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A multi-method investigation of motive dispositions: affiliative and antagonistic dispositions in psychopathy

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Abstract

Purpose – *To replicate and extend research on psychopathy and intrinsic interpersonal preferences under the broader umbrella of affiliation, intimacy and antagonism, this paper aims to examine motivational correlates of psychopathy in a nonclinical sample (*N = *125).*

Design/methodology/approach – *We used a multimethod design, including self-reports, a behavioral task and a physiological assessment of motive dispositions (automatic affective reactions to stimuli of interpersonal transactions measured with facial electromyography).*

Findings – *Results showed that self-reported psychopathy was negatively associated with self-reported intimacy motive. In the same vein, via the social discounting task, this paper found a negative association between psychopathy and a tendency to share hypothetical monetary amounts with very close others. Finally, regarding fEMG findings, multilevel analyses revealed that although individuals with low levels of psychopathy reacted more positively to affiliative stimuli, individuals with high levels of psychopathy reacted equally positively to both affiliative and antagonistic stimuli, and these results were robust across psychopathy measures. Results remained mostly unchanged on the subscale level.*

Originality/value – *These findings highlight the contribution of multimethod assessments in capturing nuances of motivation. Implicit physiological measures might be particularly sensitive in capturing motive dispositions in relation to psychopathy. Identifying mechanisms that foster positive connections between psychopathic traits and nonprosocial tendencies may be theoretically and clinically informative, with implications for forensic and penal practices.*

Keywords *Psychopathy, Electromyography, Affective reactions, Behavioral task, Motive dispositions, Motivation*

Paper type *Research paper*

Psychopathic personality is defined by a constellation of interpersonal, affective, lifestyle and antisocial features, including (but not limited to) deceptiveness, manipulation, grandiosity, callousness, meanness, impulsivity and disinhibition (Hare and Neumann, 2008; Patrick *et al.*, 2009). Although individuals with extremely high levels of psychopathic traits are more common in forensic settings, a growing body of evidence supports the dimensional nature of psychopathy and the informative value of studies based on general populations (Colins *et al.*, 2017; Hare and Neumann, 2008; Jeandarme *et al.*, 2017; Ritchie *et al.*, 2018; Salekin and Lynam, 2010; Vitacco *et al.*, 2005). Across different conceptualizations (Blackburn, 2007; Patrick *et al.*, 2009; Salekin *et al.*, 2004), psychopathic personality is consistently associated with abnormalities in interpersonal functioning (Hall and Benning, 2006). In particular, building on accounts that define psychopathy as characterized by interpersonal antagonism (i.e. the tendency to devalue social bonds and act competitively and selfishly, rather than cooperatively and

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altruistically; Moshagen *et al*., 2018; Sherman and Lynam, 2017; Vachon, 2019), we sought to investigate motivational correlates of psychopathy throughout the spectrum covering affiliative and antagonistic interactions, using a multimethod design.

There is consensus that antagonism is a central feature of psychopathy (e.g. Lynam and Widiger, 2007; Miller and Lynam, 2015, Lynam and Miller, 2019; Vachon, 2019). Empirical research has documented moderate to strong associations between psychopathy and self-reported operationalizations of antagonism (for an overview, see Vachon, 2019). In personality and psychopathy research, antagonism is considered the lower end of the Big Five personality trait of agreeableness, which predicts altruistic behavior and, conceptually, has some overlap – but is not identical to – affiliation (Denissen and Penke, 2008; Fleeson, 2007; Vachon, 2019). In terms of Interpersonal Circumplex [1] dimensions, antagonism is operationalized as low affiliation in various studies and is often understood as one pole of the affiliation axis (Hostile-Arrogant to Cold-Separate; Wright, 2019). Within the interpersonal circumplex, psychopathic traits are located in a region similar to antagonism (Sherman and Lynam, 2017).

The strong conceptual links between psychopathy and antagonism suggest a certain motivational foundation, which, however, is infrequently tested (Vize and Lynam, 2020) [for exception, which is discussed below, see Glenn *et al*., 2017; Jonason and Zeigler-Hill, 2018]). To address this lacuna, we sought to investigate associations between psychopathic traits and individual differences in motivation for antagonism and affiliation. Those two classes of motives represent two different other-directed orientations. We did not also opt for an antagonism self-report measure, because the broader motivational difference in interpersonal orientation, which we aimed to capture, is already delineated in affiliative and intimacy tendencies. First, we aimed to replicate findings linking psychopathy and (low) affiliation using self-reports and a behavioral lab task. Second, we added a new analysis by examining the affective underpinnings of the dispositional propensity toward affiliation and antagonism by assessing automatic affective reactions to affiliative and antagonistic cues through facial electromyography (fEMG).

Methods to assess motivations underlying psychopathy

Our focus on motivational correlates of psychopathy aligns with theoretical approaches that regard personality traits as motivational, contextual and interpersonal constructs (Denissen and Penke, 2008; Wright, 2019). In motivational terms, antagonism is represented by a propensity to act selfishly and competitively, as opposed to cooperatively and altruistically (Denissen and Penke, 2008). Such motivational tendencies are likely expressed in interpersonal transactions through callous and quarrelsome behavior and are empirically and conceptually connected to low affiliation (Wright, 2019; Hopwood and Bornstein, 2019). Selfish and callous tendencies have been associated with the relevant rewarding perception of such interactions (and the not rewarding perception of prosocial interactions) by higher scoring in psychopathy individuals (Foulkes *et al*., 2014). Similarly, poor social bonding and altruistic behaviors have been found to be relevant to reduced sensitivity to affiliation of individuals with higher levels of psychopathic traits, pointing toward motivational underpinnings of psychopathic tendencies (Waller *et al*., 2020). Notably, and in line with a motivational underpinning of psychopathic tendencies, individuals with higher psychopathy levels are not utterly deprived of affiliative tendencies (Christian *et al*., 2019). Rather, they lack in the quality of bonding and tend to be conflictual, even if social interactions are sought out.

We investigated motivational correlates of psychopathy adopting different research methods pertaining to what individuals report that they want, how they behave to attain it and what their physiology indicates that they want. Three different levels of investigation may offer important information as to whether results might converge or not across methodologies. It is well established that different operationalizations of motivation captures

different nuances of the broader motivation concept (Dufner *et al.*, 2015, 2018). Specifically, we included self-reported motivation, behavioral expressions of motivation and affective indicators of motive dispositions. Expanding on psychopathy research using physiology (e.g. resting heart rate; Bergstrøm and Farrington, 2018), we used psychophysiological assessments, i.e. fEMG, to capture motive dispositions (i.e. dispositional tendency to derive pleasure form motive-relevant experiences), which can be operationalized as individual differences in affective reactions to motive-relevant stimuli (Dufner *et al.*, 2015). Such dispositions have not been studied in relation to psychopathy. Below, we discuss the conceptual and empirical background of these three levels of analysis with regard to psychopathy.

Self-reported motivations underlying psychopathy

The assessment of self-reported motivation has already been applied in relation to psychopathy. A study by Glenn *et al.* (2017) found that psychopathy predicted reduced investment in motives and values related to the welfare of others and predicted greater investment in motives and values related to relative power and wealth. Psychopathic traits were also found to be associated with reduced motivation to establish and preserve functional relationships (Jonason and Zeigler-Hill, 2018). Recently, Sherman and Lynam (2017) have proposed that low communion (i.e. low motivation to create and maintain close social bonds; Tellegen and Waller, 2008) is one of the core features of psychopathic personality. One way that has been used to assess this aspect of interpersonal antagonistic motivation is by measuring self-reported motivation toward communal motives, that is, the explicit valuing of social bonds. Consistent with this, both theory (Patrick, 2018) and empirical evidence (Ali and Chamorro-Premuzic, 2010; Glenn *et al.*, 2017; Sherman and Lynam, 2017) have linked psychopathy with reduced affiliation and intimacy (as opposed to hostility and cold-heartedness; Blackburn, 1998). In addition to that, psychopathy is a robust predictor of antisocial behavior, including criminal conduct and recidivism, with the interpersonal features of psychopathy being more related to instrumental violence (for a review, see Dhingra and Boduszek, 2013).

Both affiliation and intimacy reflect a need to belong and connect with others, but also present distinct characteristics. These nuances are reflected in the respective operationalizations: Affiliation represents the motivation to create and uphold relationships with people but not necessarily sharing intimacy with them. Intimacy represents the motivation to maintain close, warm and mutual bonds with significant others (Schonbrodt and Gerstenberg, 2012). To date, however, research has not clearly addressed potentially distinct associations between psychopathy and affiliation and intimacy. Currently, we are zeroing in on self-reported reduced affiliation and not directly on self-reported antagonism. Based on the above literature, we expected negative associations between psychopathic traits and self-reported communal motives (affiliation and intimacy).

Psychopathy and motivated behavior in laboratory tasks

Behavioral tasks can be used to assess the motivation to share (or to not share) resources as an index of antagonistic motivation (Schonbrodt and Gerstenberg, 2012). These tasks ideally resemble real-life situations wherein the extent to which someone values relational closeness influences the motivation to share resources, as evidenced by sharing behavior (Curry *et al.*, 2011; Vieira *et al.*, 2014). Tasks that do not consider the level of social closeness (in that the participant is not asked to decide on sharing based on the relational distance but is only asked whether or not to share resources with another hypothetical person) typically do not correlate with other indices (e.g. self-reports) of intimacy (Schonbrodt and Gerstenberg, 2012). Thus, it is possible that these tasks measure a broader affiliation tendency as operationalized by a general tendency toward sharing, regardless of whether sharing is directed toward a close other or a stranger (Schonbrodt

and Gerstenberg, 2012). Instead, studies using behavioral tasks that have investigated tendencies to share resources with hypothetical others at different levels of closeness have found negative associations between psychopathic traits and altruistic and cooperative behavior (Curry *et al.*, 2011; Mokros *et al.*, 2008).

A task that enables researchers to investigate the role of social closeness on the behavioral disposition to share (or not to share) resources is the social discounting task (Jones and Rachlin, 2006). In this task, the value attributed to social closeness can be quantified by assessing participants' (un)willingness to share hypothetical monetary amounts with people of different levels of relational distance. It was found that individuals with higher levels of psychopathic traits tended to be less inclined to share hypothetical monetary amounts even with people that they considered very close to them (Sherman and Lynam, 2017). This pattern suggested a low communal orientation as expressed by a derogation of relational closeness and a motivation to increase personal gain to the detriment of others, even those described as the closest person. Based on the literature discussed and on the findings of Sherman and Lynam (2017), we expected negative associations between psychopathic traits and sharing tendencies in laboratory behavioral tasks (as an index of reduced affiliation and heightened antagonistic motivation).

Affective contingencies as indices of motive dispositions

A recently developed method to assess individual differences in motive dispositions captures spontaneous affective reactions to motive-relevant stimuli (Dufner *et al.*, 2015). Specifically, it is theorized that the propensity to derive pleasure from motive-relevant experiences represents the affective core aspect of motive dispositions and varies across individuals (McClelland, 1987). Empirical evidence indicates that this propensity can be measured through fEMG (Dufner *et al.*, 2015). Specifically, positive affective reactions are measured through increases in the muscular activation of the zygomaticus major (indicative of smiling) (Cacioppo *et al.*, 1986); negative affective reactions are measured through increases in the muscular activation of the corrugator supercilii (indicative of frowning) (Cacioppo *et al.*, 1986). These responses can be recorded via fEMG measurements during the presentation of visual (motive-relevant) cues in the lab. It has been shown that such fEMG measurements possess incremental validity in predicting real-life behavior over and above self-rated measures of affiliative motivation (Dufner *et al.*, 2015).

Despite their relevance to personality, affective contingencies have not been studied in association with psychopathic traits [2]. Exploring positive (hedonic) and negative (aversive) reactions to stimuli depicting interpersonal affiliation and antagonism may help elucidate the underlying motive dispositions for affiliation and antagonism as they relate to psychopathy. In addition, this allows disentangling affiliative and antagonistic dispositions unlike the self-reported and behavioral indices described above. If some individuals automatically react more positively than others to affiliation cues, indicating an underlying motive disposition toward affiliation, then these individuals might be more motivated to seek contexts wherein they can interact positively with others. In contrast, if individuals automatically react more positively (or less negatively) than others to antagonism cues, they are more likely to seek out those contexts where they can compete for resources. The present study investigated associations between psychopathic traits and motive dispositions (operationalized as affective contingencies) toward affiliation and antagonism. Based on findings that motives that lead people to maintain prosocial behaviors and refrain from antagonistic behaviors (e.g. affiliation) are less prominent in psychopathy (Glenn *et al.*, 2017; Sherman and Lynam, 2017), we considered it plausible that psychopathic traits would be related to lower positive affective reactivity to affiliative cues and lower negative affective reactivity to antagonistic cues, as evidenced by their spontaneous facial reactions.

The present study

The current was the first study to investigate motivational correlates of psychopathy employing direct (self-reports) measures, behavioral indices (laboratory task) and physiological assessment (fEMG) of motive dispositions. We hypothesized that higher scores on self-reported psychopathic traits would be negatively associated with scores on self-report measures of affiliation and intimacy motives. With regard to the social discounting task, we expected that higher levels of psychopathic traits would be related to the tendency to discount social closeness when deciding to share resources. Finally, in attempting to extend previous findings, this study was the first to use fEMG assessment as a means to capture individual differences in motive dispositions associated with psychopathic traits: motive dispositions toward affiliation and antagonism. In the lab, we presented participants with stimuli indicative of affiliation and antagonism while assessing their spontaneous facial reactions via fEMG, to assess positive (i.e. zygomaticus muscle) or negative (i.e. corrugator muscle) affective reactivity. Based on the hypothesis that higher self-reported levels of psychopathic traits would be linked to a lower affiliation motive, we expected them to be negatively associated with zygomaticus reactivity (indicative of positive affect) in response to affiliative stimuli. In contrast, higher scores on self-reported psychopathic traits were expected to tap into a lower aversion to antagonism, so we expected them to be negatively associated with corrugator reactivity (indicative of negative affect) in response to antagonistic stimuli. Based on the same stimuli and as an additional measure of affective responsivity, next to the EMG assessments, participants completed self-reported assessments of affect. Hypotheses were preregistered (see preregistration document). Additional analyses beyond the preregistration plan are explicitly mentioned in the results section. These were multilevel analyses that were conducted, to control for within-person random effects relevant to the multiple fEMG measurements.

Method

Participants and procedures

Participants were undergraduate psychology students at a Dutch university offering Dutch- and English-taught bachelor's programs. In total, 131 participants were tested in the lab (see preregistration), of whom 125 had complete responses for all parts of the study (online and lab) and eventually comprised the study's sample ($N = 125$, $M_{age} = 20.97$, $SD = 2.45$, 68.33% females). In the study preregistration, power analyses suggested that a sample size of 95 participants yielded sufficient power (i.e. 80) to capture associations of a magnitude $r = 0.25$, at $\alpha = 0.05$. These are close to the average effect sizes reported in social/personality psychology (average $r = 0.24$, see Richard *et al.*, 2003). Power analyses with 1000 Monte Carlo simulations suggested that this sample size also yielded sufficient power (i.e. 100%, $\alpha = 0.05$) to detect modest effect sizes (0.01) of image type and psychopathy main effects, and of image type $\times$ psychopathy interaction effects in multilevel within-between-subjects analyses of muscle activity (see Online Supplementary Material). Course credit was offered for participation. All study procedures were approved by the local university [blinded for review] Ethics Review Board (protocol no. EC-2017.04) [3].

Participants enrolled in the study by responding to an advertisement of the research on the university research portal. Information about the content and the goals of the study was provided, as well as the possibility for debriefing upon request. Data were collected over two consecutive academic years between 2017 and 2018. First, participants were asked to complete questionnaires online. After completing the online questionnaires, the participants were invited to the lab. During the lab sessions, the social discounting task and fEMG assessments were conducted. The social discounting task was completed prior to the fEMG assessment. An experimenter and research assistants of both genders and of approximately the same age as the participants were present. Participants were greeted

and asked to take a seat in the testing room and were monitored through a one-way mirror that connected the testing room to the control room (where the experimenters were). The testing room was well-lit, with minimal setting including a comfortable chair and a desk with a computer screen. To avoid demand characteristics as much as possible, participants were told that skin conductance was being assessed. The fEMG measurements were followed by a self-report measure of affective valence while the stimuli were presented again on the computer screen, as described below (see fEMG assessments section).

Self-report measures

Psychopathic traits. Psychopathic traits were assessed using two measures based on both Hare's four-facet model (Hare, 2003) and Patrick's triarchic model (Patrick *et al.*, 2009) to investigate generalizability across instruments (which can have idiosyncratic content). Both measures provide total and subscale scores. Our preregistered hypotheses were based on total scores because we were interested in associations with psychopathy overall rather than specific dimensions within the broader construct of psychopathy. However, to further elucidate which dimensions may be driving the associations, we also conducted exploratory follow-up analyses at the subscale level. In the interest of space, we present the findings with total scores in the main text and briefly discuss any differences in results based on subscale analyses, which are presented in detail in the Online Supplementary Tables S1, S2 and S3 (Drislane *et al.*, 2014 for a similar analytic approach).

Participants completed the *Self Report Psychopathy–Short Form* (SRP-SF; Gordts *et al.*, 2017), as conceptualized by Hare's (2003) Psychopathy Checklist–Revised model, which provides total scores and scores on four facets: interpersonal, affective, lifestyle and antisocial. The short version consists of 29 items, scored on a 5-point Likert-scale (1 = *strongly disagree* to 5 = *strongly agree*). Internal consistency of SRP-SF total scores was $\alpha = 0.90$. The *Triarchic Psychopathy Measure* (TriPM; Patrick, 2010) is a 58-item self-report scale, each item being scored on a 4-point Likert-scale, (0 = *false* to 3 = *true*). It provides scores on three scales: Boldness, Meanness and Disinhibition and a total score. Internal consistency of the TriPM total scores was $\alpha = 0.87$.

Self-reported motives. As indices of affiliation motive, we used the affiliation and intimacy scales from the Unified Motive Scales (UMS-10; Schonbrodt and Gerstenberg, 2012). The scale was developed based on item response analyses of other motive scales. Affiliation and intimacy were measured through 20 items, and responses were provided on a 6-point Likert-scale, ranging from 0 = *not important to me* to 5 = *extremely important to me*. Internal consistency coefficients were $\alpha = 0.83$ for the Affiliation scale and $\alpha = 0.81$ for the Intimacy scale.

Self-reported affective reactions. After the EMG recordings, the same set of stimuli was presented again to the participants, who were asked to report their affective reactions. These assessments served as an additional – to the physiological – measure of affective responsivity. For the first year of data collection, participants rated how positive or negative their affective reactions were while watching the pictures (ranging from 1= *very negative* to 5= *very positive*) by responding to one item per stimulus type. For the second year of data collection, participants completed the Positive and Negative Affect Schedule (Watson *et al.*, 1988), wherein positive and negative affect were measured with 10 items each. Responses could range from 1 = *very slightly/not at all* to 5 = *extremely*. We computed total scores for positive affect and negative affect and then subtracted negative from positive affect scores to create one total value for valence, with higher values corresponding to a more favorable ratio of positive vs. negative affect.

Laboratory tasks

Social discounting task. In accordance with Sherman and Lynam (2017), a social discounting task (Jones and Rachlin, 2006) was administered to measure behavioral indicators of communal motivation and value attributed to relational closeness. Participants were instructed to identify people they considered as closest to most distant and write the names of the chosen people on five concentric circles, each representing the level of social closeness (two names per circle). For each of the 10 names listed, participants responded to nine items on which they had the option to either (A) receive a given hypothetical monetary amount for themselves (from €155 to €75) or (B) receive for themselves €75 and give the listed person €75. Furthermore, the "crossover point" for each participant was defined as the point where they changed from option (A) to the entirely prosocial option (B). The relationship between the undiscounted values and discounted values is described by the equation $v = \frac{V}{(1+sN)}$ (Rachlin and Raineri, 1992), with v and V representing the discounted and undiscounted value of the monetary amount allocated to the other person, respectively, s the social discounting rate and N the level of social closeness. By fitting data resulting from different values of N, the discounting rate s can be estimated. For each participant, higher s values indicate a stronger tendency to discount outcomes allocated to others of decreasing levels of social distance (higher s corresponds to less altruistic tendencies).

Facial electromyography assessments. We recorded muscular activity of the zygomaticus major and the corrugator supercilii in response to motive-relevant stimuli to indirectly assess motive dispositions. In order for the electrodes to obtain a stable baseline signal, participants were initially presented with two relaxing pictures (depicting a lake and a mountain scenery) for 8 s. As experimental stimuli, we presented 15 affiliative pictures, 15 antagonistic pictures and 12 control/neutral pictures (e.g. pictures of people in an office/supermarket). Affiliative stimuli depicted positive interactions between friends, couples, coworkers or family members (for the validation study of affiliative and control stimuli, see Dufner *et al.*, 2015). Antagonistic stimuli depicted competitive interactions, quarrels and disputes (e.g. people competing against each other, fighting or arguing). Each picture was preceded by a fixation cross (for 1,000 ms) and shown for 4,000 ms. Pictures were presented in randomized order.

Following Dufner *et al.* (2015), we extracted and analyzed the muscular activity between 1,001 ms and 4,000 ms of picture presentation [4]. Data was filtered (Van Boxtel, 2010), rectified and aggregated across each second. We used two-step approach to normalize the data, to remove the influence of confounding factors, such as thickness of skin, on EMG records (for detailed technical and data preprocessing description, see Online Supplementary Material). Because EMG responses were recorded over multiple occasions, the intraclass correlation (i.e. ICC) was computed as the indicator of reliability (equivalent to Cronbach's α). The ICC of zygomaticus activity was 0.56, and the ICC of corrugator was 0.62, comparable to previous research (Dufner *et al.*, 2015).

Results

In the following sections, we first report the results of the analyses that were preregistered. Then, we report the results of additional analyses that were conducted to account for the multilevel nature of the data, to examine within-person differences.

Zero-order correlations

Means, standard deviations and results of (two-tailed) correlation analyses are presented in Table 1. Correlation analyses provided partial support to our hypothesis that psychopathic traits would be negatively associated with the self-reported affiliation and intimacy motives.

More specifically, both psychopathy measures were negatively associated with the intimacy motive, but this association was significant only for the TriPM. No significant associations emerged between psychopathic traits and self-reported affiliation.

Our hypothesis that psychopathic traits would be associated with more selfish choices (i.e. tendency to share less) in the social discounting task was only partially supported. No significant associations emerged between the social discounting rates (s) and either psychopathy measure. However, both psychopathy measures were negatively associated with the undiscounted rate (V), indicating less willingness to share even with a person of maximum closeness (i.e. $N = 0$ in the equation above), although also in this case the association was significant only for the TriPM total score and, at the subscale level, for the SRP-SF Lifestyle subscale (see Online Supplementary Table S1).

Finally, our hypotheses that psychopathic traits would be negatively associated with zygomaticus reactivity toward affiliative stimuli and negatively associated with corrugator supercilii reactivity toward antagonistic stimuli were not supported. In response to affiliative and antagonistic stimuli, zygomaticus muscle activity and corrugator muscle activity were not significantly correlated with the two psychopathy measures. No significant associations were found also on the subscale level, except for the SRP-SF Affective scale, for which a significant and positive association emerged with zygomaticus muscle activity toward antagonistic stimuli (see Online Supplementary Table S1). Similarly, no significant associations emerged between the two psychopathy measures and the self-reported affective valence of the presented stimuli.

Taken together, our analyses provided partial support to our hypotheses. First, we found a negative association between psychopathic traits and self-reported motivation toward intimacy, although this association was significant only for the TriPM. Second, we found an association with performance in the social discounting task, where again only the TriPM was significantly associated with reduced willingness to share resources with close others (in line with the reduced self-reported intimacy motive). In contrast, we did not find correlates of psychopathy in the EMG paradigm.

Multilevel analyses

While the first two hypotheses could only be tested through a between-subject analysis, such an approach fails to account for the within-person random effects pertaining to multiple measurements of physiological (fEMG) reactions to antagonistic and affiliative stimuli. Furthermore, this approach did not allow for a comparative test of reactions to antagonistic versus affiliative stimuli but rather considered them individually. In general, people react more positively to affiliative stimuli compared to antagonistic stimuli, rather than react positively to affiliative stimuli and negatively to antagonistic stimuli. Thus, it was deemed important to investigate the relative reactions to each type of stimuli compared to each other instead of looking at them in absolute terms. For this reason, and to account for between-person variability in overall affective reactivity, the motive dispositions associated with psychopathic traits might be best captured by differences in responses to antagonistic stimuli *compared to* affiliative stimuli. In that sense, antagonistic dispositions of individuals with higher levels of psychopathic traits might not necessarily be revealed by their higher positive affective reactions toward antagonistic stimuli, but rather by a greater difference in their positive affective reactions toward antagonistic vs. affiliative stimuli. Based on this rationale, in the following section we report the results of the multilevel analyses of the relationship between psychopathy and individual differences in motive dispositions in affiliation and antagonism, as measured by fEMG. We note, however, that this data analytic plan was exploratory.

To test the hypotheses concerning indirect measures of affective reactivity, baseline-corrected zygomaticus and corrugator activity responses, averaged across each second,

Table 1 Means, standard deviations (SD) and zero-order correlations with confidence intervals

Variable	M	SD	1	2	3	4	5
1. TriPM	57.83	16.67					
2. SRP-SF	1.77	0.50	0.67** [0.56, 0.76]				
3. UMS-AFF	3.77	0.75	0.05 [−0.14, 0.22]	−0.03 [−0.21, 0.15]			
4. UMS-INT	4.19	0.73	−0.25** [−0.41, −0.08]	−0.17 [−0.34, 0.01]	0.31** [0.14, 0.46]		
5. AFF-Valence	0.01	1.00	−0.13 [−0.30, 0.05]	−0.15 [−0.32, 0.03]	0.24** [0.07, 0.40]	0.24** [0.06, 0.40]	
6. ANT-Valence	0.00	1.01	0.09 [−0.09, 0.26]	0.08 [−0.10, 0.25]	0.10 [−0.08, 0.27]	0.07 [−0.11, 0.24]	0.04 [−0.13, 0.22]
7. AFF-Corr	0.01	0.09	0.02 [−0.16, 0.20]	−0.08 [−0.25, 0.11]	0.08 [−0.11, 0.25]	−0.03 [−0.21, 0.15]	0.04 [−0.13, 0.22]
8. ANT-Corr	0.01	0.09	−0.02 [−0.20, 0.16]	−0.09 [−0.26, 0.09]	0.05 [−0.14, 0.22]	−0.01 [−0.19, 0.17]	0.06 [−0.12, 0.23]
9. AFF-Zygo	−0.04	0.12	0.05 [−0.13, 0.23]	0.11 [−0.07, 0.28]	0.04 [−0.14, 0.22]	−0.02 [−0.20, 0.16]	0.00 [−0.17, 0.18]
10. ANT-Zygo	−0.05	0.12	0.13 [−0.06, 0.30]	0.17 [−0.01, 0.34]	0.05 [−0.13, 0.23]	−0.02 [−0.20, 0.16]	−0.12 [−0.29, 0.05]
11. Undiscounted Value	90.94	19.81	−0.20* [−0.37, −0.02]	−0.16 [−0.33, 0.02]	−0.04 [−0.22, 0.14]	0.15 [−0.03, 0.33]	0.03 [−0.15, 0.20]
12. Discounting Rate	0.09	0.17	−0.06 [−0.24, 0.12]	0.01 [−0.17, 0.19]	0.07 [−0.11, 0.25]	0.08 [−0.10, 0.25]	0.03 [−0.15, 0.20]

Notes: AFF-Valence: self-rated emotional valence toward affiliative pictures; ANT-Valence: self-rated emotional valence toward antagonistic pictures. AFF-Corr: average corrugator muscle activity (per person) toward affiliative pictures; ANT-Corr: average corrugator muscle activity (per person) toward antagonistic pictures; AFF-Zygo: average zygomaticus muscle activity (per person) toward affiliative pictures; ANT-Zygo average zygomaticus muscle activity (per person) toward antagonistic pictures; Undiscounted Value: V hypothetical monetary amount shared. Discounting Rate: s social discounting rate for the EMG measurements; the responses were averaged across per participant and partialed out the baseline responses (i.e. the EMG activities of the certain *M* and *SD* are used to represent mean and standard deviation, respectively). Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < 0.05$. ** indicates $p < 0.01$

Source: Created by authors

(*continued*)

Table 1

Variable	6	7	8	9	10	11
1. TriPM						
2. SRP-SF						
3. UMS-AFF						
4. UMS-INT						
5. AFF-Valence						
6. ANT-Valence						
7. AFF-Corr	−0.02 [−0.19, 0.16]					
8. ANT-Corr	−0.05 [−0.22, 0.13]	0.96** [0.95, 0.97]				
9. AFF-Zygo	0.13 [−0.04, 0.30]	0.14 [−0.04, 0.31]	0.08 [−0.09, 0.26]			
10. ANT-Zygo	0.18* [0.01, 0.35]	0.07 [−0.11, 0.24]	−0.00 [−0.18, 0.18]	0.93** [0.90, 0.95]		
11. Undiscounted Value	−0.12 [−0.29, 0.05]	0.09 [−0.09, 0.26]	0.16 [−0.01, 0.33]	−0.08 [−0.25, 0.10]	−0.08 [−0.25, 0.10]	
12. Discounting Rate	0.02 [−0.16, 0.20]	0.20* [0.03, 0.37]	0.26** [0.10, 0.43]	0.09 [−0.07, 0.28]	0.06 [−0.10, 0.25]	0.68** [0.57, 0.76]

were entered as dependent variables. The independent variables were the psychopathy total scores (Level 2), the type of pictures (Level 1, i.e. affiliative vs. antagonistic) and the interaction between the two, and effects of these variables were set as fixed effects. Because of the high correlation ($r = 0.67$, 90% $CI = [0.56, 0.76]$) between the TriPM and the SRP-SF total scores, we built separate models, with each of the psychopathy total scores entered as predictor in each model. We specified a random intercept for each participant. The results of the multilevel analyses are reported in Table 2 (fEMG models). We conducted robustness checks by testing these multilevel models controlling for participants' self-rated affiliation and intimacy motives, sex, age and education level. The pattern of results of these robustness-check analyses was unchanged and is presented in the supplementary document (Online Supplementary Table S4).

Overall, participants exhibited significantly lower zygomaticus activity in response to antagonistic stimuli compared to affiliative stimuli. Indeed, in both models (see Table 2, Models 2 and 4), there was a main effect of stimulus type on zygomaticus muscle activity. Importantly, in both models, there was a two-way interaction between stimulus type and psychopathy levels. Participants scoring higher on psychopathic traits (both TriPM and SRP-SF, examined separately) exhibited smaller differences in zygomaticus activity between antagonistic and affiliative stimuli than participants who scored lower in psychopathic traits. On the subscale level, these interactions appeared driven by the SRP-SF Affective and Antisocial subscales, and by TriPM Boldness (see Online Supplementary Tables S2 and S3). A graphical depiction of this interaction effect is displayed in the simple slopes analysis reported in Figures 1 and 2. At low levels of psychopathy ($M - 1SD$ of TriPM and SRP-SF), zygomaticus activity was significantly lower ($b = -0.02$, $p < 0.01$) when viewing antagonistic stimuli compared to affiliative stimuli. By contrast, at high levels of psychopathy ($M + 1SD$ of TriPM and SRP-SF, examined separately), zygomaticus activity was equally high ($b = .00$, $p = 1.00$) when viewing antagonistic and affiliative stimuli (Figures 1 and 2). Taken together, these findings suggest that individuals lower in psychopathic traits tend to react less positively toward antagonism than toward affiliation, whereas individuals higher in psychopathic traits tend to react equally positively toward antagonism and affiliation.

Regarding the analyses on corrugator activity, in Model 1 (see Table 2), there was a main effect of stimulus type on corrugator activity, with participants exhibiting significantly higher corrugator muscle activity in response to the antagonistic stimuli compared to the affiliative stimuli. The rest of the results of multilevel analyses on corrugator activity did not reveal significant interaction effects between psychopathic traits and stimulus type (see Table 2, Models 1 and 3). Taken together, these results suggest that participants had stronger aversive reactions toward antagonistic than affiliative stimuli. However, no differences in the intensity of these negative affective reactions to antagonism and affiliation stimuli occurred as a function of psychopathic traits levels. Notably, results remain unchanged on the subscale level (see Online Supplementary Tables S2 and S3).

Discussion

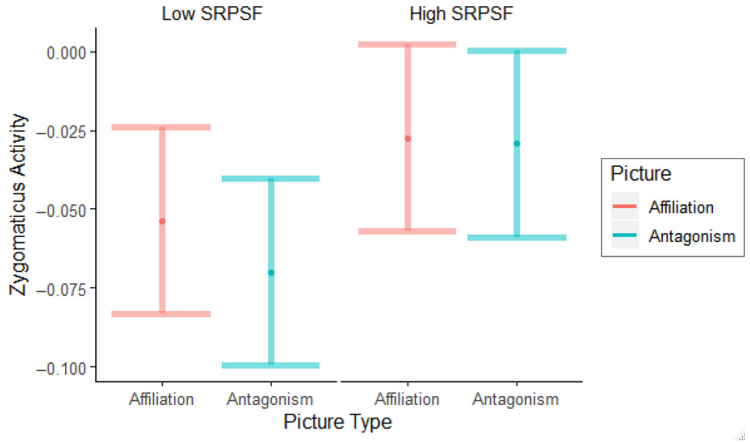
The current study used a novel, multimethod design combining self-reports, behavioral task and fEMG in an effort to replicate and extend findings on the motivational correlates of psychopathy, with special emphasis on affiliation and antagonism. We initially aimed to replicate findings on associations between psychopathy and low affiliation measured with self-report and behavioral indices and then focused on motive dispositions, operationalized as affective contingencies in reaction to affiliative and antagonistic stimuli (fEMG). We thus investigated the possibility that individuals with higher levels of psychopathic traits dispositionally derive less pleasure from affiliation and less aversion from antagonism. In the following, we discuss results obtained with all three methods of testing our hypotheses. Importantly, the current was a first test of this combination of methods, and our results were

Table 2 The effects of the types of the stimuli and the sum scores of self-reported psychopathic traits on participants' EMG responses

Model 1: TriPM on corrugator muscle responses			*Model 2: TriPM on zygomaticus muscle responses*			*Model 3: SRP-SF on corrugator muscle responses*			*Model 4: SRP-SF on zygomaticus muscle responses*		
Random effects	Variance	SD	Random effects	Variance	SD	Random effects	Variance	SD	Random effects	Variance	SD
Subject	0.01	0.09	Subject	0.01	0.12	Subject	0.01	0.09	Subject	0.00	0.11
Fixed effects	*Estimate (S.E.)*	*Sig.*	*Fixed effects*	*Estimate (S.E.)*	*Sig.*	*Fixed effects*	*Estimate (S.E.)*	*Sig.*	*Fixed effects*	*Estimate (S.E.)*	*Sig.*
Antagonistic (vs. Affiliative)	0.01769 (0.00089)	*0.045*	Antagonistic (vs. Affiliative)	−0.04054 (0.01229)	*<0.01*	Antagonistic (vs. Affiliative)	0.00835 (0.00895)	0.35	Antagonistic (vs. Affiliative)	−0.03496 (0.01248)	*<0.01*
TriPM	0.00014 (0.00052)	0.79	TriPM	0.00034 (0.00065)	0.60	SRP-SF	−0.01366 (0.01701)	0.42	SRP-SF	0.02623 (0.02136)	0.22
Antagonistic * TriPM	−0.00024 (0.00015)	0.10	Antagonistic * TriPM	0.00055 (0.00020)	*<0.01*	Antagonistic * SRP-SF	−0.00267 (0.00486)	0.58	Antagonistic * SRP-SF	0.01462 (0.00677)	*0.03*

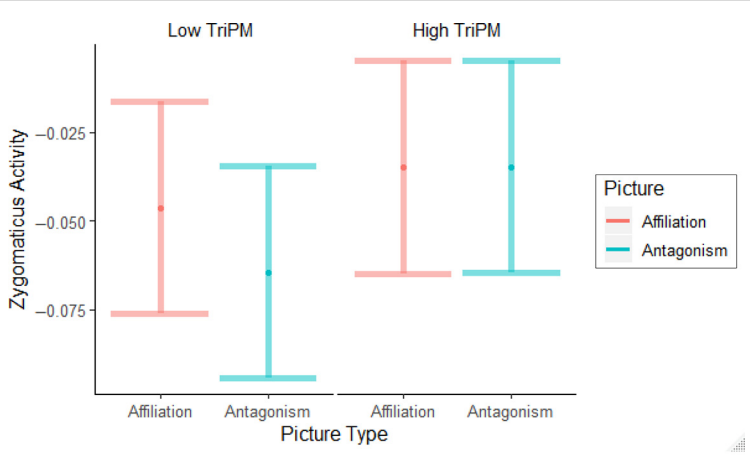
Notes: Antagonistic (vs. Affiliative) is a dummy variable indicating the type of the stimuli (0 = affiliative stimuli; 1 = antagonistic stimuli). The numbers in italics indicate significant effects (i.e. $p < 0.05$)
Source: Created by authors

Figure 1 The effects of the types of the stimuli and the sum scores of self-reported psychopathic traits (TriPM) on participants' EMG responses (bars represent 95% confidence intervals)



Source: Created by authors

Figure 2 The effects of the types of the stimuli and the sum scores of self-reported psychopathic traits (SRP-SF) on participants' EMG responses (bars represent 95% confidence intervals)



Source: Created by authors

mostly unchanged on the subscale level. This was largely the case both for the TriPM and SRP-SF subscales.

When testing associations of psychopathic traits with self-reported affiliation motive, we detected a significant negative association with intimacy and psychopathy as measured with the TriPM, thus providing only partial support to our first hypothesis. This finding suggests that individuals with psychopathic traits have a reduced motivation to seek and maintain relationships with others and specifically to share intimacy with them. It may be that closer bonds (i.e. intimacy) do not motivate psychopathic individuals as much as they

motivate nonpsychopathic individuals. This finding accords well with literature connecting psychopathy to low communion (Sherman and Lynam, 2017) and suggests that psychopathy is linked to reduced intimacy and investment in caring for close others (Ali and Chamorro-Premuzic, 2010; Glenn *et al.*, 2017) rather than to low affiliation more broadly. This intimacy-specific finding is in line with recent evidence (Christian *et al.*, 2019) that psychopathy was related with poorer interpersonal bonding within close (e.g. familial) relationships, but not with lack of relating altogether.

Additionally, the negative association between psychopathy and intimacy motive fits well with our next finding on behavioral indices of antagonism and the reduced motivation to share within intimate relationships. Namely, our hypothesis regarding a positive association between psychopathy and social discounting (*s,* i.e. systematic derogation of value attributed to outcomes allocated to others of decreasing social closeness) was not supported by our data. Instead, we found a significant positive association only when looking into sharing with closest others. Thus, in line with the findings obtained with self-reported motivation, psychopathy seemed related to limited communal orientation toward close others in particular (akin to intimacy) rather than more broadly with others. In line with the findings on self-reported motivation, this relationship was again significant for the TriPM only. The results regarding the behavioral measure are thus not fully in line with findings from one previous study that has examined relations between psychopathy and performance on the social discounting task (Sherman and Lynam, 2017) and with studies on other behavioral tests of sharing and altruism, although these latter studies did not examine the dependency of altruistic behavior on the level of closeness with others (Curry *et al.*, 2011; Mokros *et al.*, 2008).

This lack of significant association with behavioral indices of communal motivation should be interpreted with caution and calls for further empirical testing. At the same time, the fact that in our sample it was the TriPM that revealed significant associations with both self-rated and behavioral measures of antagonistic motivation merits attention. It may be that the content coverage of TriPM (and in particular meanness) includes more emphasis on overt antagonism (Patrick, 2018; Roy *et al.*, 2020) and captured connections with the opposite of antagonism, i.e. more intimate aspects of affiliation. However, because the coefficients (of the associations of intimacy with SRP and TriPM) are not very different in size, this difference could also be attributed to chance and should be replicated by future studies.

The third method we implemented aimed to assess motive dispositions through affective reactions to motive-relevant stimuli using fEMG. In particular, we sought to investigate the affective underpinnings of the dispositional propensity toward affiliation and antagonism by assessing automatic affective reactions to affiliative and antagonistic cues through fEMG. The correlational analyses did not provide support to our hypotheses because fEMG scores did not correlate with psychopathy scores. Conducting multilevel analyses, wherein we accounted for the within-person variation random effects pertaining to multiple measurements and considered dispositions toward affiliation and antagonism as *relative* to each other rather than in *absolute* terms, we did find intriguing differences between individuals with high and low levels of psychopathic traits.

Specifically, results of multilevel analyses revealed that overall, participants exhibited facial muscular activity indicative of enjoyment (zygomaticus activity) toward affiliative cues. That accords well with universalist theories (Baumeister and Leary, 1995) and previous research (Dufner *et al.*, 2015) on the intrinsically satisfying effects of affiliative experiences. In addition to that, we found that zygomaticus activity was, overall, lower in response to antagonistic stimuli compared to affiliative stimuli. This finding adds to the aforementioned literature on the general human tendency to enjoy affiliative experiences by extending it from absolute value terms (between persons) to the relative difference emerging when comparing the enjoyment derived from cues relevant to different motives, in this case, affiliative and antagonistic (within persons). Notably, this pattern of relative positive affective

automatic reactions did differ as a function of psychopathic traits. Individuals lower in psychopathic traits tended to react less positively toward antagonism than toward affiliation, whereas individuals higher in psychopathic traits tended to react equally positively toward antagonism and affiliation.

It thus seemed that although the affective reactions of individuals low in psychopathy show a pattern in line with the universal human tendencies of enjoying affiliation, as well as the currently revealed – overall – greater enjoyment of affiliation compared to antagonism, this was less the case for individuals high in psychopathy (both SRP-SF and TriPM). This suggests that individuals high in psychopathy experience affiliative and antagonistic cues as equally enjoyable and, thus, they might be more motivated to endorse antagonistic tendencies. The observed differences are in agreement with empirical evidence on individual differences in motive dispositions towards affiliation (in that although most individuals dispositionally enjoy affiliation, some do so more than others; Dufner *et al.*, 2015). Additionally, our findings are in line with previous research on psychopathy and inverted social reward (Foulkes *et al.*, 2014), wherein lower self-reported enjoyment of altruistic and positive interactions was found for individuals with higher psychopathy scores. Similar findings (Waller *et al.*, 2020) showed lower self-reported sensitivity of individuals with higher psychopathy scores in reaction to positive and prosocial transactions. Our findings also offer preliminary evidence for motive dispositions in antagonism. Importantly, these findings were consistent across psychopathy measures and survived robustness checks, in which we controlled for participants' self-rated affiliation and intimacy motives, age, gender and education level.

According to earlier findings on affective contingencies, people who enjoy affiliation more tend to act in a more affiliative manner (Dufner *et al.*, 2015). It thus seems that the tendency of individuals higher in psychopathy to be less prosocial and altruistic and behave in an antagonistic manner could be related with the fact that they enjoy it equally, on an implicit level. Our findings are novel in demonstrating individual differences in antagonistic motivation as measured by affective contingencies. Importantly, self-reported affective reactions to affiliative and antagonistic stimuli did not reveal significant associations with psychopathy measures. Thus, it appears that individuals with higher levels of psychopathic traits have a greater dispositional tendency to derive pleasure from antagonistic stimuli even if they do not self-report the experience of positive affect in reaction to antagonistic stimuli.

Finally, it is worth noting that corrugator activity, as an indicator of negative affective reactivity, did not reveal any motivational correlates. It might be that affiliation and antagonism motive-relevant systems are more sensitive to hedonic, rather than contra-hedonic automatic processes. That is in agreement with theoretical and empirical evidence on the hedonic affective underpinnings of motivation measured as positive affective reactions (Dufner *et al.*, 2015; Schonbrodt and Gerstenberg, 2012). Importantly, in our preregistered hypotheses, we expected that psychopathic traits would be associated with reduced positive reactions to affiliation and reduced negative reactions to antagonism. The revealed patterns depict something different: the hedonic affective core of affiliation and antagonism motives for higher in psychopathy individuals seemed to be equally strong when captured as automatic affective reactions (i.e. dispositions). It might also be that more psychopathic individuals could be more motivated by/sensitive to reward than aversion automatic reactions.

Conceptual and practical implications

The current findings have conceptual and practical implications. Regarding the former, our results are partly convergent with empirical and conceptual accounts of psychopathy proposing the relevance of antagonism (for an overview, see Vachon, 2019). That was partly evident in self-reported motivation and motivated behavior, but more prominent on a motive disposition level, as captured by affective contingencies. Our findings suggest that the antagonistic tendencies that characterize psychopathy may involve more than low affiliation, extending to a marked antagonistic motivation. In this context, the pattern of

results supports the added value of multimethod assessments of motivational correlates in psychopathy. Indeed, psychopathic individuals may lack the insight or the willingness to self-report, and more indirect measures can uncover dispositional tendencies that would otherwise go unnoticed. Measures of implicit, spontaneous and unconscious affective reactions seem to be valuable in assessing motives and personality (Dufner *et al.*, 2015). Additionally, implicit measures could circumvent biases of self-reported motivation pertaining to faking, self-perception and social desirability which can, also, be of interest when interviewing offenders or predicting violent offences. This adds to literature using indirect measures to assess personality-relevant antisocial tendencies; for example, interest for physical danger was predictive of violent behavior (Hoskin and Liftawi, 2022) and heightened perceptions of vulnerability based on audio-less videos of women who appeared less confident and autonomous to the sample (Stewart *et al.*, 2022).

Our approach builds on frameworks of personality traits in terms of individual differences in dispositional reactions toward contextual cues (Denissen and Penke, 2008; Mischel and Shoda, 1995). Future research can elucidate these if-then contingencies in psychopathy even further, as well as in other personality constructs and pathologies. Finally, our findings are in line with recent advances in the psychopathy literature that move from a deficit perspective to a motivational perspective (Garofalo and Neumann, 2018; Glenn *et al.*, 2017; Groat and Shane, 2019; Jonason and Ferrell, 2016; Jonason and Zeigler-Hill, 2018; Shane and Groat, 2018; Spantidaki Kyriazi *et al.*, 2020). According to the latter perspective, abnormalities in emotional [5] or cognitive functioning, as well as other maladaptive behavior typically ascribed to psychopathy, may stem not only from limited *ability* but also from limited *motivation*. The current results add to this perspective by highlighting possible motivational underpinnings of psychopathy.

Shifting the focus from what might be lacking in psychopathy to what actually motivates can be not only a promising focus of future research but also a starting point of interventions, if replicated in clinical samples. Investigating what it is that psychopathic individuals do value and what they experience as hedonically rewarding may contribute to a better understanding of psychopathy. To achieve this shift, we need to better understand what is automatically experienced as rewarding and enjoyable in psychopathic individuals. This information can be implemented in developing clinical interventions in which the focus would be on increasing hedonic investments in prosocial, moral, altruistic experiences (in terms of emotions, motivated behavior and motive dispositions) and can inform research on cultivating and maintaining of social climates in prisons and forensic settings that match the populations' characteristics and are therefore more efficient (Bennett and Shuker, 2018).

Limitations and directions for future research

Despite the strength of a multimethod design and the implemented novel approach, the current findings should be viewed in light of the study limitations. The pattern of our results across methodologies indicates that more implicit aspects of motivation may be captured via indirect measures rather than direct, explicit measures. That said, we would strongly encourage future research to replicate these results across methodologies. Given our effect sizes, one limitation may have been the sample size, which provided sufficient power for within-between subjects analyses but was on the low side for between-subjects analyses. Further, replication in more demographically diverse and also clinical samples is warranted to increase generalizability and inform interventions. Importantly, future research would benefit from comparisons among forensic and nonforensic samples in studying psychopathy correlates and, in particular, in population-sensitive analyses and interpretations (e.g. latent profile analysis), as well as in samples dwelling from university students (Boduszek *et al.*, 2021). Additionally, we detected heightened enjoyment of antagonism for individuals higher in psychopathy, even though engaging in antagonistic

and less prosocial behaviors can lead to adverse consequences in terms of poor interpersonal outcomes and/or legal repercussions. It is thus worth delving deeper into what makes antagonistic interactions equally enjoyable with affiliative for higher in psychopathy individuals (vs. lower in psychopathy). This calls for rigorous empirical testing, involving noncommunal motives that were not addressed in the present investigations, namely, dominance and power (Jonason and Ferrell, 2016). Also, additional methodologies might be useful additions to the three methodologies we used, for example longitudinal, experience sampling method and further lab observations. These additional methods could shed light on the within-person dynamics that perhaps make antagonistic interactions more rewarding for psychopathic individuals.

Conclusions

The current study provided empirical evidence of antagonistic motivational correlates of psychopathy that were partly evident in self-reported motivation and motivated behavior observed in the lab, but more prominent on a dispositional level (i.e. physiologically measured automatic affective reactions [fEMG]). These findings highlight the importance of multimethod assessments of motivational correlates in psychopathy, and particularly, of psychophysiological assessments, as direct and indirect measures offer a different angle of capturing motivation. It appears that psychopathic individuals equally enjoy interpersonal orientations under the umbrella of both antagonism and affiliation, and this is perhaps what makes them less inclined to be prosocial and altruistic. This focus adds to the literature on motivational underpinnings of psychopathic personality and could illuminate possible developmental trajectories and/or contexts that foster nonprosocial endorsements in psychopathic individuals. Identifying pathways that may strengthen positive contingencies between psychopathic traits and antagonistic tendencies may be of great theoretical and clinical value and have implications for forensic and penal practices.

Notes

1 The Interpersonal Circumplex framework offers an integrative conceptualization of motives, traits and behavior in a two-dimensional model, with four poles, a combination of which represents interpersonal styles: submissiveness vs. dominance and affiliation vs. disaffiliation (see Wright, 2019).

2 Psychopathy research thus far has not used fEMG to measure motive dispositions, but fEMG has been aptly used to measure mimicry, emotion contagion or empathy (e.g. Herpertz *et al.*, 2001; Patrick *et al.*, 1993; Wilhelm *et al.*, 2018).

3 Importantly, taking into account that the sample consisted of university students, we made sure that participants would be able to quit the experiment at any given moment if any level of discomfort would be experienced. Given the nature of the pictures, we were mostly concerned about the reactions to antagonistic stimuli when designing the current methodology and when applying for ethical approval. Research assistants were always available, as well as the option to be debriefed by the principal investigator.

4 Within this timespan, differences of muscle reactivity to stimuli vs. baseline reactivity are more pronounced according to prior research (Dufner *et al.*, 2015).

5 There is preliminary evidence of motivated emotion regulation in psychopathy and specifically that psychopathic traits are associated with negative other-directed emotions, like anger, as desired affective states which is in line with antagonistic motivation (Spantidaki Kyriazi *et al.*, 2020).

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Supplementary material

The supplementary material for this article can be found online.

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