack of robustness in these relationships points to a problem arising from using the particular measure we used to detect implicit emotional associations to violence.

In line with that, another important fact in regards to our implicit measure is its lack of correlation with our explicit response measures. Such finding additionally confirms a validity issue with SPF task as means to study implicit emotional associations. Even though these measures probably focus on different aspects of affective responding, we did expect at least weak relations between them. Other studies already showed very striking lack of

relation between implicit and explicit measures. For example, Snowden et al. (2004) measured associations between explicit measures of attitudes towards violence/peace concepts, using semantic differential, Feeling Thermometer (explicit measures), and IAT measure, and found no significant correlations between them. They speculated that IAT might represent a cognitive measure that captures evaluation of how dangerous the situation is and the risk it carries, which might mean the measure is time-variant. Overall, the lack of such relations puts in question the exact meaning of results obtained using IAT or SPF, the exact nature of the measured construct, and validity of these measures. A separate section addresses this issue in more detail.

Explicit and implicit measures: two sides of the same coin?

There is one important notion that should not be ignored in our study – we did not obtain any correlations between explicit measures of emotional responses and the measure of implicit emotional associations (SPF task), even though we did expect some associations would be present. The basis of such expectation lies in the similarity of content (violent and peaceful stimuli), and the fact that implicit measures of social cognition have previously been associated more strongly with affective aspects of attitudes, compared to cognitive (Hofmann, Gawronski, Gschwendner, & Schmitt, 2005). Such a finding was confirmed for Implicit Association Test, as well as Sorting Paired Features Task. A study by Smith and Nosek (2011) showed that these measures have higher relations with explicit measures when they are focused on affective aspects of attitudes (i.e. feelings and emotions). Authors also consider the fact that the affect has advantage over cognition when it comes to accessibility (Giner-Sorolla, 2004). In addition to that, it was shown that structural fit (similarity in task demands) affects magnitude of correlations between the implicit and explicit measures (Payne, Burkley, & Stokes, 2008). With that in mind, we did expect certain convergence of these measures. However, this was not the case.

There are several factors affecting results coming from implicit methodology. In the literature, the discussion on varying relations between implicit and explicit measures has already been a central topic of several research papers. In their all-encompassing meta-analysis, Hofmann and colleagues (2005) delve deeper into factors underlying the low correlation between implicit and explicit measures or lack thereof. Although they were primarily focused on the famous Implicit Association Test, we think that similar explanations can be applied to our Sorting Paired Features task, which belongs to the same task "family". One mentioned factor is the *type of studied domain:* for example, correlations are higher for measures that cover group attitudes and consumer attitudes and below average for stereotypes and self-esteem (Hofmann et al., 2005). According to the authors, evaluation of new stimuli falls into the "other attitudes" category (together with religious attitudes, death attitudes, attitudes towards political parties), which is characterized by mean population correlation of 0.23. Authors do not offer a theoretical explanation for this, and tend to put emphasis on more specific factors. Nevertheless, this fact makes it even harder to explain the discrepancy of our finding.

An additional group of factors includes certain *features of explicit measures*. For example, *spontaneity* when making explicit evaluations: the less spontaneous and more inference-demanding the explicit measures are, the correlation between the measures is lower. In our case, the task was not time-restricted, and demanded a deeper and longer analysis of the presented content. Therefore, we could conclude that the level of spontaneity was rather low. Additionally, there is an assumption that *social desirability* and *introspection* play a role in the varying relationships between implicit and explicit measures, by affecting the individual differences in tendency to control expression of explicit responses. In our case, the topic was very sensitive, required self-reflection, and forced participants to express their attitude (i.e. its affective component) towards peaceful and violent human interactions. With that in mind, we could say that the higher level of self-control in evaluations was probable in some participants. There is one surprising, even counterintuitive, finding in relation to emotional responding to static and dynamic visual stimuli. It is significant not only in discussion the relations of implicit and explicit, but the usage of dynamic (i.e. multimodal) visual stimuli. A relatively recent study showed that elicitation of emotional responses is different with pictures and videos, and not in the direction we would suggest: dynamic stimuli actually induce weaker (negative) emotional responses (Uhrig et al., 2016). This finding should indeed be taken with the grain of salt since the database studied used already well-known movies, yet lesser known images, because familiarity (versus novelty) with the material may have an effect on given responses. Nevertheless, using different type of material in different tasks could also alter the nature of the relationship between implicit and explicit measures. Nevertheless, we confirmed the validity of our explicit measures expressed in meaningful relations with all dark personality constructs. Therefore, the most relevant and more probable issue regarding the lack of associations between our explicit and implicit measure is the nature and validity of the implicit measure.

There are certain *methodological and procedural factors* coming from the implicit measure itself, that potentially moderate the relationship between implicit and explicit. Unlike IAT, SPF measures four associations within the same block, which helps to equally distribute any changes in response strategy, effects of distraction, practice, or interference (Bar-Anan et al., 2009). In that sense, we cannot ignore the additional complexity of the SPF task, compared to IAT. As mentioned before, the SPF task offers four responses, and forces participants to categorize two stimuli simultaneously – one belonging to the target category, and the other belonging to the attribute category. Surely, this must contribute to a larger cognitive load. Additionally, this task shows sensitivity to focal and non-focal aspects of stimuli (i.e. the ones studied, and the ones that are not of primary interest), but, it is yet to be determined whether this alleged advantage actually presents a confounding factor (Teige-Mocigemba et al., 2016); this factor might also moderate the relationship between implicit and explicit.

Our study is definitely not a pioneering study when it comes to using implicit measures in Serbian samples. Several notable doctoral dissertations extensively covered the relations between implicit and explicit measures. For example, the findings by Pavlović (2015) showed lack of predictive validity of IAT in one domain of the study (attitude towards smoking), and no associations between implicit and explicit measures in another (attitude towards elderly people), while Lazarević (2012) showed little to no significant

relations in personality domain. To explain such findings, the former author used the notion of complex nature of attitudes, which generally claims that we can have positive attitude towards something, yet dislike certain aspects of it, or have a negative attitude, but be appreciative of certain aspects (Ajzen, 2001). When talking about implicit attitudes, that would mean that an individual can have differing reactions on implicit and explicit level (for example, emotions of guilt or shame can mediate that relationship). Nonetheless, Pavlović (2015) did confirm validity of IAT in domains such as attitudes toward healthy eating, or sensitivity to social discrimination of the elderly. Observing those findings, together with the ones coming from our study, it is obvious that there is a validity issue when using implicit measures (especially SPF) in the domain of personality, which includes dark personalities as well. As the reader might have already concluded, the relationship of implicit (IAT and SPF that is) and explicit measures is incredibly complex, and it was not fully appreciated in our study. Although we have tried to go through some reasons that explain our finding, this remains a topic in itself, that needs to be investigated further, both in form of replication studies as well as extension studies.

Limitations and future directions

The present study suffers from general and specific shortcomings, related either to technical, procedural or methodological difficulties. As frequently is the case, our *sample* was relatively small. When it comes to the analysis of associations between the average scores on self-report measures, and measures capturing reaction times and correct responses, it is expected that the magnitude of the effect is small. This was the case in our study, as we obtained certain effects at the level of marginal significance. Hence, our study suffers from higher probability of type II error due to the smaller sample size. Furthermore, our sample consisted of university students, and was not gender-balanced, comprising greater number of female participants. This makes extrapolation of our findings difficult. More importantly, this affects the variance of dark traits. Average scores on these measures, especially sadism, are very low in our study, with small standard deviations, pointing to the "floor effect". This makes it harder to capture the covariance and the effect.

Additionally, previous research showed gender differences are present in psychopathy, and reflect on emotion perception (Snowden, Craig, & Gray, 2013), and other emotional processing deficits (Efferson & Glenn, 2018). Even though we registered some gender differences in our study, deeper investigation of this topic was not a part of our research goals. However, we drew our conclusions based on this female-dominated sample, which further limits generalization. Although our findings represent new contribution to investigation of subclinical psychopathy and sadism (primarily), applying measures we used to a broader community sample might significantly broaden the response range, and thus capture associations which were "invisible" due to range restriction, both in the case of self-reported traits and affectivity-related measures.

Our research had certain *procedural difficulties* too. Measures were administered to different parts of the sample at different time points, and this could present a confounding

factor. Even though it was very difficult to avoid these procedural issues, this surely affected the quality of the data. Furthermore, all of our measures were administered online, even tasks that require registering very sensitive data (e.g. reaction times in milliseconds), which are usually used in a controlled laboratory setting. An example of such sensitivity is the fact that processing of emotional expressions is highly dependent on motivation to attend to stimuli (Skelly & Decety, 2012). Therefore, extraneous contextual factors, such as lack of focus, interruption, or even technical difficulties in participation might have been at play and this needs to be addressed in future studies.

One more constraint leading to potential future improvements comes from the *measures and tasks* used in our study. As we already addressed the difficulty of using implicit measures, our focus here are other tasks used in the study. The used emotion perception tasks belong to an all-encompassing battery of tasks (Wilhelm et al., 2014). The authors of the battery recommend treating each task as an item in a test; administering a compilation of tasks, with at least three tasks from each ability-domain strengthens psychometric properties of the tasks (Wilhelm, 2005; Wilhelm et al., 2014). This was definitely not the case in our study, due to technical limitations. In addition to that, recent studies showed (using the same battery of tasks) that *general mental ability* accounts for most of the variance in psychopathic deficits in emotion perception (Olderbak, et al., 2018). Aside from that, the authors of the PPTS scale also showed intelligence should be controlled for when exploring relations of psychopathy with emotional responsiveness (Bate et al., 2014). We did not include any measure of general mental ability; this remains a topic to be covered in future studies of psychopathy and sadism. Ultimately, a big issue of our research is that we did not use any behavioral measure that would "actively" capture psychopathic or sadistic behavior. All our tasks represent "vicarious preferences", since they do not include active participation in the behavior; they only show reactions to what person observes. This limitation should definitely be attended to in future studies, and would be best addressed through strict experimental design.

Future research should use emotion perception tasks with *stimuli* of greater ecological validity, such as dynamic (multi-modal) faces; these were already used in psychopathy (Decety et al., 2014; Machell, 2010), and their processing requires activation of different neural pathways compared to static facial expressions (Faivre, Charron, Roux, Lehéricy, & Kouider, 2012). In accordance, studies show how results in emotion perception and recognition in psychopathy depend on type of stimuli and their complexity (Brook & Kosson, 2013; Sadeh & Verona, 2012). In line with that, one contribution of our study is using lesser known dynamic video stimuli (feature films). Most previous studies which explored emotional response to this type of stimuli used highly commercial feature films (Hewig et al., 2005), even in context of psychopathy (Pham et al., 2000). Since the quality of the stimuli has great importance for capturing individual differences, our goal was to reduce any effect of previous exposure to the material. Repeated exposure is present even in threatening stimuli; it reduces the level of interest and perceived negativity (or even enhances positivity, Reber, et al., 2004), while novel stimuli attract attention (Young & Claypool, 2010). However, this approach can also backfire. For instance, low quality and weak persuasiveness of videos probably resulted in diminished level of emotions, which might have led to range restriction, making our stimuli set less applicable in other samples. One solution is using documentary footage rather than scenes from feature films, since they

usually induce greater negative affect, such as guilt and disgust, which further affects interest (LaMarre & Landreville, 2009). Although we were limited by ethical constraints, researchers should try making stimuli as realistic as possible, in order to successfully simulate everyday context.

CONCLUSION

The first part of our study showed that psychopathic traits, lack of affective and cognitive responses in particular, are the most significant contributors to deficient perception of negative emotions. Present findings mostly point out to broader deficit than just in fear and sadness perception, which includes other negative emotions, as well as happiness. Our investigation resulted in additional noteworthy results, such as positive contribution of psychopathic manipulativeness to more accurate identification of sadness, showing how important it is to conceptually and empirically distinguish psychopathic traits. It should be noted that these effects are still rather small, and that subsequent analyses showed general psychopathy is not predicted by negative emotion perception once all aspects of emotional functioning were accounted for. To the best of our knowledge, this is the first study on the role of subclinical sadism using tasks specific to the field of emotion perception. We established contribution of this trait to successful identification of negative emotional expressions, which confirms our notion sadistic individuals should be more precise in this ability, since they derive direct pleasure from such signals.

The second goal of our study was to determine emotional responses to violent and peaceful stimuli, and if psychopathic response patterns differ from sadistic response patterns. We were conservative and predicted no specific relations in psychopathy, but registered unique difference between these traits and sadism with regards to emotional experience. It is a deficit in generating negative emotions in socially appropriate context in psychopathic individuals, and specific focus on violence and positive response to it in sadistic individuals. Such findings reflect broad literature on psychopathic aberrant reactions, and core sadistic attribute of enjoyment in torment and distress of others.

The third goal of the present study was to investigate implicit emotional associations to violence (and peace), in a similar manner as with explicit responses, and with similar assumptions. Although we partially confirmed our hypotheses, we did so only on specific measures of sadism. Implicit measures proved to be more successful in predicting psychopathy, suggesting preference for violence. However, our study joins a number of previous ones that question the validity of implicit measures, at least in relation to domain of self-reported (dark) personality traits.

Despite its shortcomings, this study managed to cover important domains of emotional processes - contribute to field of emotional experience, emotion perception, and rarely studied affective implicit associations in psychopathy. But, the greatest contribution of the present study is studying these in sadistic personality. We confirmed certain shared features, and more importantly, discovered discrepancies in emotional functioning in sadistic and psychopathic individuals.

Psychopathic and sadistic traits, as well as emotional reactions in penal populations are often measured in the aftermath of social rules violation, and crimes comitted; they are associated with criminologically relevant phenomena, such as recidivism rates, victimization, or behavior within the institution. However, in general population, these traits are expressed in everyday circumstances and situations we experience on a regular basis, which are accompanied by different levels of emotional experience. For this reason, we decided to use an ambulatory assessment that would help us register such experiences in relation with the dark traits.

Study 2: psychopathy and sadism in everyday context – a diary study

The focus of the second study was to examine the emotional experience in the context of the different everyday situations. Previous research has confirmed that basic personality traits are associated with characteristics of situations individuals find themselves in (Rauthmann, Sherman, Nave, & Funder, 2015). In this regard, there are assumptions that people with elevated psychopathy and sadism may tend to actively seek situations in which they could meet their own different needs (Taylor, 2009). Findings point to possible different types of motivation in the basis of exploitative and potentially violent behavior of individuals with pronounced psychopathy and sadism. While a person with expressed psychopathic traits is characterized by instrumental motivation - manipulation and potential injury to a person in order to fulfill one's own goals (Hare & Neumann, 2009), or the inability to generate or recognize fear and sadness (Hare, 2003; Kirsch & Becker, 2007), sadist is driven by appetitive motivation, where damage and injury to another is the goal itself, and this cruel behavior should not be too dependent on external factors (Buckels, 2012). Unlike psychopathy, sadism should be related to heightened satisfaction, or positive emotional experience in the context of these situations (Buckels et al., 2013; Chester et al., 2019; Međedović, 2017).

Although our focus is primarily on psychopathy and sadism, in this study we also decided to include two additional dark traits, *narcissism* and *Machiavellianism*, that are usually studied with psychopathy as Dark Triad (Paulhus & Williams, 2002), or together with psychopathy and sadism, in the form of Dark Tetrad (Chabrol et al., 2009; Paulhus, 2014). An interesting summary given by Paulhus (2014) points out specific characteristics of these traits. The main point of overlap for all the four traits is lack of empathy for other people (callousness). Other personality and behavioral features are more pronounced in some than others. For example, sadism is the only one characterized by enjoyment in cruelty; narcissism is primarily characterized by grandiosity and attention-seeking, while Machiavellianism with manipulation. One might pose a question how do they differ from psychopathy, when psychopaths manipulate (and so do narcissists), and also have grandiose self-image. The answer lies in the intensity – while these features are slightly elevated in psychopaths compared to the population average, they are highly elevated in narcissists or Machiavellians. On the other hand, impulsivity and broad pro-criminal tendencies are more present in psychopaths. In contrast, narcissists have slightly elevated impulsivity and criminal proclivity at population level, whereas Machiavellians do not have "problems" with impulsivity, but do tend to be involved in white collar crime (Paulhus, 2014; Furnham et al., 2013). If we observe these traits from the angle of damage done to others, narcissism represents a "lightest" member of this group (Rauthmann & Kolar, 2013). Some authors showed that it conceptually diverges from other dark traits (Međedović & Petrović, 2015), and exhibits unique pattern of relations with emotion-related constructs, such as elevated emotional intelligence (Petrides, Vernon, Schermer, &

Veselka, 2011), preserved cognitive empathy i.e. recognition of emotional states, versus defective affective empathy (Wai & Tiliopoulos, 2012). However, the results highly depend on the facets of narcissism studied. For example, grandiose narcissism (reflected in inflated self-image and confidence) is the one associated with positive outcomes. In contrast, vulnerable narcissism (negative self-image and sensitivity) does not share the same nature of relationships with those constructs (Vonk, Zeigler-Hill, Mayhew, & Mercer, 2013). Narcissism is also associated with experiencing greater positive affect and well-being (Żemojtel-Piotrowska, Clinton, & Piotrowski, 2014), and engaging in cordial interaction (unlike psychopathy and Machiavellianism; Rauthmann & Denissen, 2014). On the contrary, Machiavellianism is associated with greater experience of negative emotions (Muris, Merckelbach, Otgaar, & Meijer, 2017), and symptoms of alexytimia and anhedonia (Al Aïn, Carré, Fantini-Hauwel, Baudouin, & Besche-Richard, 2013). Machiavellians also have less positive perception of other people (Rogers, et al., 2018), and generally misanthropic and cynical worldview (Rauthmann & Will, 2011). Findings such as these are somewhat divisive, since Machiavellians are traditionally considered cold and calculated (Christie & Geis, 1970). Nevertheless, their emotional instability is combined with difficulty in expressing emotions, which does make manipulation and deception easier (Szijjarto & Bereczkei, 2015). Machiavellianism shares inappropriate emotional profile and empathic deficits with psychopathy (e.g. negative affect to neutral or happy stimuli; Ali, Amorim, & Chamorro-Premuzic, 2009; Wai, & Tiliopoulos, 2012), and is associated with reduced emotional intelligence (Austin, Farrelly, Black, & Moore, 2007).

For our second study we opted for Day Reconstruction Method, a systematical reconstruction of participant's experience (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). This method represents momentary self-report ambulatory assessment. It has certain advantages over other types of ambulatory assessments, such as experience sampling: it does not interfere with present activities, which makes participants more motivated to do it, and it offers a general overview of the entire day (Popadić, Pavlović, & Žeželj, 2018). A recent study by Pilch (2020) represents one of the rare cases of Day Reconstruction Method used to study Dark Triad traits (psychopathy, Machiavellianism, narcissism) and their relation with everyday affective experience. This experience was operationalized via list of adjectives that form positive momentary affect (happy, enthusiastic, relaxed) and negative momentary affect (annoyed, afraid, depressed), while psychopathy was measured using Triarchic model of psychopathy (Patrick & Drislane, 2015). The findings showed that psychopathic *boldness* is associated with increased positive and decreased negative momentary affect, indicating that less anxious, more emotionally resilient individuals experience increased positive emotions cross-situationally. This is in line with the claim that this trait represents an adaptive aspect of psychopathy (Lilienfeld et al., 2016). Furthermore, psychopathic *meanness* was related to reduced positive momentary affect, suggesting that individuals that are more callous and exploitative, as well as less empathetic tend to experience fewer positive emotions in everyday context. Finally, psychopathic *disinhibition* (impulsiveness, hostility, aggression) was shown to correlate with increased negative affect. This study further showed Machiavellianism negatively relates to momentary positive affect, and positively to negative affect. This finding confirmed the presence of negative emotionality in Machiavellians we mentioned prior. In terms of narcissism, its vulnerable form was

associated with decreased positive momentary affect, and increased negative affect, while grandiose form lacked significant correlations. This finding confirmed the emotional vulnerability of narcissists in everyday context.

This study is very useful evidence of implementation of DRM, although our study is somewhat different in nature. We were indeed interested in everyday affective profile of individuals with dark traits (therefore we also measured Machiavellianism and narcissism), but we put emphasis on psychopathy and sadism (which wasn't a variable of interest before). Consequently, we were focused on contextual features that are more likely to be encountered (or so we assume) by individuals in whom these traits are elevated. This method is a great way to determine a trend in the emotional life and behavior, by registering the characteristics and frequency of the situations associated with psychopathic and sadistic traits, as well as the accompanying emotional experience in the context of these situations. Since it is assumed that the motivation for manifesting certain behaviors, such as the maltreatment of others, and accompanying levels emotional gratification differ in psychopaths and sadists, we expected that this will reflect on their everyday experience.

Research goals

Besides examining between- and within-individual variability in assessing situational characteristics, perceived emotional hurt, as well as emotional responses, the second study of this research had the following principal goals:

1. Examine the magnitude of relationships between psychopathy and sadism with the estimated characteristics of everyday situations;
2. Examine the magnitude of relationships between psychopathy and sadism with the estimated perceived emotional hurt of another person;
3. Examine the magnitude of relationships between psychopathy and sadism with emotional experience in everyday situations;
4. Examine the magnitude of relationships between psychopathy and sadism with subjective physiological activity;
5. Examine the moderating role of sadism and psychopathy in relationship between positive and negative affect and emotional hurt inflicted on another person.

Research hypotheses

In line with the above objectives, we primarily tested the following hypotheses:

H1. Sadism and psychopathy will positively correlate with estimated deception in everyday situations;

H2. Sadism and psychopathy will positively correlate with estimated negativity in everyday situations;

H3. Sadism and psychopathy will positively correlate with estimated adversity in everyday situations;

H4. Sadism will positively correlate with degree of negative emotions felt across situations, while psychopathy will not;

H5. Sadism will positively correlate with the estimation of another person's emotional hurt in everyday context, whereas psychopathy will not;

H6. Sadism will moderate the relationship between positive emotional responses and perceived emotional hurt experienced by another person, in such a way that higher sadism increases relation between hurt and positive emotions, while psychopathy will not. It is possible that people with a pronounced sadism trait actively put themselves into situations in which they can experience certain pleasant emotions (Kirsch & Becker, 2007).

METHOD

Sample

This research was carried out on a sub-sample of 67 participants of the first study (82.6% female; M_{age} = 20.57, SD = 1.14) – psychology sophomores at Faculty of Philosophy, University of Belgrade. The number of participants was originally higher, however sample attrition happened on three occasions: 1. After the first study - some respondents who participated in the first study did not participate in the diary study; 2. After the second day of the diary study – some respondents who participated in the first day of the diary study failed to do so on the second day; 3. During merging of data – although some participants were missing larger number of measures collected before the diary study, they still participated in it, resulting in failure to obtain complete data for those participants. As compensation for participation, students were offered additional course points.

Variables

The study used the following variables from the "dark" personality domain: self-assessed psychopathy measured through Psychopathic Personality Traits Scale comprising four scores (Affective responsiveness, Cognitive responsiveness, Interpersonal manipulation, Egocentricity), as well as a general psychopathy score (Boduszek et al., 2016). Furthermore, sadism and Brutality were expressed through the score from the first study, derived from multiple scales. Additionally, we included narcissism and Machiavellianism that were measured via Dark Triad Dirty Dozen scale.

Besides dark traits, assessment of specific aspects of situation is operationalized using four out of eight scales from the Situational Eight DIAMONDS Taxonomy (Adversity, Positivity, Negativity, Deception). Moreover, we included assessment of another person's emotional hurt and assessment of relationship change after the interaction took place. Finally, we included assessment of emotional experience of the given situation (expressed via positive and negative emotions scores), as well as scores of subjective physiological reactivity (ergotropic activation, trophotropic activation, temperature and energy changes).

Measures

In this study, we used the measures from the first study, with the following additional measures as part of the diary study:

1. *Dark Triad Dirty Dozen* (DTDD; Jonason & Webster, 2010). This questionnaire consists of 12 items, with three subscales measuring psychopathy (impulsivity, callousness, lack of remorse), Machiavellianism (cynicism, manipulativeness) and narcissism (entitlement, grandiosity) on 5-point Likert scales (originally 7-point). The scale was already used and adapted for Serbian samples (reliabilities ranging from .73 to .90, Međedović, & Bulut, 2017; see more in Dinić, Petrović, & Jonason, 2018). For the purpose of our study, we used the subscales measuring Machiavellianism and narcissism.
2. *Day reconstruction method (DRM;* Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) allows the systematic reconstruction of experiences and activities from the previous day, as well as the accompanying emotional reactions. This measure consists of two parts:

Packet 2. It serves to encourage recollection of events from the previous day, by requiring respondents to fill in the sequence of episodes. Hence, their task was to reconstruct the previous day by sharing episodes from morning, afternoon and evening. For each episode, they described an event, its time and place, and description of one's own behavior and emotions. In the end, they were asked to go through the diary again and see if there are certain aspects of episodes they would change. Respondents were asked to fill out the diary package ("Packet 2") first, and only after completing it begin filling out the second one ("Packet 3"), so the latter questions would not affect their content reconstruction, and to reduce the likelihood of them focusing on more memorable episodes.

Packet 3. It provides an answer to the details of each episode of the situation and the emotions experienced. The respondents were first asked to mark the number of morning, afternoon and evening episodes, and to choose the earliest morning episode. Then they would answer structured questions about what they were doing (15 check-list items), where they were (3 check-list items), with whom they were and interacted with (8 check-list items). The measures used as a part of Packet 3 also comprised:

1. Ultra-brief measure for the Situational Eight DIAMONDS (S8-I; Rauthmann & Sherman, 2016). This instrument was included in the *Packet 3* of the Day Reconstruction Method. It consists of eight items and is part of a larger taxonomy of situational characteristics (Rauthmann et al., 2014) and measures psychologically important characteristics of a situation (behavior, goals, and situational cues). The task of the participant is to estimate the given episode on eight situational dimensions, using a 7-point scale: *1. Duty* – the degree to which a person sees the situation as containing work duties and tasks, problem solving and decision making; *2. Intellect* - the degree to which a person views the situation as intellectually demanding; *3. Adversity* – the degree to which a person views the situation as threatening, conflicting and competitive; *4. Mating* – the degree to which the person sees the situation as suitable for sex and romantic relationships with a potential partner and acceptance from that person; *5. Positivity* – the degree to which a

person sees the situation as pleasant, fun and easy to navigate; *6. Negativity* – the degree to which the situation contains negative states and feelings - such as rage, frustration, anxiety, and guilt; *7. Deception* – the degree to which a person observes that the situation involves mistrust, deceit, and hostility; *8. Sociality* – the degree to which a person sees the situation as suitable for social interaction and establishing a relationship. As mentioned, for the purpose of our study we used Adversity, Positivity, Negativity, and Deception.

2. Hurting and interpersonal interaction-related measures. In addition to the existing items from the taxonomy, we also added the following item: "In a situation you were in, the other person emotionally hurt" (answers on a 5-point scale: I completely disagree, I somewhat agree, I am not sure, I somewhat agree, I completely agree), which should be particularly important in the context of emotional experience in people with expressed sadism, especially due to the fact that the dimension of the Deception within this taxonomy does not provide information on whether the respondent is a subject or object of behavior in a given situation. Also, we added item on relationship change: "In what way has your relationship with the person changed after the interaction?" (the answers were: 1 – worsened, 2 – remained the same, 3 - improved).

3. List of positive and negative emotions. Participants rated their emotional experience on the PANAS-based list of emotions from the first study on the scale from 1 to 5 (adapted by Međedović, 2017; Watson & Clark, 1994). The list comprised: assertiveness, attentiveness, disgust, fear, guilt, joviality, love, pleasure, rage, sadness, serenity, shyness, surprise, tension. As in the first study, these were grouped in two scores, positive and negative emotions.

4. Physiological sensations checklist (Scherer & Wallbott, 1994). This checklist was first adapted and validated for studying psychopathic individuals by Marsh et al. (2011), we thought it would also be beneficial in registering potential differential associations of dark traits in physiological reactivity. We included items measuring several aspects of self-reported physiological changes: *ergotropic activation* (sympathetic nervous system) measured with five items: changes in breathing, faster heart rate, tension, shivering, sweating; *trophotropic activation* (parasympathetic nervous system) with items: upset stomach, lump in the throat, crying/sobbing; *temperature and energy changes* measured with four items: feeling cold, feeling warm, feeling hot and cheeks burning, feeling energetic). The degree of presence of these symptoms was marked on a 5-point Likert scale (1 - the least, 5 – the most).

Procedure

The duration of the Day Reconstruction Method study was two days, Monday and Tuesday. These days were reconstructed retroactively – Sunday was reconstructed on early morning Monday, while Monday was reconstructed on early morning Tuesday. That way, events from the weekday and weekend were sampled, and we hopefully managed to control for the "weekend peak effect", the tendency to experience more intense positive

affect during the weekend (Egloff, Tausch, Kohlmann, & Krohne, 1995). When it comes to personality measures, these were collected month and a half before the start of this study.

The student participants were instructed via email, at the same time each day (early in the morning) with two links forwarded to them each day. First link directed them to Participant's diary (Packet 2), a fillable PDF form which participants could download to their computer. This file served as a prompt for recollection of episodes they lived through the previous day. Only after they would enlist all the episodes, they would open the second link leading them to Packet 3 on Google Forms platform, which displayed all the DRM measures. These also comprised explicit measures of emotional responses to the given situations. In order to preserve anonymity, and facilitate the integration of the data from the two studies, the respondents entered their personalized password generated in pre-determined way, each time the questionnaire was filled out (the same principle was used in the first study).

Data analysis

Data processing consisted of a descriptive and an inferential part. Within the descriptive part, we present the measures of the central tendency and dispersion for each of the variables of the research. This part of the analysis was done in SPSS Statistics, version 24. The inferential part of the data processing tested the set hypotheses. Because the nested nature of the data, we used hierarchical linear modeling, which considers the common variation of hierarchically structured data (Woltman, Feldstain, MacKay, & Rocchi, 2012). For this purpose, analysis was conducted with packages in R software, version 3.5.3.

RESULTS

The analyses were conducted on the total of 1340 episodes (20 data points per participant, 10 per day). The average number of episodes per participant was 10.50 (SD=5.77). We first present descriptive statistics and features of the measures used, then we show the inferential section with applied multilevel modeling.

Descriptive statistics and metric characteristics of the measures

Descriptive statistics for the measures of dark traits, DIAMONDS situational characteristics, emotional experience, and subjective physiological changes are shown in Table 33. The descriptives show situations were on average rated highest on Positivity, indicating they are seen as more pleasant, fun, easy to handle. Averages are lowest for Deception and Adversity, indicating that the experienced situations are less seen as deceitful, hostile, as well as threatening, conflicting, and competitive. In line with that, participants are on average experiencing slightly higher positive emotions, however, the overall emotional experience is relatively low. Similarly, average subjective physiological indicators are also low. These findings are somewhat expected since our time sample included only episodes from two days.

Table 33. Descriptive statistics of Dark traits, situational characteristics, emotional experience and subjective physiological measures

	Min	Max	M	SE Mean	SD
Dark traits					
Sadism	-1.04	2.23	-0.14	0.02	0.68
Psychopathy	1.20	3.07	2.06	0.01	0.41
Affective responsiveness	1.00	3.40	1.73	0.02	0.58
Cognitive responsiveness	1.00	3.17	1.92	0.01	0.53
Interpersonal manipulation	1.00	3.80	2.29	0.02	0.66
Egocentricity	1.00	3.80	2.30	0.02	0.60
Brutality	-1.42	2.99	-0.08	0.03	1.01
Narcissism DD	1.00	4.75	3.35	0.02	0.69
Machiavellianism DD	1.00	5.00	2.13	0.02	0.86
Situational characteristics					
Adversity	1.00	7.00	1.38	0.03	1.04
Positivity	1.00	7.00	4.05	0.06	1.80
Negativity	1.00	7.00	2.04	0.05	1.53
Deception	1.00	6.00	1.08	0.02	0.62
Emotional experience					
Positive emotions	1.00	4.43	2.18	0.03	0.79
Negative emotions	1.00	4.63	1.53	0.02	0.58
Subjective physiological changes					
Ergotropic activation	1.00	4.00	1.43	0.02	0.51
Trophotropic activation	1.00	5.00	1.36	0.02	0.73
Temperature and energy changes	1.00	4.00	1.34	0.02	0.51

Multilevel model analyses

In the following analysis, we created several multilevel models to assess the association of various episode-level variables with sadism, psychopathy, narcissism, and Machiavellianism, as well as Brutality. For the sake of ease, the four former traits are called Dark tetrad in the further text. When creating models, a one-level model was always created first, and compared to an intercept-only multilevel model. Fits of these two models were compared, and interclass correlation coefficient (ICC) was calculated in order to assess the need for multilevel modeling. In the next step, we introduced the predictors. In all of the models with predictors, the first predictor was the variable indicating measurement number. It was introduced in order to control the variations that are associated with passage of time. After that, the Dark tetrad traits and Brutality were introduced one by one. A particular trait was kept in the next step only if it turned out to be a significant predictor. The Dark tetrad traits and Brutality were always introduced in the same order: sadism, psychopathy (if it turned out to be significant, it was replaced by its facets, one by one: Affective responsiveness, Cognitive responsiveness, Interpersonal manipulation, Egocentricity), Brutality, narcissism, and Machiavellianism.

Dark traits as predictors of situational characteristics

When *adversity* was used as the dependent variable, the comparison of one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL $X2(1)=124.765$, $p <.0001$). ICC indicated that 16% of variance comes from the differences between respondents, while 84% comes from differences within respondents. The final model showed a significant effect of sadism ($b=0.18$, $t(860)= 2.00$, $p <.0455$). When *negativity* was used as the dependent variable, the comparison of one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL $X2(1)=233.141$, $p <.0001$). ICC indicated that 30% of variance comes from the differences between respondents, while 70% comes from differences within respondents. The final model showed a significant effect of sadism ($b=0.55$, $t(860)= 2.74$, $p <.0062$). In the next model, *positivity* was the dependent variable. Comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL $X2(1)=260.435$, $p <.0001$). ICC indicated that 30% of variance comes from the differences between respondents, while 70% comes from differences within respondents. The final model showed a significant effect of Brutality ($b=-0.55$, $t(860)= -4.79$, $p<.0000$). The same modeling procedure was performed with deception as the dependent variable, but none of the Dark tetrad traits, nor Brutality, proved to be significant predictors. The same modeling procedure was performed with deception as the dependent variable, but none of the Dark tetrad traits, nor Brutality, proved to be significant predictors.

Dark traits as predictors of positive and negative emotions

When *positive emotions* score was used as the dependent variable, the comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL X2(1)=301.153, p <.0001). ICC indicated that 25% of variance comes from the differences between respondents, while 75% comes from differences within respondents. The final model showed a significant effect of Brutality (b= -0.14, t(854)= -2.97, p <.0030). With *negative emotions* score as the dependent variable, the comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL X2(1)=411.558, p <.0001). ICC indicated that 47% of variance comes from the differences between respondents, while 53% comes from differences within respondents. The final model showed a significant effect of sadism (b= 0.19, t(854)= 2.86, p <.0043).

Dark traits as predictors of emotional hurt and relationship change

In the first model, the dependent variable was *emotional hurt* (perceived emotional damage inflicted on another individual). Comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL X2(1)=241.274, p <.0001). The interclass correlation coefficient (ICC) indicated that a miniscule proportion of the variance is caused by interpersonal differences, while the large majority (99,9%) is caused by intrapersonal variations. The final model showed a significant effect of sadism (b=0.31, t(557)= 3.46, p <.0006). The same modeling procedure was performed with *relationship change* as the dependent variable, but none of the Dark tetrad traits, nor Brutality, proved to be significant predictors.

Dark traits as predictors of subjective physiological changes

Next, *trophotropic activation* was used as the dependent variable, and the comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL X2(1)=635.72, p <.0001). ICC indicated that 58% of variance comes from the differences between respondents, while 42% comes from differences within respondents. The final model showed a significant effect of sadism (b= 0.23, t(854)= 2.44, p <.0148). When *temperature and energy change* was used as the dependent variable, the comparison of a one-level model with an intercept-only multilevel model showed that the multilevel model had a significantly better fit (-2LL X2(1)=291.982, p <.0001). ICC indicated that 39% of variance comes from the differences between respondents, while 61% comes from differences within respondents. The final model showed a significant effect of Cognitive responsiveness (b= 0.20, t(873)= 2.60, p <.0095).

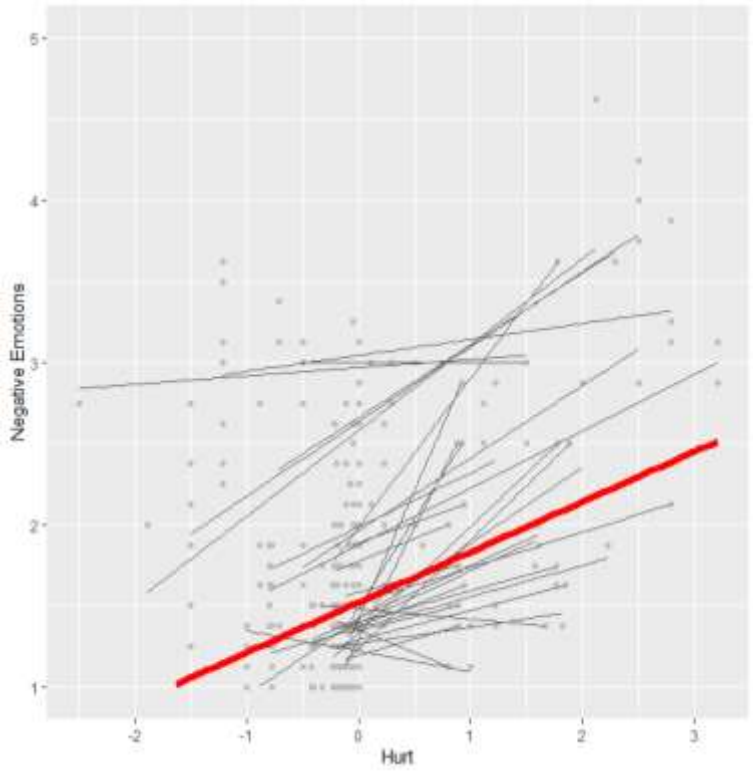
The same modeling procedure was performed with *ergotropic activation* as the dependent variable, but none of the Dark tetrad traits, nor Brutality, proved to be significant predictors.

Interactions between dark traits, emotional experience, and situational characteristics

Next step in the analysis was to explore associations of episode characteristics with resulting positive and negative emotions of the respondent, as well as the interactions of the resulting emotions with the Dark tetrad and Brutality traits. In all the models, the number of the episode was again introduced to control the effect of time.

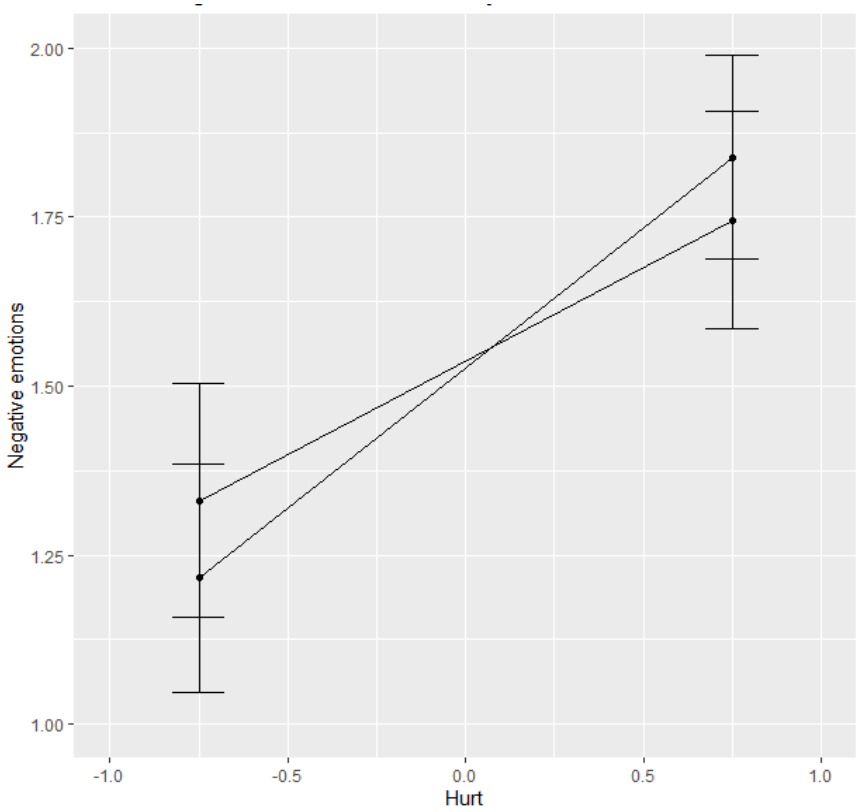
Emotional experience and hurt. In this case, negative emotions score was the dependent variable, while emotional hurt was the episode-level independent variable. The Dark tetrad traits and Brutality were introduced one by one in the prespecified order, allowing for interaction with emotional hurt. Hurt was first introduced with random intercept only, and in the next step with random slope as well. The random slope model had a significantly better fit (-2LL X2(1)= 218.386, p <.0004). Hurt was a significant predictor of negative emotions (b= 0.35, t(562)= 8.38, p= .0000), as seen in Figure 10.

Figure 10. Prediction of negative emotions by emotional hurt



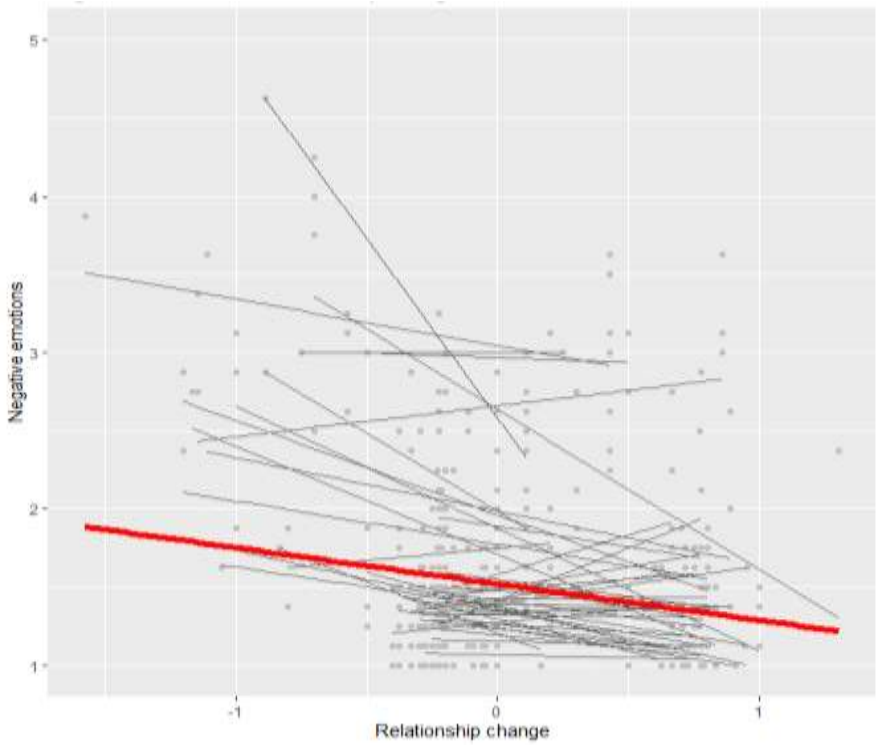
Hurt also showed a significant interaction with narcissism (b= 0.10, t(562)= 1.99, p= 0.0460). High level of narcissism was associated with higher correlation between hurt and negative emotions (Figure 11). Same procedure was applied with positive emotions as the dependent variable, but no significant effects were observed.

Figure 11. Hurt and negative emotions moderated by narcissism



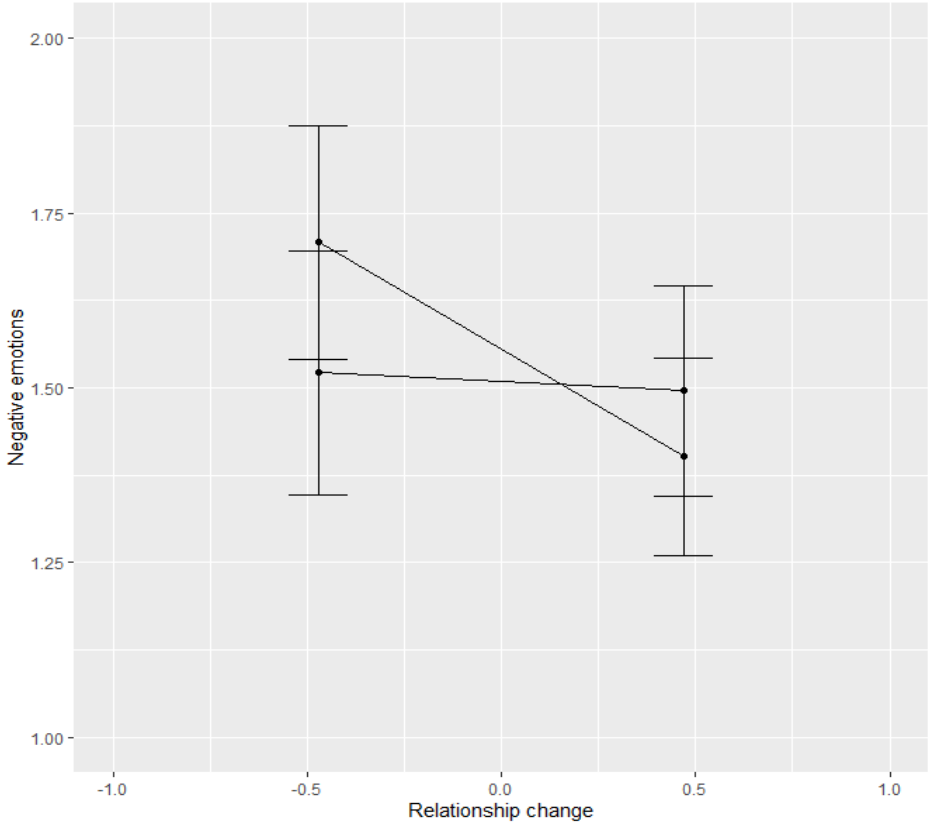
Emotional experience and relationship change. In the next model, negative emotions score was the dependent variable, while relationship change was the episode-level independent variable. The Dark tetrad traits and Brutality were introduced one by one in the prespecified order, allowing for interaction with relationship change. Relationship change was first introduced with random intercept only, and in the next step with random slope as well. The random slope model had a significantly better fit (-2LL X2(1)= 29.594, p <.0224). Relationship change was a significant predictor of negative emotions (b= -0.18, t(562)= -3.37, p= .0008), as presented in Figure 12.

Figure 12. Prediction of negative emotions by relationship change



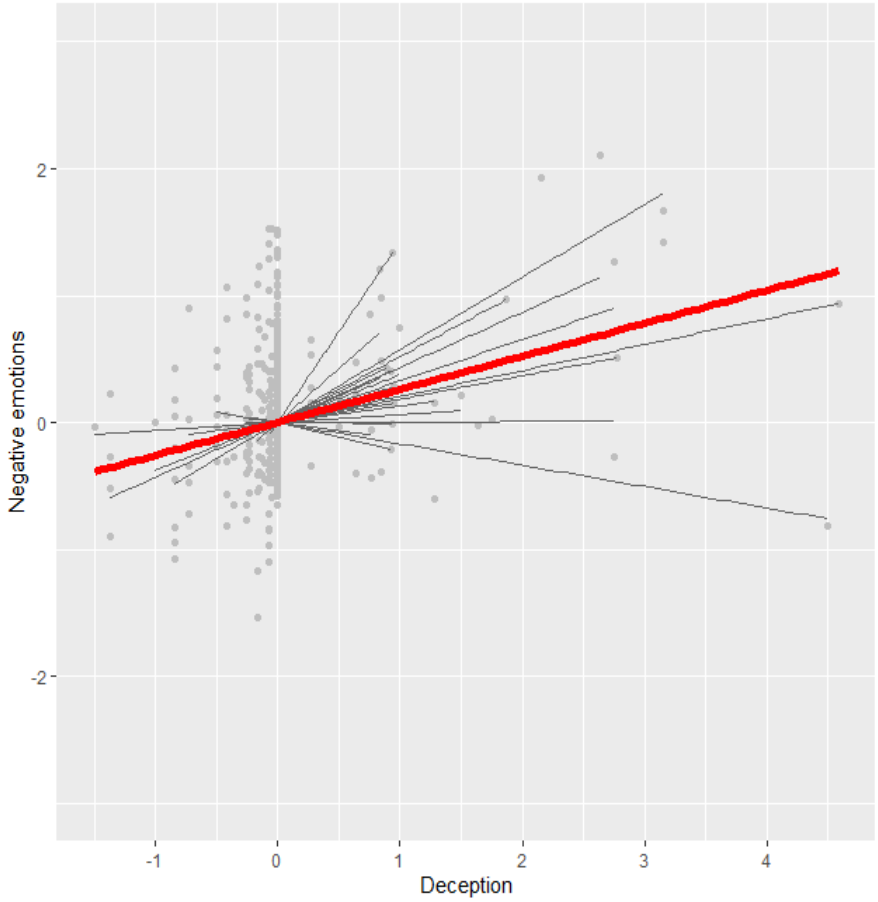
Relationship change had a significant interaction with Affective responsiveness (b= -0.22, t(561)= -2.82, p= .0050), where higher level of Affective responsiveness was associated with stronger (negative) correlation between negative emotions and relationship change, but it fell under the level of statistical significance in the final model. Narcissism also had a significant interaction with relationship change (b= -0.20, t(560)= -2.61, p= .0092). Higher level of narcissism was associated with stronger (negative) correlation between relationship change and negative emotions (Figure 13). Same procedure was applied with positive emotions score as the dependent variable, but no significant effects were observed.

Figure 13. Relationship change and negative emotions moderated by narcissism



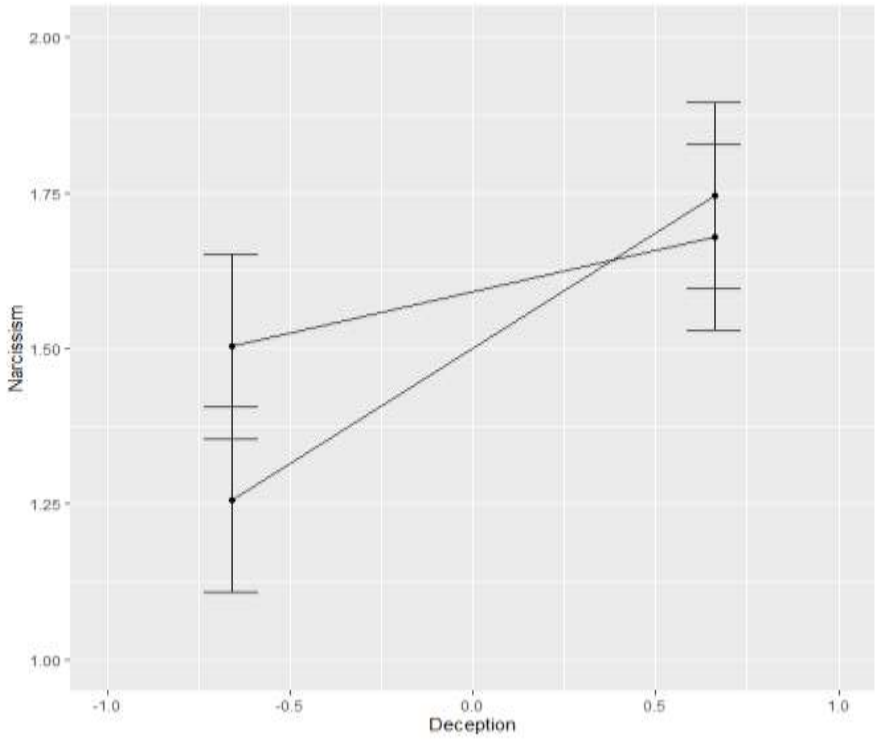
Emotional experience and Deception. Negative emotions score was the dependent variable, while deception was the episode-level independent variable. The Dark tetrad traits and Brutality were introduced one by one in the prespecified order, allowing for interaction with Deception. Deception was introduced with random intercept only, since the final model did not have a significantly better fit when random slope was introduced. Deception was a significant predictor of negative emotions (b= 0.25, t(872)= 5.73, p= .0000), as shown in Figure 14.

Figure 14. Prediction of negative emotions by Deception



Relationship of Deception and negative emotions showed a significant interaction with narcissism (b= 0.17, t(872)= 5.94, p= 0.0000). Higher level of narcissism was associated with stronger correlation between deception and negative emotion (Figure 15).

Figure 15. Deception and negative emotions moderated by narcissism



Deception also had a significant interaction with Sadism (b= -0.16, t(852)= -4.31, p= 0.0000) and Psychopathy (b= 0.21, t(871)= 2.36, p= 0.0181) when they were first introduced, but in the final model, these interactions fell under the statistical significance threshold. Same procedure was applied with positive emotions as the dependent variable, but no significant effects were recorded.

DISCUSSION

The aim of the present study was to investigate psychopathic and sadistic traits in situational context, everyday emotional experience, and consequences of interpersonal interaction such as inflicted emotional pain. Although these traits were central to our investigation, we also included other dark traits to our models, since they have established importance in studying perception of everyday situations (Jonason & Sherman, 2020), as well as everyday emotional experience (Pilch, 2020).

One of our main assumptions was that sadistic individuals would see the situations they experienced through "dark-tinted glasses". Our main features of interest were Adversity (risk overt threats in the situation), Negativity (risk of negative feelings in the situation), and Deception (risk of mistrust in a situation) (Rauthmann & Sherman, 2016). We concluded that sadism is a positive predictor adversity and negativity as contextual features. This implies that individuals with pronounced sadism tend to rate situations they find themselves in as being more threatening, accusing and criticizing, and filled with negative feelings, like rage, frustration, anxiety, and guilt. This finding partially confirmed our hypotheses H2 and H3. Further, we expected sadistic individuals would give higher ratings of situational deception, however this was not the case. Sadists benefit from by harassing or observing harassment and its immediate negative effects; however, deception might not directly serve this purpose, but rather fulfill goal-seeking tendencies that are more psychopathic or Machiavellian in nature. With that in mind, we also expected the abovementioned associations to be present for other dark traits. For instance, Machiavellianism should have similar relations to negativity characteristics, because sadists and Machiavellians share similar negative and pessimistic views of people and their environment (Rogers, et al., 2018; Rauthmann & Will, 2011), however our data did not confirm this. We also expected (perhaps prematurely) that psychopathy and Machiavellianism would relate to adversity and deception, a view of situations as more competitive, threatening, and filled with mistrust, because psychopaths react angrily to situations that represent a hurdle for reward/goal achievement; on the other hand, they are not as sensitive to perceived threat (Blair, 2012; Marsh, 2013). In that regard, we should reflect on the nature of our method and instruments used. Our predictions on situational characteristics might have been affected not only by operationalizations of dark traits, but the fact that variance of these features was low in our sample of data points. This is probably the most important issue of the present study. On the other hand, the broad nature of the DIAMONDS items we used and the way they are phrased might not successfully reflect the nature of individuals with dark traits. For example, deception item states "Somebody is being deceived". This item is not specific enough in depicting who is the subject and object of deception. Measuring whether someone thinks they are being deceived or they are being the deceiver in the situation might be crucial difference when studying dark traits. For example, it has been shown that both individuals higher on neuroticism and individuals with elevated Dark triad traits rate situations as more deceiving. It is speculated they do so for different reasons – while the former expect to be a

victim of deception, the latter perceive themselves as the victimizer (Jonason & Sherman, 2020). The authors of the scale point out this actor-target issue as one of its downsides that resulted from making it more economical (Rauthmann & Sherman, 2016). Future studies using the scale should specifically focus on adapting it for nuances important for the context of dark traits.

Sadism also predicts the degree of negative emotions felt across situations – sadistic individuals report higher degree of experienced negative emotions. This finding shows us that sadism is indeed characterized by negative emotional profile in everyday circumstances. This finding supports previous ones showing sadists have higher negative baseline affectivity, together with lower positive baseline affectivity (Chester et al., 2019), and our finding that they view their surroundings as more negative. As we expected, this relationship did not appear with psychopathy (H4). Empirical evidence shows that, when observing everyday experience of young psychopathic versus non-psychopathic individuals, they do not differ in intensity and frequency of experienced basic emotions, except when it comes to fear (Marsh et al., 2011). Rather, psychopaths even express normal or increased levels of positive excitement, a state related to goal-achievement (Marsh, 2013). This is also in line with the previously mentioned finding obtained through Day Reconstruction Method; psychopathic individuals with pronounced boldness (lower anxiety, higher resilience), a trait with greater adaptive potential, experience enhanced positive affect (Pilch, 2020).

Our results further show that sadism predicts increased trophotropic activation cross-situationally. Trophotropic activation represents arousal of parasympathetic nervous system. Unlike ergotropic symptoms, which represent energizing and preparation for energy spending, trophotropic symptoms serve for preparation for rest and recuperation of an organism (Gellhorn, 1970; Scherer, 2001). Based on previous body of work, we included three trophotropic symptoms: upset stomach, lump in the throat, and crying/sobbing (Marsh et al., 2011; Scherer & Wallbott, 1994). In the literature, these symptoms are associated with experiencing negative emotions, and are most intense in sadness; on the other hand, ergotropic arousal (changes in breathing, increased heart rate, tension, shivering, and sweating) is most intense when experiencing fear and anger, respectively (Scherer & Wallbott, 1994). Our finding on increased trophotropic activation in sadism is novel, but not unexpected. Sadism has been previously associated with depressive symptomatology; furthermore, pronounced sadistic traits are associated with suicidal ideation in more depressed individuals (Chabrol et al., 2011). It is also associated to schizotypy, a disposition toward psychotic-like experiences that incorporates depression indicators: sadness, loneliness, self-worthlessness, hopelessness, self-pity, helplessness, chronic fatigue, and suicidal ideas (Međedović, 2017).

Sadism was also the only significant predictor of perceived emotional hurt to another person, indicating that sadistic individuals report higher degree of emotional pain of individuals they interacted with. This association was not obtained for psychopathy, which is in line with our research hypothesis (H5). Of all dark traits, subclinical sadism is resulting in worst social consequences, while also possessing none of the potential adaptive benefits other traits have; for example, success in the workplace (Lilienfeld et al., 2014; Pavlić & Međedović, 2019), reproductive success of psychopaths in detrimental conditions

(Međedović, Petrović, Želeskov-Đorić, & Savić, 2017), or facilitating exploitative mating strategies in all Dark triad traits (Jonason, Webster, & Schmitt, 2009). In contrast, sadism is the one that is tightly associated with intentional inflicting harm on others, and it always leads to detrimental consequences because of its arousal-seeking component (Trémolière & Djeriouat, 2016). Based on previous empirical studies, we assumed sadists would be more sensitive to detect emotional pain of other people, unlike psychopaths, whose motivation is not solely revolving around other's distress. While psychopaths are thought to inflict damage for reasons such as personal benefit (Hare & Neumann, 2009) or inability to recognize distress in others (Marsh & Cardinale, 2012), sadistic individuals get direct positive incentive from being able to perceive negative emotions successfully. They are motivated by pleasure-seeking, and are characterized by premeditation of cruelty (Trémolière & Djeriouat, 2016). This finding substantiates data from the first study – sadists tend to be more perceptive when it comes to negative emotions. However, present result could also imply that they tend to overestimate the pain of others (Harenski et al., 2012), or even overstate the pain they caused in self-report measures since they are so focused on distress (Buckels, 2018). Since we did not include some form of objective measure, we can only speculate. Finally, we did not confirm our hypothesis that sadism would moderate relations between perceived emotional pain and positive affect (H6). A large body of empirical evidence shows hurting others is intertwined with positive affect in sadists (Chester et al., 2019; Trémolière & Djeriouat, 2016). In fact, positive responses to violence are also shown in our first study, and ever greater number of studies points out that this is the central feature of this trait (Buckels et al., 2013; Međedović, 2017). One of the reasons we failed to register this might be that in this circumstance sadists did not consider themselves agents of other's emotional pain. Also, we have to factor in range restriction, the lower variance in the measures we used in the student population, but also the smaller number of episodes where individuals had interpersonal interaction that might have resulted in emotional pain.

In case of our PPTS psychopathy measure, both general psychopathy score and specific traits were not predictive in the models. For example, there were some indications of psychopathy having a moderating role between increased deception and higher negative emotions, unlike sadism, which lead to lower negative emotions. However, by introducing other dark traits this effect became insignificant, therefore we will restrain from further discussion. Nevertheless, we did register heightened subjective thermal reactivity in individuals with greater psychopathic cognitive responsiveness. This trait represents lack of ability to understand emotional states of others and create mental representations based on other's mental states. Unlike Affective responsiveness, it does not include actual lack of "feeling" of other's emotions. Therefore, the heightened temperature symptoms we obtained is not going against the core descriptions of these traits. To this date, the majority of findings on physiological responses in psychopaths come from clinical populations, and suggest decreased physiological responses, especially in presence of emotionally saturated or violent stimuli (Fanti et al., 2016). On the other hand, comparison of psychopathic and non-psychopathic individuals on objective physiological measures while they are observing emotionally saturated stimuli did not show significant difference between them, but it did exist on subjective level (Pham, Philippot, & Rime, 2000). Certain findings obtained on subclinical samples point to increased somatosensory resonance in psychopathic men as

the result of observing other's pain, even though their perception of observed pain intensity is not different from non-psychopaths (Marcoux et al., 2014). This finding tells us that such individuals might have certain reactivity and physical symptoms to distress, but not convert it to caring for others. This might also indicate problems with emotional regulation, which were already detected in psychopathic individuals (Donahue, McClure, & Moon, 2014; Casey, Rogers, Burns, & Yiend, 2013). In line with that, pronounced Cognitive responsiveness is associated with less self-control leading to criminal behavior (Boduszek, Debowska, Sherretts, & Willmott, 2018). Finally, our results may stem from the fact that psychopathic individuals tend to report normal levels of reactions, whereas actual objective measures indicate deficits in psychophysiology (Levenston, Patrick, Bradley, & Lang, 2000). But there are data that are just the opposite - comparison of psychopathic and non-psychopathic individuals on objective physiological measures while observing emotionally saturated stimuli did not show significant difference between them, but it did exist on a subjective level (Pham, Philippot, & Rime, 2000). Psychopaths are also known to overreport experience of anger, an emotion high in arousal and accompanying physiological changes, thus our finding which is based solely on self-report measures might be an artifact of this tendency (Marsh, 2013). A deeper analysis across specific emotions felt on everyday basis may help us understand this finding better. A study by Marsh and colleagues (2011) compared psychopaths and non-psychopaths in daily responding to fear-evoking situations and did not register temperature changes between the groups using the same classification of symptoms (Marsh et al., 2011). The same team discovered decreased subjective sympathetic arousal in psychopathic individuals during fear-evoking situations. In our case, we were only registering regular emotional fluctuations, not responses during or following stressful or dangerous situations. In the future studies it would be interesting to record emotional responses to different situational cues in relation to dark traits.

Contrary to study by Pilch (2020), we did not register specific relations of psychopathic traits with positive and negative emotions. Our studies differ in several ways: besides using different measures for narcissism and Machiavellianism. Second, our study used Psychopathic Traits Model (scale), whereas Pilch used Triarchic psychopathy model. Međedović and Damjanović (2018) give a good review of problematic aspects of this scale. First, it includes items measuring criminal behavior through Disinhibition facet, which is not central to psychopathy (Skeem & Cooke, 2010). Second, Meanness scale includes deliberate cruelty, which belongs to sadistic, rather than psychopathic tendencies. With that in mind, we come to another major difference between our studies – our research introduced sadism as a fourth dark trait, which was not controlled for in the study by Pilch (2020).

We also had some interesting findings in relation to narcissism, which appeared as a moderator between hurt and negative emotions – negative emotions are higher with increased perceived emotional hurt in individuals with pronounced narcissism. Furthermore, it was the moderator between relationship change and negative emotions – the worse the relationship was after the interpersonal interaction, those with pronounced narcissism experienced more intense negative emotions. Finally, narcissism moderated the relations of deception and negative emotions: individuals with pronounced narcissism experience more negative emotions in situations they rate as more deceptive. Using the same method, Pilch (2020) showed that vulnerable narcissism is characterized by decreased positive and increased negative affect. In our study we didn't confirm

narcissism's association with greater positive affect, nor its direct relationship with negative affect. Unlike Pilch (2020), we used a measure that does not differentiate between vulnerable and grandiose narcissism. The Dirty Dozen narcissism scale is very short (four items), and it has several shortcomings (Jonason & Webster, 2010): it excludes ego-threat, an important factor in narcissistic response to external influences (Jones & Paulhus, 2010), as well as items relating to grandiosity and entitlement, aspects of self-esteem instability (Jonason & Webster, 2010). This probably results in the scale not being associated with coercion or aggression, contrary to psychopathy and Machiavellianism (Jonason & Webster, 2010). Altogether, our findings show a pattern that might fit into a general profile of a narcissist. Narcissism is considered more of "an interpersonal irritant than a threat" (Paulhus & Wiliams, 2002, p. 562), and is associated with preserved cognitive, but damaged affective empathy, indicating impaired emotional responses (Wai & Tiliopoulos, 2012). However, narcissists are more invested in keeping good impression in social interactions (Rauthmann & Denissen, 2014), and work hard to preserve positive self-image by exaggerating their knowlegde as a form of self-deception (Paulhus, Harms, Bruce, & Lysy, 2003). This is in line with the fact that they are also more extroverted (Paulhus & Williams, 2002), least dishonest and exploitative of all Dark Triad members (Lee & Ashton, 2005; Međedović & Petrović, 2015), and more agreeable and cooperative in certain circumstances (Međedović & Petrović, 2015).

Finally, Brutality, a score we generated using Amorality scales in a previous study, was the only one that showed (negative) relations with positivity ratings across situations, indicating that brutal individuals with pronounced view situations as less positive, pleasant, and fun. Similarly, it predicted decreased positive emotions across episodes. Our first study showed Brutality shares a high amount of variance with psychopathic Affective responsiveness. However, Brutality seems to be more sensitive to everyday manifestations of emotions compared to psychopathic traits in this study. Our findings confirm the validity of Amorality scales, and point to their usefulness in predicting everyday behavior.

Limitations and future directions

Our study suffers from several drawbacks. First, as is the case with most psychological studies, our study too relied on a *student sample*. We confirmed that DRM is a useful way to study intra and inter-individual variation of traits and self-reported emotional experience, but it would be beneficial to replicate and extend these findings on a broader community sample. Although present in the student sample, we should expect that greater variance in dark traits exists in the broader sample, thus making Type 2 error less probable.

Second, there are drawbacks that come from general usage of *ambulatory assessment*: they are sensitive to measurement reactivity (multiple assessments change the behavior) and higher compliance rates, but also setbacks coming from *DRM itself*, such as retrospective reporting and memory recall, which always makes us question the reliability

(Gunthert & Wenze, 2012). If resources are available, this type of study should be repeated using Experience Sampling Method, which uses assessment of activities people are actively involved in, hence can compensate for DRM's shortcomings.

Third, our study had much smaller *number of registered episodes* than average study using these methods. For example, a recent Day reconstruction study on a similar topic by Pilch (2020) recorded 3047 episodes with 270 participants, while our study recorded only 1340 from 67 participants. Moreover, other studies measuring affect fluctuation across episodes used even greater number of data points and participants (Kahneman et al., 2004; Stone et al., 2006). Thus, our analysis was done with the data collected over an extremely short time period (two days). Furthermore, we generally captured events with low emotional intensity, and with generally greater positive affect. Such "profile" of emotional episodes and their low frequency makes it that much harder to capture the associations with dark traits, which are expressed mostly in situations characterized by negative emotions. Measuring such a specific domain of personality, while trying to capture as many situations with negative elements, requires "casting a wider net". Future studies on dark traits should try to capture larger sample of episodes, especially when studying the episode-level data that is very dynamic and prone to change, such as emotional experience (Augustine & Larsen, 2012).

Fourth, we heavily relied on *self-report measures*, some of which have issues with comprehensiveness and phrasing. Future studies should consider features of DIAMONDS scales and potentially modify them to specifically reflect the study's purpose, and avoid unnecessary ambiguity in interpretation. As mentioned earlier, our biggest issue was with phrasing of DIAMONDS items, which should be adapted for use together with the dark traits. With the current formulation of items (relevant to us), we lost the sense of agency, and information about wether an individual is an active participant whose actions affect others in the situation, or just a passive observer. In spite of that, we hope that this implementation of diary method gives a small, yet significant contribution for deeper understanding of dark traits and their expression in everyday behavior.

CONCLUSION

In our second study we touched on relations of dark traits with evaluation of situational context, emotional experience, and certain features of interpersonal interaction using Day Reconstruction Method and multilevel modeling. We established sadism's relations with general negative affectivity, perceived negativity and adversity of experienced situations, as well as perceived emotional distress of other individuals. These findings shed light on sadism as trait differing from dark traits, with emphasis on negative emotions, showing us that sadistic individuals are more sensitive to negative environment.

We failed to register some expected correlates of psychopathy traits but tried to elaborate on that in consonance with contemporary theoretical and empirical framework. However, the most probable reason for not capturing these relations was methodological in nature: the number of the registered episodes was small. We also discovered interesting moderating effects of narcissism in perceived deception, emotional hurt and negative

emotions, conveying narcissism's "sensitive" side. Finally, we confirmed validity of Brutality, and its potential to predict everyday behavior as an independent measure.

CONCLUDING REMARKS

Our study's main contribution was integrating multiple measures of different aspects of emotional processes into research of dark traits. To the best of our knowledge, such comprehensive study covering strictly that domain has not been done for sadism, and sadism together with psychopathy. Our first study included measures of emotion perception ability. The results showed that individuals with reduced psychopathic cognitive and affective empathic ability have less success in perceiving negative emotions in other individuals. On the other hand, we registered contribution of sadism to this ability, which is a novel finding in sadism research. This points to an important difference between psychopathy and sadism: being able to correctly detect a negative emotion in another individual is crucial for a sadist, while the same is not the case for psychopath. The simplest way to define the discrepancy between these traits is using descriptors closest to them: intentional versus careless. Sadistic profile generally assumes intentionally hurting others, while psychopathic inflicts physical or emotional pain due to recklessness or as a negative side effect of a goal that is wanting to be achieved. This also goes in line with previous claims that emotion perception ability is associated with experiencing emotions (Marsh et al., 2011).

Based on our fidings about emotional reactions to violence, we were able to extract a key difference between psychopathy and sadism when it comes to emotional responsiveness. As was anticipated, sadism is characterized by abberant emotional response to violence (reflected in the presence of positive emotions as a reaction to violence). On the other hand, there is an absence of normal emotional response pattern to violence in psychopathy (reflected in the lack of appropriate generation of negative emotions), which does fit well into pre-existing findings on psychopathy, for example the fact that psychopaths lack empathy and have lowered affectivity. This is not to say that sadists do not share these features. As a matter of fact, we are also able to draw similarities between our traits of interest. The tightest point of convergence of sadism and psychopathy is tendency towards interpersonal manipulation and lowered affect. This implies individuals being deceitful, grandiose, and superficially charmful in interpersonal interactions, while retaining lower levels of experienced emotions. These features lie in the basis of both of our constructs.

However, we should note that we tested numerous effects in this study – even though we confirmed certain expectations, we also failed to confirm some of them. As is often the case in the field of individual differences, we failed to capture a notable number of effects. Moreover, the effects we did obtain are not very robust, especially in the case of sadism, as some relations were observed only in certain sadism scales. Given the nature of sadism, we

expected to replicate this effect on multiple measures, but we did not. These scales somewhat differ in their content and operationalization, which created heterogeneity in our results. Our use of SPF task to measure implicit emotional associatons with violence in dark traits was its first such application. We registered stronger positive associations to violence in psychopathy; however, the non-existence of relations with explicit measures, and inconsistent relations with dark traits makes us question its validity in this personality domain.

By using an abulatory assessment in the second study, we tried to apply more ecologically valid measure to investigate cross-situational relationships. Our diary study helped to explore perceptions of situations and associated affective experience that are relevant to subclinical psychopathy and sadism, since these traits are regularly occurring in general population. So far, this was the first study to measure sadism in connection with emotional experience in everyday setting. We also expanded our investigation to other relevant dark traits: narcissism and Machiavellianism. However, we had certain issues with our application of Day Reconstruction Method. We had very low number of data points, which (most probably) led us to not registering certain expected effects, especially concerning psychopathic traits. As is known from previous research, psychopathy and Machiavellianism are traits that share notable number of features, such as pronounced interpersonal manipulation. Interestingly, we did not obtain expected relations in psychopathy, but Machiavellianism as well. However, we did obtain certain meaningful relations for narcissism and sadism, that are considered "lightest" and "darkest" members of Dark Tetrad, respectively. One could suspect that expressions of certain types of behaviors are more easily detected in connection to some traits compared to others. For instance, sadistic behaviors might be more easily detectable, since they have a direct, immediate effect on another individual, as it is the only dark trait that features enjoyment in cruelty. It could also be said that narcissists, who are characterized by greater attention-seeking (compared to psychopaths and Machiavellians), encounter more opportunities to express themselves. On the other hand, it could be more difficult to detect certain everyday reactions in psychopaths and Machiavellians due to their disinterest in the environment and others unless it serves their personal interest.

Despite the shortcomings, especially considering the nature of our sample, which was small in size, and comprised of students, our research made an important step towards better understanding of psychopathy and sadism. Although similar in certain respects, they are unquestionably two traits with qualitatively distinct elements.

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APPENDIX A

Explicit emotional responses to dynamic stimuli – descriptive statistics

Frames of dynamic stimuli belonging to groups violent (1-5) and peaceful (6-10) and their average ratings on basic emotions from preliminary study, and PANAS descriptors from the main study.

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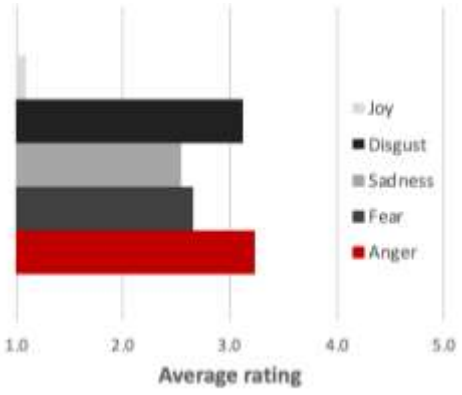

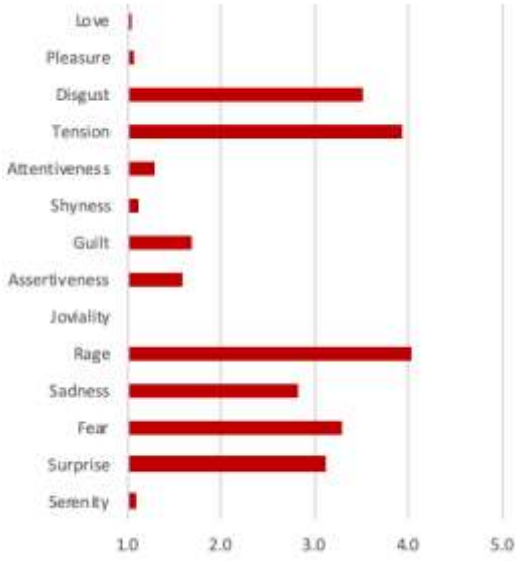

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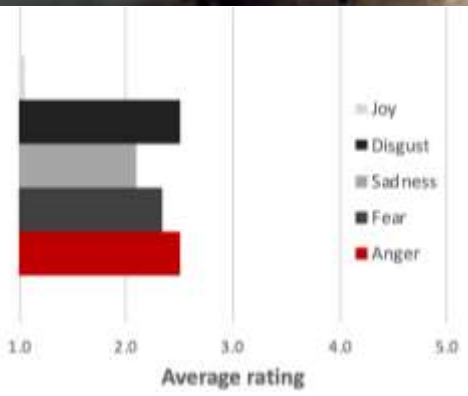

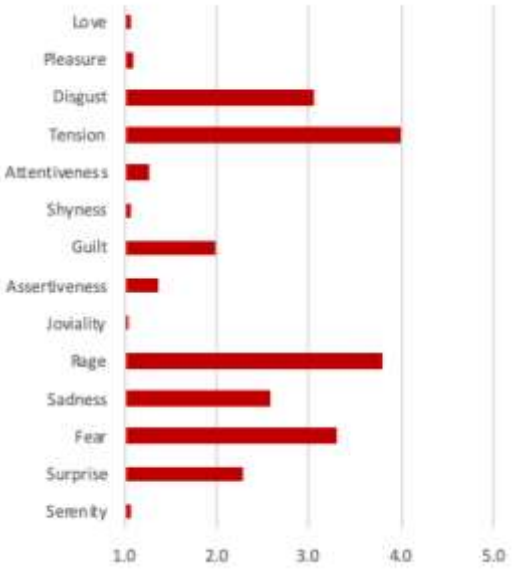

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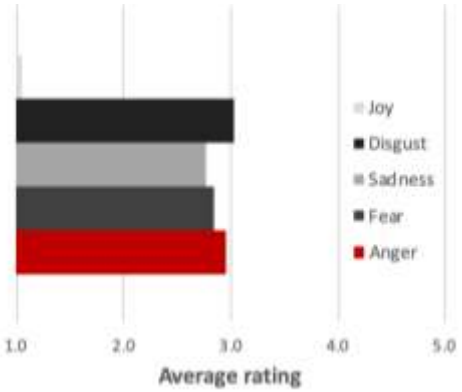

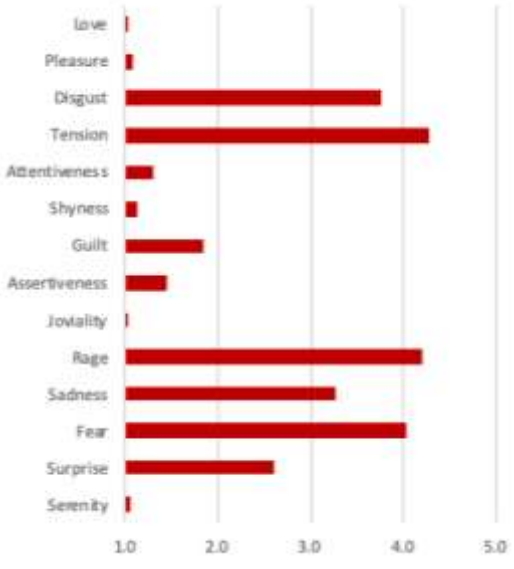

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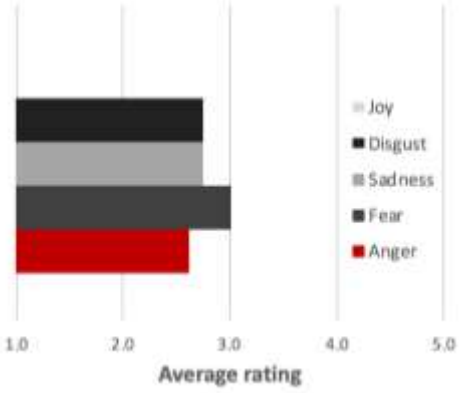

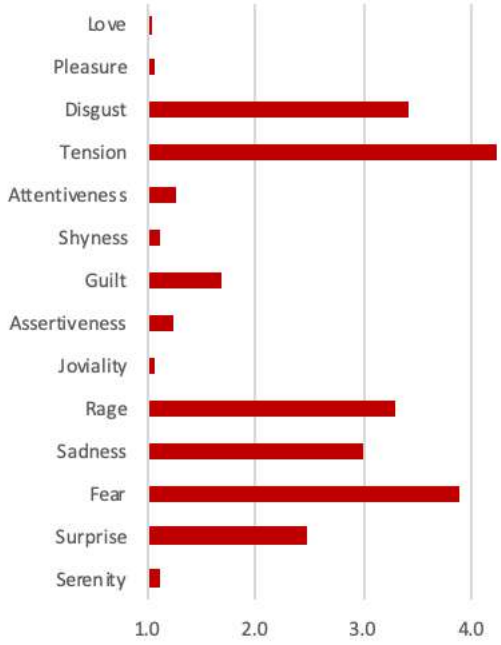

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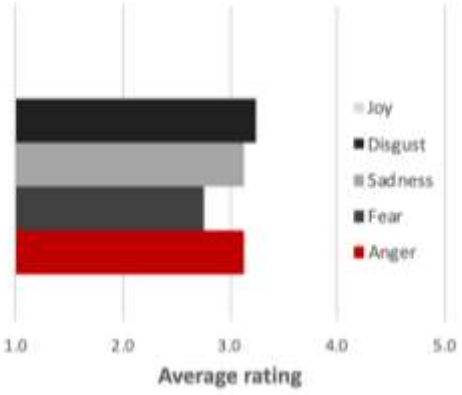

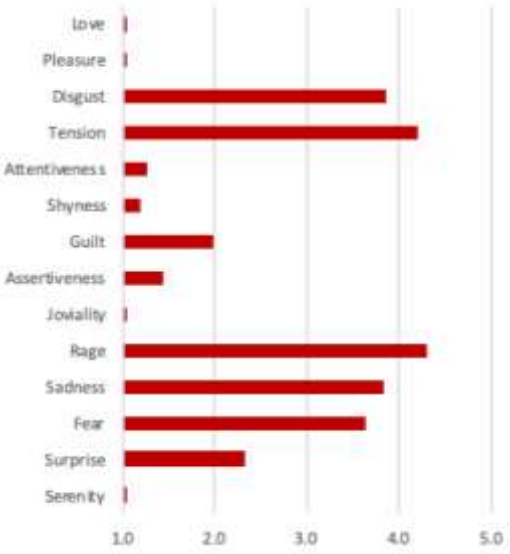

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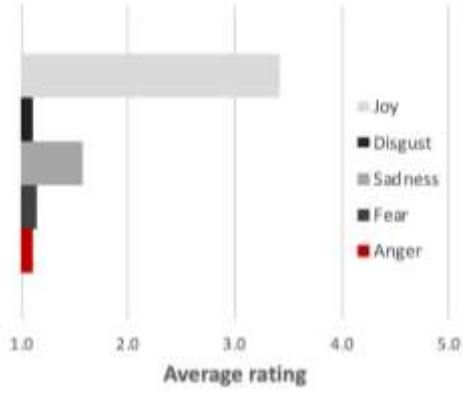

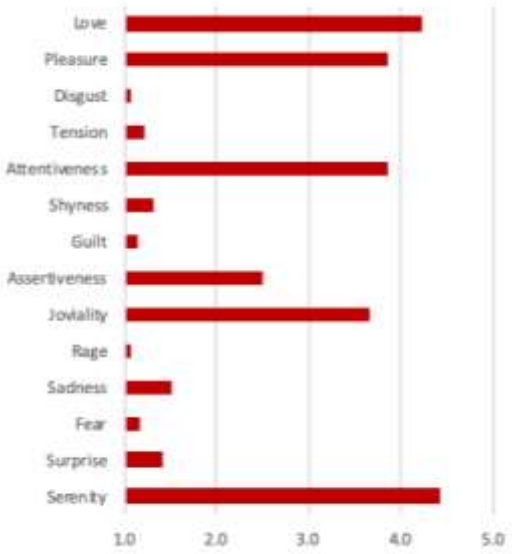

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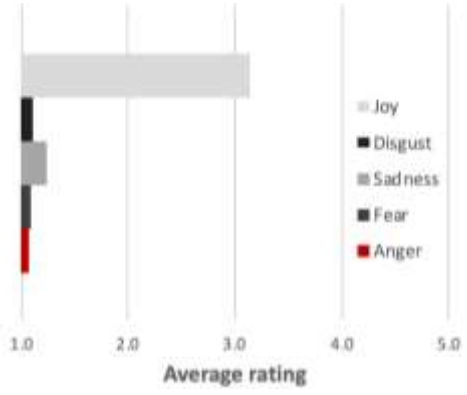
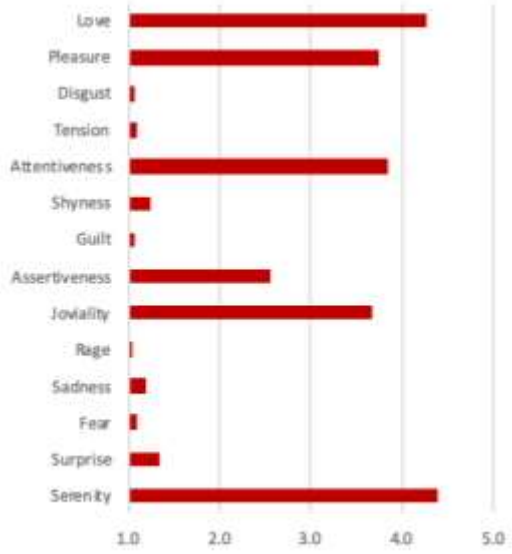
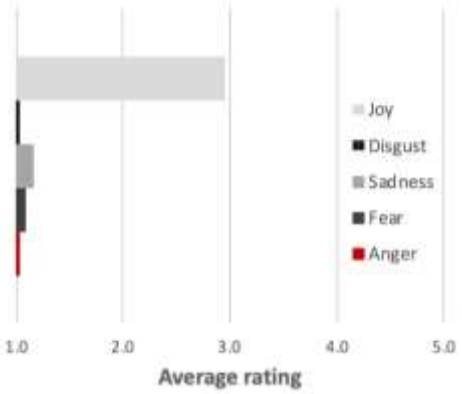
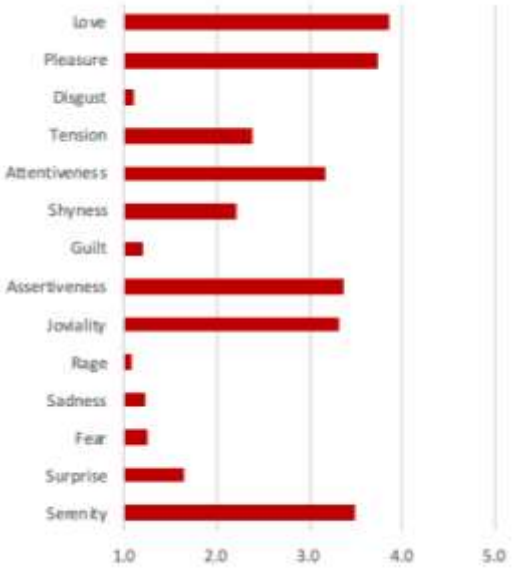




MEDIAEVAL16 00627





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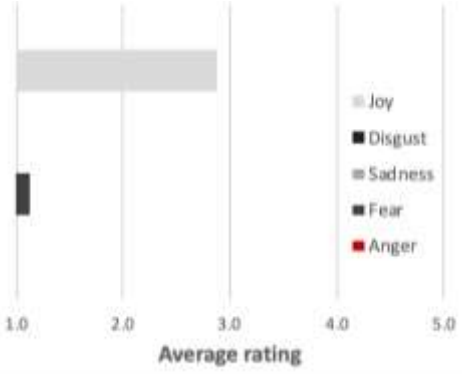
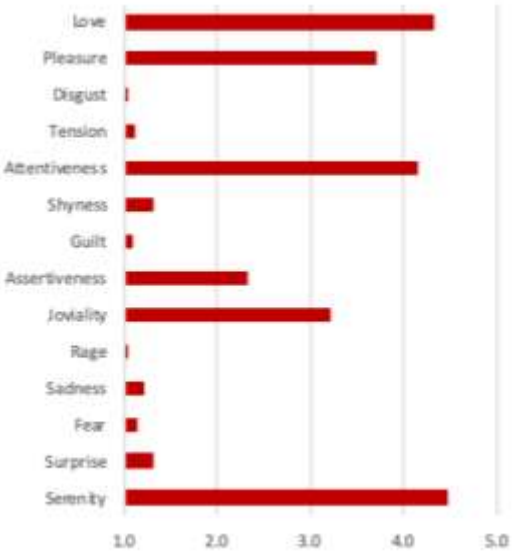
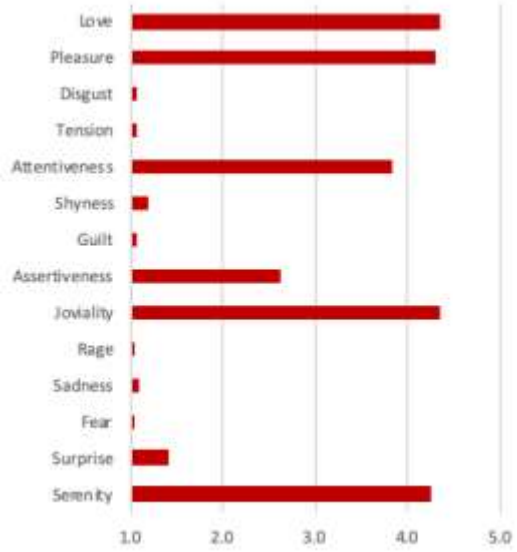
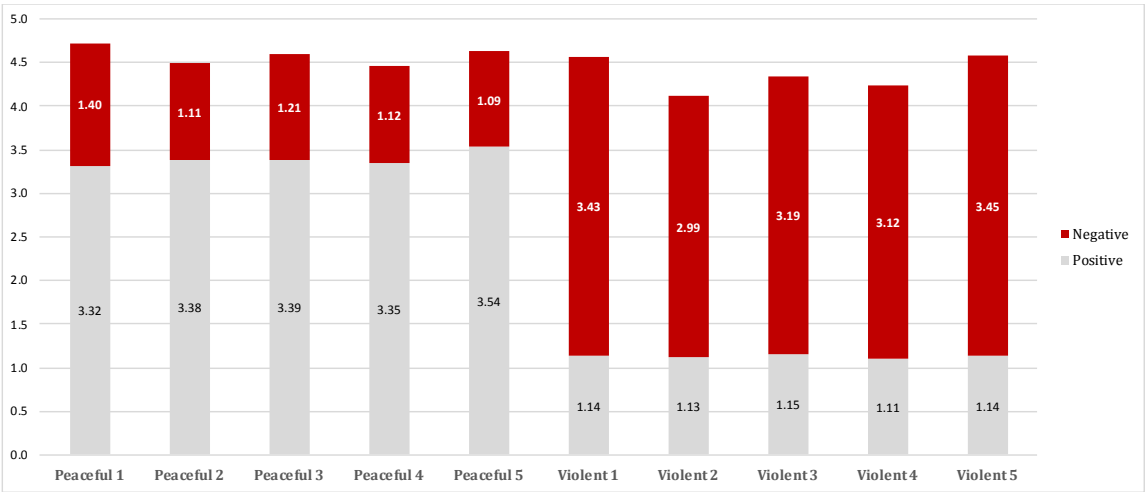






Average scores on positive and negative emotions for ten dynamic video stimuli from preliminary study



APPENDIX B

Links to the dynamic video stimuli used in the study

1. MEDIAEVAL16 01158: https://osf.io/8vf5a
2. MEDIAEVAL16 01134: https://osf.io/ncfvh
3. MEDIAEVAL16 00428: https://osf.io/f5udq
4. ACCEDE06973: https://osf.io/syr3a
5. ACCEDE00426: https://osf.io/gv2dr
6. MEDIAEVAL16 01138: https://osf.io/9d8nx
7. MEDIAEVAL16 01036: https://osf.io/dtevb
8. MEDIAEVAL16 00627: https://osf.io/vzyns
9. ACCEDE09253: https://osf.io/xwf3j
10. ACCEDE01545: https://osf.io/6zcb3

APPENDIX C

The structure of Brutality factor derived from Amorality scales

	Factor loadings
Baš me briga za probleme drugih ljudi, ko mene gleda.	.677
Why should I care about the problems of other people, when no one cares about me? *	
Nikad nisam zažalio što sam se nekome osvetio, zažalio sam samo kad sam propustio da se nekom osvetim.	.656
I never regretted taking revenge on someone, I only regretted when I failed to do so.	
Slađa je osveta koja se dugo priprema.	.634
Revenge Is the sweetest when served cold.	
U suštini me ne zanima ništa sem mog vlastitog uživanja.	.610
I'm basically not interested in anything but my own enjoyment.	
Bavljenje humanitarnim radom ima najviše smisla. (r)	.593
Participating in humanitarian work makes the most sense. (r)	
Voleo bih da nekim ljudima smrsim konce, pa taman i mene đavo odneo s njima.	.582
I'd really like to see some people fall, even if it's the last thing I do.	
Dobročinstvo je izvor sreće i zadovoljstva. (r)	.525
Benefaction is a source of happiness and contentment. (r)	
Nisam ja kriv zbog svojih nagona: priroda me je takvim stvorila i ako su oni loši, znači da su joj baš takvi bili i potrebni.	.522
I'm not to blame for my instincts: nature made me this way, and if my instincts are bad they are that way for a reason.	
Mislim da bi svi trebali da se češće uključuju u akcije dobrovoljnog davanja krvi. (r)	.492
I think everyone should get involved in blood drives more often. (r)	
Ja poznajem jedino svoje potrebe i ponašam se u skladu sa svojim željama.	.486
I know only my needs and act in accordance with my desires.	
Pametan čovek uvek zna kada, kako i kome treba nešto da kaže pa da onome ko mu se zamerio zapečati sudbinu.	.480
A smart man always knows when, how and to whom he should say something so that he can seal the fate of the one who resented him.	
Dobre stvari koje se dese ljudima koje volim me uvek istinski obraduju. (r)	.442
Seeing good things that happen to the people I love always make me really happy. (r)	
Spreman sam da neko vreme i besplatno radim za ljude koji su u nevolji. (r)	.463
I am ready to work free of charge for some time for people who are in trouble. (r)	
Slaba je uteha od osvete. (r)	.415
There is little value in trying to get revenge. (r)*	

Note: the English translation is only presented for descriptive purposes, this is not official translation of the scale. The original items were in Serbian. Original items are in light grey, while the translated ones are in white fields. *Translation taken from Paulhus and Jones (2015).

APPENDIX D

Bivariate correlations of psychopathy, sadism, and Brutality with inverted visual search speed measures

Emotion visual search speed	Overall iRT	Negative iRT	Anger iRT	Fear iRT	Sadness iRT	Happiness iRT	Surprise iRT	Disgust iRT
SSIS	-.11	-.11	-.09	**-.19****	-.11	-.11	-.04	-.12
CS	**-.16***	**-.16***	**-.13***	**-.19****	**-.16***	-.10	**-.16***	**-.18****
VS	**-.15***	**-.14***	-.11	**-.20****	-.08	**-.20****	-.11	-.15*
SA	-0.09	-0.09	-0.07	**-.15***	-0.08	-0.08	-0.07	-0.09
AR	**-.14***	**-.14***	-.12	**-.20****	-.12	-.10	-.09	-.10
CR	**-.16***	**-.16***	**-.13***	**-.24****	-.09	**-.17****	**-.15***	**-.19****
IM	-.12	-.12	-.12	**-.14***	-.10	-.11	-.10	**-.13***
EG	-.06	-.05	-.03	-.08	-.04	**-.14***	-.04	-.02
BR	-0.10	-0.10	-0.05	**-.16***	-0.09	-0.09	-0.09	-0.12

Labels: iRT – inverted reaction time

SSIS – SSIS sadism, CS – Core sadism, VS – Vicarious sadism, SA-Sadism Amorality; AR - Affective responsiveness, CR - Cognitive responsiveness, IM - Interpersonal manipulation, EG - Egocentricity; BR - Brutality

APPENDIX E

The structure of Sadism factor derived from SSIS, VAST core, and Amorality Sadism scales (first principal component)

	Factor loadings
U nekim situacijama uživam da gledam ljude kako pate. (VAST)	0.749
I enjoy seeing people suffer.	
Ponekad uživam u tome da povredim nekoga (VAST)	0.737
I enjoy physically hurting people.	
Nekad se tako naljutim da želim da povredim ljude. (SSIS)	0.658
Sometimes I get so angry I want to hurt people.	
Povređivao sam ljude zato što sam mogao. (SSIS)	0.651
I have hurt people because I could.	
Imam fantazije koje uklju?uju povređivanje ljudi. (SSIS)	0.622
I have fantasies which involve hurting people.	
Uživao bih kad bih nekog povredio fizički, seksualno ili emotivno. (SSIS)	0.616
I would enjoy hurting someone physically, sexually or emotionally.	
Uživam da vidim ljude kako pate. (SSIS)	0.601
I enjoy seeing people hurt.	
Bilo bi uzbudljivo povređivati ljude. (SSIS)	0.599
Hurting people would be exciting.	
Ljudi bi uživali u povređivanju drugih samo kad bi probali. (SSIS)	0.596
People would enjoy hurting others if they gave it a go.	
Ponižavao sam druge da bih ih doveo u red. (SSIS)	0.551
I humiliated other people to put them in their place. (SSIS)	
Ne bih nikoga namerno povredio. (SSIS) (r)	0.533
I wouldn't intentionally hurt anyone.	
Ponekad uživam da povredim partnera tokom seksa (ili da se pretvaram da to radim) (VAST)	0.525
I enjoy hurting my partner during sex (or pretending to).*	
Uživam da se gubitnicima rugam u lice. (VAST)	0.515
I enjoy mocking losers to their face. *	
Povredio sam ljude zbog sopstvenog užitka. (SSIS)	0.506
I have hurt people for my own enjoyment.	
U nekim situacijama je potrebno uplašiti ljude da bi ih kontrolisali. (VAST)	0.492
I dominate others using fear.	
Nikad ne bih namerno ponizio nekoga. (VAST) (r)	0.484
I would never purposely humiliate someone. (r)	
Potpuno mi je svejedno kako se osećaju ljudi oko mene, ako ja uživam. (Amorality)	0.48
It is all the same to me how people around me feel if I am enjoying myself. *	
U srednjoj školi sam namerno bio zao prema nekim osobama. (VAST)	0.472
I was purposely cruel to someone in high school. *	
Priče o poštenju i dobroti služe samo tome da zbune i zaglupe čoveka. (Amorality)	0.436
Stories of honesty and kindness only serve to confuse and fool a person.	

Note: the English translation is only presented for descriptive purposes, this is not official translation of the scale. The original items were in Serbian. Original items are in light grey, while the translated ones are in white fields. English versions of VAST and SSIS items, as well as some Amorality items (*) were taken from Paulhus and Jones (2015).

APPENDIX F

Bivariate correlations between general measures of psychopathy and sadism and emotion-related measures

	General psychopathy	General sadism
Emotion perception accuracy		
Overall	.00	-.11
Negative emotions	.01	-.10
Anger	.00	.00
Fear	.00	-.04
Sadness	-.02	-.04
Happiness	-.08	-.10
Surprise	-.04	**-.14***
Disgust	.04	-.05
Visual search speed of emotions		
Overall	**.16***	**.19****
Negative emotions	**.17****	**.19****
Anger	.13	.17*
Fear	**.23****	**.26****
Sadness	**.16***	**.16***
Happiness	.10	**.18****
Surprise	**.13***	**.14***
Disgust	**.15***	**.17***
Explicit responses		
Positive emotions to violent stimuli	**.15***	**.24****
Positive emotions to peaceful stimuli	**-.18****	**-.18****
Negative emotions to violent stimuli	**-.25****	**-.26****
Negative emotions to peaceful stimuli	**.19****	**.20****
Implicit responses		
Peace-unpleasant stimuli	-0.07	-0.09
Peace-pleasant stimuli	-0.07	-0.05
Violent-unpleasant stimuli	0.00	-0.04
Violent-pleasant stimuli	**-.14***	**-.15***

Curriculum Vitae

Tara Bulut was born on July 13th 1988, in Belgrade, Serbia. She graduated from VII Belgrade Gymnasium in 2007, and enrolled in Bachelor studies in psychology at Department of Psychology, University of Belgrade the same year. She graduated in 2012, and enrolled in Master studies, which she finished the same year. She attended the Research module at both levels of studies. She defended her Master thesis under supervision of Prof. Slobodan Marković, PhD. She enrolled in Phd studies in 2015, under supervision of Prof. Goran Knežević, PhD.

In 2009, she became a member of Laboratory for Experimental Psychology, where she was actively participating in research projects, and leading undergraduate student research groups throughout her studies. As a member she also voluntarily participated in organization of European Conference on Visual Perception held in Belgrade in 2014, as well as research projects that the Laboratory was collaborating on with University of California, Berkeley. During her studies she also participated in projects such as "TALIS – The OECD Teaching and Learning International Survey" and "Perception of knowledge, attitudes and behaviours of health professionals related to HIV" organized by International Aid Network and Ministry of Health of the Republic of Serbia.

In 2016, she became a member of Laboratory for Research of Individual differences and, is involved in cross-cultural projects, such as "Cross Cultural Tears - A Systematic Investigation of the Interpersonal Effects of Emotional Crying Across Different Cultural Backgrounds" ran by University of Oslo, and "Investigating Feelings and Behaviors Related to COVID-19" run by Psychological Science Accelerator. During her PhD studies she participated in summer school "Observing primate behavior" organized by Department of Behavioral Ecology, Utrecht University.

She published five papers in international and four in domestic academic journals, participated in various domestic and international conferences. She reviewed papers for journals such as Europe's Journal of Psychology and Psihologija Journal.

She gained professional experience in the field of market research, and as counselor and psychology teacher within the International Baccalaureate Diploma Program.