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Responses to Dominance Challenge Are a Function of Psychopathy Level: A Multimethod Study

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This study assesses the relationship between psychopathy and dominance, both as a trait level and in 2 interpersonal contexts. Following the interpersonal circumplex model, we expected that interacting with a dominant interviewer would reduce dominance displays by low psychopathy participants (interpersonal complementarity) but might increase such displays in those with higher psychopathy (anticomplementarity). Psychopathic traits and dominance were assessed in a community sample ($N = 91$) using multiple dominance indicators: self-reported overall dominance level, job preference, dominance displays observed during identical interviews with a subordinate and dominant interviewer, and baseline and postinterview measures of personal space and testosterone level. Psychopathic traits were positively related to dominance on both trait measures and in the interviews. As a trait, higher self-reported psychopathy scores were associated with higher levels of self-reported dominance and preference for supervisory job positions. Higher Factor 1 psychopathy scores were associated with increased dominance display in interaction with the dominant interviewer. Higher Factor 2 scores were associated with allowing the dominant interviewer to approach more closely (reduced physical distancing). Psychopathy was partly related to a delayed increase in testosterone levels after interaction. Psychopathic traits may include a general tendency to dominate, a tendency which increases when interacting with a dominant other. The emotional/interpersonal psychopathy factor is specifically related to increased dominance displays when interacting with a dominant individual, while the behavioral factor of psychopathy is related to reduced physical distancing of a dominant partner. At higher psychopathy levels the general rule of dominant-subordinate reciprocity during social interaction is reversed.

Keywords: psychopathy, dominance, interpersonal behavior, personal space, testosterone

Psychopathy is a personality constellation characterized by deficits in emotional function and antisocial behavior. The emotional and interpersonal dimension (Factor 1), includes reduced empathy and guilt, shallowness, and narcissism, and is referred to as the core personality feature of psychopathy. “Primary” psychopaths also show low levels of anxiety and deficits in fear conditioning (Lykken, 1957; Skeem, Johansson, Andershed, Kerr, & Louden,

2007). Behavioral aspects (Factor 2), like early conduct disorder and criminal versatility, reflect an unstable and antisocial lifestyle (Hare, Hart, & Harpur, 1991; Harpur, Hare, & Hakstian, 1989). Taxometric studies suggest that psychopathy is a dimensional construct existing on a continuum, rather than a qualitatively distinct category (Edens, Marcus, Lilienfeld, & Poythress, 2006; Guay, Ruscio, Knight, & Hare, 2007). Accordingly, psychopathic traits have been linked with increased violence in both noncriminal (Vitacco, Neumann, & Pardini, 2014) and criminal (Walters, Knight, Grann, & Dahle, 2008) samples.

Psychopaths’ propensity to violence has been attributed to deficits in inhibitory self-control, or to lacks in empathy and fear (Blair, 2003, 2005, 2010). However, excessive motivation for social dominance may also play an important role. Recent literature views dominance motivation as a drive to gain control over resources, situations and people using strategies like coercion and aggression (Johnson, Leedom, & Muhtadie, 2012). It has been argued that “fearless dominance” is a major psychopathic trait (Ross, Benning, Patrick, Thompson, & Thurston, 2009). A dominance-psychopathy link has, in fact, been empirically indicated by several studies using either self-report (Edens, 2009; Hall, Benning, & Patrick, 2004; Harpur et al., 1989; Hicks, Markon, Patrick, Krueger, & Newman, 2004; Johnson et al., 2012; Rauth-

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mann & Kolar, 2013; Semenyna & Honey, 2015; Verona, Patrick, & Joiner, 2001) or peer ratings (Kosson, Steuerwald, Forth, & Kirkhart, 1997; Rauthmann & Kolar, 2013) in both noncriminal and incarcerated populations.

Self-report measures of dominance are cost effective, may be informative about a person's predisposition to exert dominance across contexts and over long periods of time, and are included in this study to provide comparison with the literature. However, several authors have pointed out the need to move beyond self-report measures whose validity is jeopardized by people's self-serving bias and reliance on cognition-based rather than affect-based self-concept (Johnson & Carver, 2012; Leising, Sporberg, & Rehbein, 2006). Furthermore, psychopathy (Fowler, Lilienfeld, & Patrick, 2009) as well as other personality disorders (Klonsky & Oltmanns, 2002) have been specifically related to inadequate self-insight. Dominance ratings have likewise been shown to correlate with overly positive self-ratings of task performance (Jackson, Stillman, Burke, & Englert, 2007) and social desirability (Mehrabian, 1996). Conversely, more objective behavioral indices of dominance have been underutilized (Bornstein, 2003). Such indices can extend the assessment of dominance from a static, retrospectively reported trait to a more dynamic context.

A behavioral test to assess dominance per se would involve a realistic situation in which dominance motivation might be plausibly evoked by competition (at least implicit) for something of value but in which cues for empathy are minimized as are any direct threats that might elicit anxiety or fear, or hostility/aggression. Thus, our experimental design contrasts subjects' behavior in two interviews for a job that might become available at some later point. The interviews have almost exactly the same format and content, but the first is conducted by an interviewer who behaves in a conspicuously subordinate manner, and the second by an interviewer whose dominance is equally conspicuous. Part of the second interviewer's dominance display is contempt directed to the first interviewer, but not to the subject. Our hypothesis is that individuals with lower psychopathic tendencies will become more subordinate when confronted by the high dominant interviewer, but that individuals with higher psychopathic tendencies will respond to that implicit challenge with greater displays of dominance. We used a male-only sample because men generally exhibit dominance more conspicuously than women (Colarelli, Spranger, & Hechanova, 2006).

Our expectations are informed by the interpersonal circumplex model, which organizes social behavior along two orthogonal axes. The first dimension is affiliation, which is anchored at the extremes by agreeableness versus quarrelsomeness. The second dimension of control/power is anchored by dominance versus submission (Carson, 1969; Leary, 1958). The circumplex model predicts complementarity along the control dimension, implying dominance/subordination reciprocity (i.e., dominant behaviors elicit subordinate behaviors and vice versa; Carson, 1969; Kiesler, 1983). Complementary responses are often preferred because they create both subjective and objective benefits, like increased positive feelings and more liking between the interaction partners (Tiedens & Fragale, 2003) and reaching integrative agreement by creating a hierarchy (Wiltermuth, Tiedens, & Neale, 2015). To the best of our knowledge, there has been no empirical investigation of how psychopathy relates to interpersonal behavior in face-to-face

interactions. The hypothesis that dominance motivation is a key psychopathic trait suggests that increasing psychopathy will be associated with increasing violation of complementarity as psychopaths meet the dominance displays of others with their own displays. In terms of the interpersonal circumplex, we expect that lower psychopathy individuals will demonstrate complementarity, but higher psychopathy individuals will show anticomplementarity.

Methodologically, displays of dominance in social interactions are readily captured on videotape and various approaches to assessing the degree of dominance are available, but there is no "gold standard" measure of behavioral dominance at this time (e.g., Hall, Coats, & LeBeau, 2005). The investigation of personal space presents an additional, more easily quantified approach to assessing the relationship between psychopathy and dominance. Personal space refers to the area maintained around oneself in social interactions (Vieira & Marsh, 2014). A defining feature of this metrically defined boundary, or portable bubble, is that intrusion into it by others causes discomfort (Sommer, 1959). A larger personal space implies less tolerance for physical closeness. Interest has been renewed in the relationship between personal space and dominance, and a meta-analysis suggests that individuals with high dominance tend to have smaller personal buffer space (Hall et al., 2005). Whether personal space fluctuates in interaction with a dominant versus a submissive partner, and how psychopathic traits might influence this relationship is currently unknown. An assessment of personal space by each of the interviewers was included as part of the interview protocol.

Testosterone is a steroid hormone whose pulsatile secretion is influenced by both constitutional and situational factors; its concentration in blood often correlates with dominance. Self-report, observational, and implicit dominance have all been linked with testosterone in both laboratory paradigms and naturalistic settings (Archer, 2006; Archer & Webb, 2006; Grant, & France, 2001; Mazur & Booth, 1998; Schultheiss et al., 2005; Sellers, Mehl, & Josephs, 2007). Testosterone levels are generally higher in men (Read, 1993) and the relationship between testosterone and dominance is more robust in men than women (Dabbs, 1992; Mazur & Booth, 1998). The challenge hypothesis of hormonal response specifically suggests that testosterone level becomes elevated when dominance is challenged or increased through competition but depressed when dominance is reduced by competitive loss. We therefore measured testosterone level before and after interactions.

Overall, the current study was designed to assess and compare multiple tests of the relationship between psychopathy and dominance. We expected that individuals with lower self-reported psychopathic tendencies would become more subordinate when confronted with a high dominant interviewer, but that those with higher psychopathy scores would respond to him with greater displays of dominance. Because of the complexity of this expected behavioral interaction, we included personal space and testosterone measures to see if lower and higher psychopathy were correlated with reduced versus increased personal space and testosterone responses to low and high dominance challenges, respectively. Using a normal sample as baseline, we set out to identify the most sensitive and consistent measures for future use with clinical psychopathic samples.

Method

Materials

Psychopathic Personality Inventory Revised (PPI-R). Psychopathy was assessed using the PPI-R which is a self-report questionnaire assessing personality traits relevant to psychopathy but omits explicitly antisocial behaviors that are more indicative of criminal psychopathy (Lilienfeld & Widows, 2005). The PPI-R consists of 154 items that have to be scored using a 4-point Likert scale (1 = *false*, 2 = *mostly false*, 3 = *mostly true*, and 4 = *true*). Factor analysis has shown that the PPI consists of two main factors; Fearless Dominance (Factor 1) and Self-Centered Impulsivity (Factor 2). Together, seven out of eight subscales of the PPI load on these two scales, that is, Fearlessness, Social Potency, and Stress Immunity; and Machiavellian Egocentricity, Carefree Non-planfulness, Blame Externalization, and Impulsive Nonconformity, respectively (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). Recent evidence suggests that Coldheartedness—indicating affective detachment and meanness—likely represents another important component of psychopathy that is unrelated to Factors 1 or 2 (Berg, Hecht, Latzman, & Lilienfeld, 2015). Satisfactory internal (PPI-R total, $\alpha = .91$; PPI-I, $\alpha = .91$; PPI-II, $\alpha = .89$), construct (correlates ranging from $r = .18$ – $.68$ with other psychopathy measures), and external validity has been reported for PPI-R factors (Uzieblo, Verschuere, Van den Bussche, & Crombez, 2010). Additionally, test–retest reliability proved to be high (PPI-total, $r = .93$; PPI-R I, $r = .91$; and PPI-R II, $r = .90$ Sandler, 2007).

Self-Perceived Social Status Scale (SSSS). Self-reported level of dominance was assessed using the SSSS (Buttermore, James, & Kirkpatrick, 2005). The SSSS incorporates a Dominance (i.e., the use of force and intimidation to attain status) and a Prestige (i.e., status attained through sharing expertise; Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013) subscale both assessed with eight items.¹ Answer options vary from 1 (*strongly disagree*) to 7 (*strongly agree*). Internal reliability has shown to be adequate, Dominance: $\alpha = .82$, Prestige: $\alpha = .81$ (Johnson & Carver, 2012).

Job preference. Participants were asked to select one of three job preferences: (a) a nonsocial, nonsupervising job (i.e., furniture maker, truck driver on long distances, night-time security guard), (b) a job supervising others (i.e., personal manager, head of a department, chief officer in the army), and (c) a social job under the supervision of someone else (i.e., bank employee, teacher in secondary school, nurse). A supervising position is thought to correspond with a dominant personality style, while a position working for someone else is often related to a more subordinate personality (Hollenbeck, Ilgen, Ostroff, & Vancouver, 1987; Trouba, 2009).

Job interview. Both interviewers asked participants to indicate their preferred job. This was followed by a carefully scripted brief interview in which they were questioned to assess suitability for a hypothetical job. They were then asked to explain why they had chosen this position, and what aspects would make them qualified to perform the job, or which aspects would not. Next, participants were given nine hypothetical situations they might confront on their preferred job (e.g., “What would you do if you were a supervisor and there was an insecure employee who un-

derestimated his capacities?”). The interview was specifically developed for the current study. The interviewers were male master psychology students who were trained to play either a subordinate or a dominant role. The subordinate interviewer was instructed to display a constrained and insecure attitude. He acted as if it were the first time he conducted an interview and was unsure about what to do or to say. He spoke softly, hunched in his chair, acted nervous, avoided eye contact with the participant, kept his hands mostly beneath the table, and read the instructions literally from the script. The dominant interviewer was instructed to display a dominant, self-assured, and extraverted interaction style. He talked loudly, looked the participant straight in the eyes, used expansive gestures, held his head up high, and proactively followed and maintained the conversation (e.g., by often nodding or humming when the participant spoke). The designated nonverbal behaviors of the interviewers are empirically established correlates of either dominant or subordinate interaction styles (e.g., Hall et al., 2005; Kalma, 1991; Wiltermuth et al., 2015). The subordinate interviewer was always the same male student. The dominant interviewer was one out of three other male students.

Observer’s ratings of dominance. We used global scores derived from Mehta and Josephs (2010), wherein raters recorded their overall impression of dominance, assertiveness, and confidence. This method was chosen over the extremely time-consuming assessment of specific physical and interactional behaviors (e.g., body openness, number of interruptions), given that the literature is inconsistent about which are true microscopic indicators of dominance and clear scoring systems for these behaviors are lacking (see, e.g., Hall et al., 2005). Three male raters independently watched 166 video fragments of the job interviews (mean duration = 8 min): one where the participant was interviewed by the subordinate interviewer and one interviewed by the dominant interviewer. The raters were psychology students (1 undergraduate and 2 graduates, Mean age = 23, $SD = 2.65$), blind to the study hypotheses. The raters were trained (approximately 6 hr) by two researchers (M.V. and J.L.) who are experienced in rating nonverbal behavior related to social anxiety and narcissism. The raters were trained in group sessions in which video materials were scored together, and scores were compared and discussed. A macrolevel observational scale was used that asked raters to score their general impressions. Participants were rated on their level of dominance using 17 items from Mehta and Josephs (2010). The items were: engaged, bored (reverse scored), leaderlike, energetic, confident, shy/timid (reverse scored), comfortable, assertive, directive, indecisive (reverse scored), dominant, nervous (reverse scored), stumbled over words (reverse scored), masculine, anxious (reverse scored), strong posture, and hesitant (reverse scored). Mehta and Josephs (2010) based their scale on dominance theory and research, suggesting that dominance is characterized by a motivation to gain high status. Items had to be scored on a 7-point Likert scale ranging from *not at all applicable* to *completely applicable*. Intraclass correlation coefficient (ICC; model mixed, type: absolute agreement, average measures) across the three observers was excellent, average ICC = .81.

¹ Future studies are advised to use the Dominance-Prestige scales of Cheng et al. (2013), which excluded two of the original Buttermore items and added three new items, because of its improved psychometric properties.

Testosterone. Salivary testosterone was collected using synthetic salivettes; 3.5 cm long synthetic rolls packaged in conical plastic tubes (Sarstedt, Numbrecht, Germany).

Participants removed the roll, placed it in their mouth and chewed slightly on it for about 120 s until it was fully saturated, at which time it was placed back into the plastic tube. Specimens were frozen at -20°C until analysis. Dresden LabService GmbH (Germany) performed the biochemical analyses using IBL ELISA immunoassays. Mean intra- and interassay coefficients of variation are typically less than 8% and 14%, respectively, and the reportable range is 2–760 pg/mL.

Stop distance procedure. Personal space was assessed with the stop distance procedure (Wormith, 1984). In this procedure participants are instructed to stand still in the middle of a room while the experimenter approaches slowly from a distance of 2 m. Participants are instructed to say “stop” when they begin to feel uncomfortable. The experimenter recorded the distance between him and the participant. The procedure is carried out twice from each of four different start positions (front, right, back, left) and the average of the two trials for each position was used to calculate personal space as follows (Wormith, 1984):

$$\text{Personal space} = \pi \times \frac{1}{4} \times [(\text{front} + \text{behind} + 1) \times (\text{left} + \text{right} + 1)]$$

Early psychometric studies (Hayduk, 1983) showed that the measure had acceptable test–retest reliability ($r = .81$). The participant was first approached in the stop distance procedure by the subordinate interviewer, and then by the dominant interviewer.

Procedure

Participants were either recruited by flyers at Maastricht University, or by having signed onto mailing lists in a previous experiment allowing them to be contacted again. Exclusion criteria were alcohol intoxication on arrival, the presence of a psychotic disorder, and age below 18 or above 65 years. Participants were asked beforehand to avoid drinking alcohol the evening before the experiment and not to eat, drink, smoke, brush their teeth, be physically active, or chew gum for at least 2 hr prior to collection of saliva samples in order to minimize impurities. Upon arrival at the university laboratory, the subordinate experimenter led the participant to the testing room. The participant was provided with a brief outline of the study procedure after which the participant filled out the informed consent form. The experimenter then provided more detailed instructions about how to use the salivettes to donate saliva to assess the level of testosterone. Sampling took place at six different points during the experiment. To become familiar with the procedure of saliva collection, the first sample was introduced as an exercise and was given before the experiment started. The second sample served as the baseline assessment and was given immediately after the first set of questionnaires and before the job interview. The third (Post 1), fourth (Post 2), fifth (Post 3), and sixth (Post 4) samples were given immediately after the second personal space test and 10, 20, and 30 min after the third sample, respectively. As soon as the first salivette was filled, the participant filled out the first set of questionnaires. The administration order of the self-report scales was counterbalanced to control for response bias. After this, the second saliva sample was

given, and the subordinate role player started the job interview. The interview was introduced as a joint project between Maastricht University and several local businesses with the goal of studying relationships between personality characteristics and job preference. Participants were provided with the description of the three job options, followed by the other questions of the job interview. Next, the participant was asked to follow the experimenter to another room, which was sufficiently large to perform the personal space test. This empty room was marked by a 2×2 m square, containing a 30 cm grid. The participant was centered in the center of this square in a 10×10 cm block, and was instructed to remain foot there during the rest of this task. Participants were told that they would be approached from four different directions and that they should indicate the point at which they started to feel uncomfortable. They were instructed to keep their gaze directed straightforward. The experimenter approached the participant from the outside of the outer square in steps of 15 cm with his gaze directed to the ground. He looked up, waited 3 s for the participant to signal, and stopped approaching as soon as the participant signaled he did not want the experimenter to come closer, or continued to approach if the participant gave no signal. Each direction had two trials, in sequence: front, left, behind, right, right, behind, left, front. While the subordinate interviewer performed the personal space test with the participant the dominant role player took a seat in the test room. Upon entering the test room, the dominant interviewer introduced himself to the participant as the test leader and supervisor of the subordinate interviewer. He told the subordinate interviewer in a supercilious way that he had not administered the interview adequately and wondered aloud how he could have gone wrong after so much practice. He announced that, in order to avoid having to exclude the participant from the experiment, he would take over and repeat the interview and personal space test. The dominant interviewer apologized to the participant for the inconvenience and asked if he agreed repeating the exact same interview and personal space test with him as a test leader. Having the two interviewers ask the same questions was intended to equate the cognitive aspect of interaction with the difference being specifically in the dominance. After both tests were redone, the dominant interviewer left the room, and the subordinate interviewer took over again, instructing the participant to fill in the second part of the questionnaires, and continue to collect the saliva sample for the next testosterone assessments. Finally, the participant was asked to describe his idea about the goal of the study, and was debriefed about the true nature of the experiment. They were thanked for their participation, and received course credits or a small financial compensation. This study was approved by the Ethical Committee Psychology at Maastricht University (“Psychopathy and dominance,” Approval No. 114_06_05_2012).

Results

Participants

Ninety-one males participated in this study. Mean age was 29.82 years ($SD = 13.36$, range 18–68). About half of the participants were students (51%), 41.8% were employed, and 2.2% were retired. With respect to educational level, 2.2% completed only primary school, 11% high school or low-level vocational studies, 29.7% secondary education, and 37.4% higher education. The

majority of the sample were Dutch nationals (94.5%); 5.5% were German. During the exit interview, eight participants said that they believed the interviewers were playing a role, so only their self-report (noninteractional) data were used in analyses.

Interviewers' Levels of Displayed Dominance

The level of displayed dominance of the four interviewers (i.e., one subordinate and three dominant) was assessed by the three independent raters, using the item "dominant" from Mehta and Josephs (2010) observer's rater scale. ICC (model mixed, type: absolute agreement, average measures) was acceptable (ICC = .45). Paired sample *t* tests indicated that the dominant interviewers were rated as more dominant than the subordinate interviewer, $M = 5.24$, $SD = .69$, and $M = 1.53$, $SD = .42$, respectively, $MD = 3.31$, $t = 44$, $p < .001$. Analyses of variance (ANOVAs) showed no difference in the level of dominance between the three dominant interviewers, $F(2, 80) = .42$, $p = .66$. Thus, the three dominant interviewers displayed comparable levels of dominance, and all were more dominant than the subordinate interviewer.

Descriptive Results

Table 1 shows the mean scores of the study measures. The levels of psychopathy, self-perceived dominance, and observer's ratings of dominance are comparable to those of previous studies using nonpatients (Johnson, Burk, & Kirkpatrick, 2007; Mehta & Josephs, 2010; Uzieblo et al., 2010). The observed personal space (between 1.27 and 1.44 m²) seems large compared with the 0.3 m² observed by Van Teffelen, Zorjan, and Lobbestael (2017), but is likely attributable to the male-male interaction in the current study (Hayduk, 1983). Regarding job preference, seven participants (8.4%) opted for a nonsocial, noninteractive job; 52 (62.7%) for a position supervising others; and 24 (28.9%) for a position working for someone else.

Table 1
Means and Standard Deviations of the Study Measures

Study measures	Mean (SD)	Range
Psychopathy ($n = 91$)		
Total score	300.25 (32.27)	219–372
Factor 1 (Fearless Dominance)	125.37 (17.94)	78–164
Factor 2 (Self-Centered Impulsivity)	139.60 (20.09)	78–178
Coldheartedness	35.27 (6.53)	20–48
Self-rated dominance ($n = 91$)	3.88 (.95)	1.63–5.75
Self-rated prestige ($n = 91$)	5.01 (.67)	3.50–6.63
Observer's rating of dominance ($n = 83$)		
Subordinate interview	4.53 (.64)	2.31–6.02
Dominant interview	4.66 (.67)	2.25–5.94
Personal space, m ² ($n = 83$)		
Subordinate interview	1.27 (1.03)	<1 cm ² –3.88
Dominant interview	1.44 (1.15)	<1 cm ² –4.99
Testosterone pg/ml ($n = 83$)		
Baseline	56.76 (26.39)	17.13–168.75
Post 1	58.69 (20.23)	26.53–104.14
Post 2	59.47 (22.38)	20.61–125.64
Post 3	58.97 (22.65)	18.34–118.02
Post 4	58.63 (21.85)	20.22–114.60

Relationship Between Psychopathy and Self-Reported Dominance

Zero-order Pearson correlations (Table 2) showed that all psychopathy scores were significantly positively correlated with self-reported dominance, while prestige was related to psychopathy total and Factor 1 scores. Overall, this implies that the higher the level of psychopathy, the higher self-reported dominance.

Relationship Between Psychopathy Score and Choice of Job

Table 3 presents means and standard deviations of psychopathy scores per choice of profession, along with the ANOVA main effects of profession choice and Bonferroni-corrected post hoc group analyses. Findings demonstrated main effects of profession choice on total psychopathy score, psychopathy Factor 1 and 2 scores. Group contrast analyses showed that psychopathy total and Factor 1 and Factor 2 scores were higher among participants opting for a supervisor position compared with participants opting for a nonsocial position, while total psychopathy and psychopathy Factor 1 scores were also higher for those opting for a supervisor position compared with those opting for a job under supervision. These results indicate that psychopathy scores are highest among those participants opting for a supervisor position.

Relationship Between Psychopathy Score and Observer's Rating of Dominance During the Interviews

Pearson correlations (see Table 2) between self-reported level of psychopathy and observer's ratings of dominance showed that the higher the level of psychopathy total and of psychopathy Factor 1, the greater was the dominance participants displayed during interaction with the dominant interviewer. Observed levels of dominance were unrelated to psychopathy in interaction with the subordinate interviewer. Difference scores of dominance in interaction with the dominant interviewer compared with interaction with the subordinate interviewers were significantly positively related to psychopathy Factor 1 scores (Table 4). That is, the higher was the participant's Factor 1 psychopathy score, the greater was the increase in dominance he displayed to the dominant interviewer.

Relationship Between Psychopathy and Personal Space

None of the Pearson correlations between self-reported level of psychopathy and personal space assessed by the subordinate or the dominant interviewer reached significance (see Table 2). Difference scores of personal space in interaction with the dominant interviewer compared with interaction with the subordinate interviewers were significantly negatively related to psychopathy Factor 2 scores (see Table 4). This implies that the lower Factor 2 psychopathy scores, the larger personal space in interaction with a dominant interaction partner compared with with a subordinate partner.

Relationship Between Psychopathy and Testosterone

Pearson correlations (see Table 2) between self-reported level of psychopathy and testosterone levels at the five assessment points

Table 2
Intercorrelations Among Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.88														
2	.75**	.88													
3	.79**	.24*	.88												
4	.45**	.24**	.18	.74											
5	.61**	.37**	.57**	.22*	.84										
6	.28*	.40**	.15	-.17	.75**	.77									
7	.16 ^a	.15 ^a	.07 ^a	.16 ^a	.23 ^{ab}	.23 ^{ab}	.94								
8	.27 ^{ab}	.29 ^{ab}	.10 ^a	.24 ^{ab}	.35 ^{ab}	.34 ^{ab}	.82 ^{ab}	.95							
9	.08 ^a	.14 ^a	.01 ^a	-.009 ^a	.01 ^a	.21 ^{ab}	-.12 ^a	-.01 ^a	.87						
10	-.02 ^a	.15 ^a	-.15 ^a	-.06 ^a	-.05 ^a	.15 ^a	-.01 ^a	.02 ^a	.89 ^{ab}	.90					
11	.13 ^a	.04 ^a	.21 ^a	-.08 ^a	.18 ^a	.12 ^a	-.18 ^a	-.20 ^a	.26 ^{ab}	.10	n.a.				
12	.17 ^a	.13 ^a	.18 ^a	-.04 ^a	.25 ^{ab}	.13 ^a	-.03 ^a	-.07 ^a	.28 ^{ab}	.16	.79 ^{ab}	n.a.			
13	.23 ^{ab}	.13 ^a	.27 ^{ab}	.006 ^a	.31 ^{ab}	.12 ^a	-.03 ^a	-.10 ^a	.18 ^a	.10	.73 ^{ab}	.83 ^{ab}	n.a.		
14	.14 ^a	.03 ^a	.23 ^{ab}	-.09 ^a	.24 ^{ab}	.05 ^a	.03 ^a	-.07 ^a	.09 ^a	.04	.72 ^{ab}	.81 ^{ab}	.83 ^{ab}	n.a.	
15	.16 ^a	.07 ^a	.23 ^{ab}	-.07 ^a	.22 ^{ab}	.03 ^a	-.06 ^a	-.14 ^a	.22 ^a	.12	.66 ^{ab}	.81 ^{ab}	.81 ^{ab}	.87 ^{ab}	n.a.

Note. *N* = 91.1 = psychopathy total; 2 = psychopathy Factor 1; 3 = psychopathy Factor 2; 4 = psychopathy Coldheartedness scale; 5 = self-rated dominance; 6 = self-rated prestige; 7 = observed dominance: submissive; 8 = observed dominance: dominant; 9 = personal space: submissive; 10 = personal space: dominant; 11 = testosterone baseline; 12 = testosterone Post 1; 13 = testosterone Post 2; 14 = testosterone Post 3; 15 = testosterone Post 4. Internal consistency data of the study variables are reported along the diagonal.

^a *N* = 83

* *p* < .05. ** *p* < .001.

show that total psychopathy scores were positively correlated with testosterone levels at Post 2, while Factor 2 psychopathy scores were positively related to testosterone levels at Post 2, Post 3, and Post 4.

PPI Subscale Analysis

The primary finding of a reviewer-requested follow-up subscale analysis was that Factor 2 (Machiavellian Egocentricity) was consistently and significantly correlated with self-reported Dominance (*r* = .65**) and Prestige (*r* = .27*), job choice (*F*(2, 88) = 6.58*, *p* = .002), personal space (*r* = -.25*), and testosterone at post Times 2: (*r* = -.33*) and 3: (*r* = .28*). Observed dominance was correlated with two out of three Factor 1 subscales, Social Immunity (*r* = .42**) and Stress Immunity (*r* = .25*).

Discussion

The relationship between psychopathic traits and dominance was studied in a community sample using multiple indicators of

dominance: self-reported overall dominance level, job preference, dominance displays observed during identical interviews with a subordinate and then a dominant interviewer, measures of personal space, and testosterone level (baseline and postinteraction). Overall, the hypothesis that psychopathic traits are positively related to dominance was confirmed on both trait measures and in behavioral interactions.

As a trait, higher self-reported psychopathy scores were associated with higher levels of self-reported dominance and preference for a supervisory job position. The association between self-reported psychopathy and self-reported dominance applied for both the Dominance and Prestige subscales and replicates several previous correlational studies (e.g., Johnson et al., 2012; Rauthmann & Kolar, 2013; Verona et al., 2001). While supervisory positions were previously proposed to be associated with dominance (Hollenbeck et al., 1987; Trouba, 2009), we and Lilienfeld, Litzman, Watts, Smith, and Dutton (2014), are among the first to present empirical evidence of a relationship between psychopathic traits and preference for supervisory positions.

Table 3
Descriptives (Means and Standard Deviations) of Psychopathy Scores per Choice of Profession, Along With Analysis of Variance Main Effects of Profession, and Bonferroni-Corrected Post Hoc Group Analyses

Psychopathy	Descriptives: <i>M</i> (<i>SD</i>)			Main effect profession: <i>F</i> (2, 88), <i>p</i>	Group contrasts		
	Nonsocial	Supervising others	Under supervision		Nonsocial vs. supervising others	Nonsocial vs. under supervision	Supervising others vs under supervision
Total score	266.57 (25.01)	309.22 (30.24)	287.31 (29.74)	8.87**, <.001	-3.58*, <i>p</i> = .002	1.79, <i>p</i> = .23	2.84*, <i>p</i> = .017
Factor 1	108.57 (23.17)	130.43 (16.19)	118.62 (15.69)	8.41**, <.001	-3.29*, <i>p</i> = .004	1.42, <i>p</i> = .48	3.01*, <i>p</i> = .01
Factor 2	123.00 (12.14)	143.22 (18.70)	136.00 (22.35)	4.00*, .02	-2.60*, <i>p</i> = .03	1.57, <i>p</i> = .36	1.57, <i>p</i> = .36
Coldheartedness	35.00 (6.66)	35.57 (7.20)	34.69 (4.89)	1.66, .85	-.22, <i>p</i> = .83	.11, <i>p</i> = .91	.56, <i>p</i> = .57

Note. *N* = 91.

* *p* < .05. ** *p* < .0001.

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Table 4
Correlations Between Psychopathy Scores and Difference Scores (i.e. During Interaction With Dominant Interviewer Minus During Interaction With Subordinate Interviewer) of Observed Dominance and Personal Space

Psychopathy	Difference scores	
	Observed dominance	Personal space
Total score	.21	-.22
Factor 1	.25*	-.04
Factor 2	.06	-.26*
Coldheartedness	.19	-.17

Note. $N = 83$.

* $p < .05$.

In the interactional main measure of interest, higher Factor 1 psychopathy scores were significantly related to the increase in participants' dominance display with the dominant interviewer. Per the interpersonal circumplex model, expectations about dominant-subordinate complementarity at lower levels of psychopathy and anticomplementarity at higher psychopathy levels were met. Individuals with lower Factor 1 psychopathy scores reduced their dominance displays when confronted by a highly dominant interviewer, but higher Factor 1 psychopathy-scoring individuals increased dominance displays during this confrontation.

Lower levels of psychopathy Factor 2 scores were related to keeping the dominant interviewer at a greater distance than the submissive interviewer. This is likely to be adaptive because dominant individuals present a potential threat. Individuals scoring at higher levels of behavioral psychopathic features, however, do not display such a defensive spatial strategy. In contrast, higher Factor 2 scores were associated with allowing the dominant interviewer to approach more closely (reduced spatial defensiveness). These findings are in line with studies showing that participants scoring high in reactive and proactive aggression—both strong correlates of psychopathy—tend to approach angry faces (von Borries et al., 2012) and attack-related scenes (Lobbestael, Cousijn, Brugman, & Wiers, 2016). Our findings differ from those of Vieira and Marsh (2014) who found personal space to be related to the PPI.

Taken together, our behavioral findings indicate that, compared with interaction with the subordinate interviewer, participants high in Factor 1 psychopathy scores increased their own dominance displays when interacting with the dominant interviewer, while those with higher Factor 2 scores reduced defensive distancing. These distinct correlates of each psychopathy factor are not surprising given Factor 1 denotes the interpersonal dimension of psychopathy, and a lack of fear. On the contrary, Factor 2 reflects behavioral psychopathic tendencies, which are reflected in the current study as reduced spatial defensiveness. Correlation coefficients serve as measures of effect size, so effects reported here would be considered small, perhaps because subjects were individuals without clinical psychopathology. Clinical-level psychopaths might have exaggerated responses to dominance challenges and it would be worthwhile seeing if exaggerated dominance displays would be systematically elicited with the dual interview paradigm in this population. Alternatively, a study involving clinical psychopaths might also show similar effect sizes, which might

indicate that the relationship between psychopathy and dominance is not strong, but of a medium effect size. In this context, it should be noted that the PPI scores of our sample did not appear to be lower than those of offender samples (e.g., Wygant et al., 2016; Tonnaer, Cima, Sijtsma, Uzieblo, & Lilienfeld, 2013), an overlap that is likely related to the fact that the PPI assesses the nonclinical variant of psychopathy.

One important extension of the present study would be to assess self-reported and observed levels of anxiety and empathy and compare their contribution with dominance measures in the dual interview situation. Having the participants assess the two interviewers with a personality checklist after the procedures could yield some insights into how participants experienced the test. An alternative view of our results within the circumplex model is that some people mimic high-status (and thus, dominant) behavior (Erickson, 1978; Gregory & Webster, 1996). This hypothesis could be tested with participants' postinterview assessments.

These concerns notwithstanding, current social psychology research is consistent with evolutionary analysis in showing advantages that accrue to dominant individuals. Dominance is associated with personal attractiveness and likability (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004; Glenn, Kurzban, & Raine, 2011; Pusey, Williams, & Goodall, 1997). Participants in a face-to-face interaction who were rated high on trait dominance were considered to be more competent, even when controlling for their actual skills (Anderson & Kilduff, 2009). In the evolutionary context, dominants have greater access to resources, a particularly important advantage when resources are unevenly distributed or scarce (Glenn et al., 2011). These resources include mates, so the trend over generations is to maintain and increase drive for dominance. Aggressive behavior in many primates serves to establish and maintain social dominance. The heightened aggressive behavior of psychopaths may be primarily generated by their greater drive for dominance with their lack of empathy and fear being secondary permissive factors that allow their aggressive impulses to be unrestrained.

Correlational analyses reveal that both self-reported dominance and psychopathy Factor 2 measures were positively associated with most posttest testosterone assessments. This observation is in line with studies consistently reporting higher testosterone levels associated with dominance (e.g., Archer & Webb, 2006; Schultheiss et al., 2005; Sellers et al., 2007). Our correlations only reached significance in the samples taken after the interviews were completed, similar to previous findings of testosterone-dominance linkage only after status was challenged (Archer & Webb, 2006; Mehta & Josephs, 2010; but see Johnson et al., 2007; Mehta & Josephs, 2006). An alternative explanation for a delay between dominance interaction and testosterone release is the intermittency of testosterone secretion. Similar delays were found in other studies assessing the impact of a behavioral aggression task (Lobbestael, Baumeister, Fiebig, & Eckel, 2014; only after 8 min) and victory on narcissism and power motivation (Schultheiss & Rohde, 2002; only after 15 min).

There are a few concerns about this novel and rather complex study. The scripted behaviors of the submissive and dominant interviewers were intended to project only differences in dominance, but may have created perceptions of differences in interviewer hostility that influenced subjects' reactions. Selecting a job with a particular social status, which preceded the personal space

test and interactions with the interviewers, might have created a mental “set” that influenced subsequent behavior. Testosterone levels were measured after interaction with the dominant interviewer; this design did not permit corrections for possible carry-over effects from the previous interaction with the subordinate interviewer. Not having assessed testosterone at the same time of day for all subjects is also an issue because those levels are known to decline over the day, especially in younger men (Brambilla, Matsumoto, Araujo, & McKinlay, 2009).

We have found the subordinate/dominant interviewers methodology successfully elicits differential dominance displays related to psychopathic traits in normal individuals. Taxometric studies (Guay et al., 2007; Edens et al., 2006) support the continuous nature of psychopathic traits, which extend from the normal population to more extreme individuals. This methodology can now be used with forensic samples to assess the role of dominance in the social interactions of clinical-level psychopaths. The results of the follow-up subscale analysis requested by two reviewers suggest that special attention should be paid to Factor 1 (Machiavellian Egocentricity) and Factor 2 (Social and Stress Immunities) in the design and analysis of any such future study.

Taken together, higher psychopathy scores were associated with higher self-reported level of trait dominance and greater preference for supervisory positions. As observed by raters blind to the psychopathy scores, participants with higher psychopathy scores reacted with more dominance when interacting with dominant interviewers. The two factors of psychopathy proved to be differentially related to the two dominance measures. Factor 1 emotional/interpersonal features of psychopathy related to increased reactive-dominant behaviors, while Factor 2 psychopathic behavioral components mainly related to reduced spatial defensiveness toward the dominant interviewer and to testosterone responses after the interviews.

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