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ORIGINAL PAPER

The power motive as a predictor of receptiveness to nonverbal behavior in sport

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Abstract

The study tested the hypothesis that the implicit power motive is positively associated with receptiveness to nonverbal cues related to submissiveness in sports. Participants' ($N = 156$) implicit and explicit power motives were measured. Receptiveness to nonverbal dominance and submissiveness cues was measured using videos from sports competitions depicting elite athletes who are supposed to send nonverbal signals dependent on the current score. Participants' task was estimating if athletes were currently trailing or leading. Participants' estimates were compared to the actual score in the video scenes. Results suggest that participants scoring high in the implicit power motive were more receptive towards submissive cues, but not more receptive towards dominant cues. This finding suggests that the implicit power motive is associated with a greater receptiveness for cues related to submissiveness.

Keywords Sport · Emotion expression · Nonverbal behavior · Thin slices · Implicit power motive

"Power permeates all relationships, in the family, among friends, and in economic exchanges" (Keltner 2016, p. 29). Hence, people seek power and power has been described as a central adaptive motivational drive in humans (McClelland 1975), similar to the cravings for sweet food or even sex. Although power was typically defined in forceful Machiavellian terms, power is about making a difference in the world (McClelland 1987). Importantly, making a difference in the world means affecting other people and altering the states of others (e.g., emotionally, cognitively, or physically). Power can either be perceived as a quality possessed by a person, by an interaction process through which power is manifested (e.g., being ahead in a sport competition), or the outcome of such an interaction (e.g., winning the competition) (Berger 1994; Ellyson and Dovidio 1985). One way by which power is exerted is dominance, which can be described as one of the behavioral aspects of power (Burgoon et al. 1998). Just as with any adaptive motivational drive, individuals differ in how strongly they experience this motivational drive and how strongly it influences observable dominant behavior. Pertinent to the present research, one way that people attempt to satisfy their need for power is by being receptive to nonverbal signals amongst other people associated with dominance/submissiveness (Donhauser et al. 2015; Schultheiss and Hale 2007). Recently sports competitions have been shown to be an "arena" in which people are constantly displaying nonverbal cues related to dominance and submissiveness (Furley 2019; Furley et al. 2016; Furley and Schweizer 2014a; 2016; Matsumoto and Hwang 2012; Tracy and Matsumoto 2008). Therefore, the present research addressed the question of whether individual differences in people's need for power predict how receptive they are towards athletes' nonverbal behavior associated with dominance and submissiveness.

The power motive can be broadly defined as a concern of having an impact (cognitively, emotionally, or physically) on others (Winter 1973). More specifically, the need for power has been described as a disposition for feeling affective pleasure from having an impact on others or the world at large, and for feeling aversion when other people influence oneself (Schultheiss 2008). Two fundamentally different motivational systems can be distinguished from

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one another (McClelland et al. 1989): An explicit motivational system representing self-attributed (or explicit) motives or goals that people ascribe to themselves; and an implicit motivational system representing motives outside of conscious awareness. This distinction stems from the idea that people sometimes lack introspective insight into their fundamental motivational needs. As a consequence, two different methods for assessing motives have been developed: self-report motive questionnaires and the Thematic Apperception Test (TAT; Morgan and Murray 1935) that was later refined to Picture-Story Exercises (PSE; Schultheiss and Pang 2007). Motive questionnaires are comprised of a series of statements related to a person's motivation in particular contexts. In the TAT or PSE participants are asked to tell a story about certain pictures and their responses to these pictures are subsequently coded with an experimentally derived coding system. Decades of research using dichotomous assessments (i.e., explicit questionnaires and implicit measures) of human motives has led to the conclusion that scores on explicit and implicit measures of human motives tend to be uncorrelated (e.g., Köllner and Schultheiss 2014; Pang and Schultheiss 2005; Spangler 1992; Schultheiss et al. 2009). This lack of variance overlap has been interpreted as explicit and implicit measures assessing different kinds of motive constructs (but see Thrash et al. 2012). More specifically, as people verbally report their explicit motives these are assumed to give rise to controlled forms of behavior, whereas implicit motive measures are assumed to assess how people are likely to orient, select, and energize more autonomous forms of behavior (Schultheiss and Brunstein 2010; McClelland 1987).

Although a growing body of research has used implicit and explicit motive measures (Schultheiss and Brunstein 2010; McClelland et al. 1989, for an overview), comparatively little is known about the role of implicit and explicit motives on basic cognitive processes. Of central importance to the present research, motives are assumed to fulfill an attentional orienting function to motivationally relevant cues (e.g., Schultheiss 2008). That is, motives are assumed to affect behavior by orienting attention towards salient cues in the environment that are associated with the satisfaction or thwarting of activated motives (McClelland et al. 1989). The modulation of attentional orienting has been demonstrated for many other motivational constructs, for example by showing an attentional bias of anxious individuals towards threat-related stimuli (e.g., Mogg and Bradley 1999). Regarding the implicit power motive (*n*Power), initial research has shown that this motive has the potential to affect behavior (Stoeckart et al. 2017), for example, by affecting memory processes (Wang et al. 2017), and, of particular importance to the present research, by orienting attention to cues in the environment that facilitate exercising influence on other people or impending influence of others on oneself (Donhauser et al. 2015; Schultheiss and Hale 2007; Schultheiss et al. 2008). More specifically, this research has provided converging evidence that individual differences in observer's implicit power motive predicted their receptiveness towards nonverbal cues related to dominance and submission. Schultheiss and Hale (2007) found evidence that individuals high in *n*Power oriented their attention towards submissive faces (i.e., showing surprise) and away from dominant faces (i.e., showing anger). Presumably, this pattern emerges because the nonverbal expressions of dominance and submission are of fundamental importance in satisfying one's dispositional motive of having an impact on others and avoiding to be controlled by others (Schultheiss 2008). Arguably, being able to easily distinguish between dominant and submissive nonverbal cues would help satisfy this implicit motive or avoid thwarting this motive. While this theorizing has been supported by first studies using stimulus material of staged expressions of basic facial emotions like joy, anger, or surprise that are linked to dominance and submission (Donhauser et al. 2015; Schultheiss and Hale 2007; Schultheiss et al. 2008), it is not clear if these first empirical studies transfer to settings in which individuals show subtle forms of naturally occurring nonverbal behaviors as a consequence of feeling more dominant or more submissive. Moreover, in such naturally occurring nonverbal behavior (e.g., on a sports court) facial expressions are often less obvious and more difficult to detect than exaggerated close-up images of facial expressions used in previous studies (e.g., Matsumoto and Ekman 1988).

For the explicit power motive research findings regarding attentional orienting are less elaborated. Research on sense of power—that is the perception of one's ability to influence others (Anderson et al. 2012)—for example, proposed that individuals high in sense of power show more optimism for future events in and outside of their control (Anderson and Galinsky 2006) and tend to rather speak up in a work environment compared to individuals low in sense of power (Morrison et al. 2015). Further, powerful individuals tend to focus their attention more strongly on power cues compared to individuals low in power (e.g., Mason et al. 2010). Taken together, it could be argued that individuals high in self-attributes of power (explicit power motive) may focus their attention to power cues associated with success, which are in sync with their self-attributes, rather than to power cues associated with failure.

There have been increasing calls for replications of psychological findings (Camerer et al. 2018; Open Science Collaboration 2015) due to the fact that many published findings do not replicate. Of further relevance, Fiedler (2011) pointed out the necessity of replicating psychological findings with different stimulus material to ensure that psychological theorizing does not only apply to a highly specific set of selected stimuli (e.g., an association of the implicit power

motive to Matsumoto and Ekman's (1988) facial database, but no association for naturally occurring subtle everyday expressions of dominance/submissiveness). Hence, the present research followed these calls by addressing the question of whether individual differences in people's explicit and implicit need for power predict how receptive observers are towards athletes' nonverbal behavior associated with dominance and submissiveness. In addition, the present research attempted to expand existing knowledge by investigating the attentional orienting hypothesis for both explicit and implicit power motives and by individually assessing the relationship of the explicit and implicit measures to receptiveness measures towards submissiveness and dominance. Finally, the present research bridges the fields of nonverbal behavior and motives. Previous research has shown that neither gender nor domain-specific sports knowledge influenced the receptiveness of participants in judging nonverbal behavior in sports (Furley and Schweizer 2014b). According to Cronbach (1957), a comprehensive account of human behavior can only be achieved through the synergy of experimental and differential approaches to psychology. Hence, the present research seeks to investigate how individual differences in a person's need for power are associated with the receptiveness towards dominance and submission in sports contests.

The present research

Recent research has demonstrated that perceivers of sport competitions can estimate who is leading or trailing without being aware of the score (Furley and Schweizer 2014b). In the respective research, participants were shown short recordings of athletes during breaks in competition that only showed the nonverbal behavior of the athletes. The experimental task of participants was to estimate the current score of the athletes. As the score was occluded in all videos, perceivers could only use athletes' nonverbal behavior to estimate the score. The general pattern of results of this research demonstrated that perceivers could distinguish between trailing and leading athletes. Importantly, a follow-up study (Furley and Schweizer 2016) using the same videos provided evidence that leading and trailing athletes significantly differed in terms of dominance and submissiveness. This finding is arguably in line with previous research on dominance and submissiveness that has shown that animals and humans winning antagonistic encounters (i.e., deemed dominant) puff themselves up to appear larger, while animals losing antagonistic encounters (i.e., deemed submissive) show submissive sinking in and lowering of the body and limbs (Ekman 2009). Reliably communicating and assessing dominance/submission (i.e., a means of attaining rank, status, and power in social hierarchies) has been suggested to be critical amongst not only humans, but all primate species (Mazur 2005; Rule et al. 2012). Sports competitions have been argued to be institutionalized forms of status or dominance contests (Furley 2019; Lombardo 2012; Mazur 2005) and therefore seem well suited to test the attentional orienting function of the power motive using naturally occurring stimulus material.

Our primary hypothesis was derived from the findings of Schultheiss and Hale (2007) showing that people high on the implicit power motive tended to allocate their attention towards low-dominance facial expressions and away from high-dominance facial expressions. Based on the findings of Furley and Schweizer (2016) we decided to test this reasoning in the context of competitive sports as trailing athletes were shown to differ in terms of dominance/submission in comparison to leading athletes. According to Furley and Schweizer (2016, 2014b) these relative differences in dominance and submissiveness informed participants' ratings in a different task in which they were asked to guess the current score of athletes based on their nonverbal behavior while the actual score was occluded. If this reasoning is correct and a person's implicit power motive is indeed associated with enhanced attentional allocation towards submissive bodily expressions, then we would expect to find that people with a high implicit power motive should be more receptive to nonverbal cues associated with submissiveness and therefore assign lower scores to trailing athletes compared to leading athletes and athletes in close game situations. This hypothesis is derived from contemporary theorizing on implicit motives suggesting that they—amongst others—serve to orient attention to facilitate information pick-up and enhanced processing of motivationally relevant stimuli (Schultheiss and Brunstein 2010).

In addition, we explored if a person's explicit power motive would also be predictive of a person's receptiveness towards score-related nonverbal behavior related to dominance and submission. Given the small research base concerning the role of the explicit power motive in attentional orienting, we did not have a clear-cut hypothesis as with the implicit power motive based on Schultheiss and Hale (2007). Arguably it seems feasible that individuals high in the explicit motive tend to be more sensitive to nonverbal cues that are dominant, reflecting their self-attributes of power. Hence, it seems reasonable that this would show in a higher receptiveness towards dominant nonverbal behavior in sport (i.e., higher score ratings of winning athletes).

Methods

Participants

German-speaking students ($N = 156$, $n_{women} = 74$, $n_{men} = 82$) from the three universities of Bern (Switzerland), Cologne

(Germany), and Heidelberg (Germany) with a mean age of $M = 26.11$ ($SD = 6.36$) years voluntarily participated in the study in exchange for course credit and receiving feedback on their individual implicit motive profiles. Participants were recruited via university courses. Participants did not differ regarding age, gender, the power motive scores, nor regarding receptiveness scores in identifying nonverbal behavior depending on the university they studied in. The study was carried out in accordance with the Declaration of Helsinki. Written informed consent was obtained from every participant before commencing the study. Sample size was calculated prior to the study to have sufficient power (.95) to detect small-to-medium effects ($r = .3$) on two-tailed Pearson correlations (Faul et al. 2007). G × Power 3.1.9.2 indicated a sample size of 134 as sufficient to achieve 95% power.

Power motive measures

Implicit power motive

The implicit power motive was measured using the Picture Story Exercise (Schultheiss and Pang 2007). Participants were asked to typewrite imaginative stories on a computer for 4 min in response to six ambiguous picture cues (a boxer, women in laboratory, ship captain, couple by the river, trapeze artists, nightclub scene). This set of six pictures was selected because this is the standard set to measure the three implicit motives (power, affiliation, achievement) as proposed by Schultheiss and Pang (2007). Although the affiliation and achievement motives were not part of the research question we promised participants feedback on their implicit motive profiles as a compensation for not receiving financial rewards for participating in the study. Each picture was presented for 15 s. Subsequently participants were asked to write down their stories to these pictures. Participants' stories were coded for their power motive content according to Winter's (1994) scoring system by two experienced raters. Coders showed sufficient inter-rater reliabilities to the calibration set of above ICC = .85. Their inter-rater reliability for an initial subset of $n = 52$ participants ($N = 312$ picture stories) in this study was at ICC = .87 (see Schultheiss and Pang 2007). For this subset disagreements were resolved through discussion. All other stories were coded by the aforementioned coders individually. In cases of ambiguity, the second coder was consulted. The power motive was coded whenever stories included a description of a person or group having an impact on another person or group. Such descriptions included (1) strong or forceful actions, (2) control or regulation of others, (3) attempts to persuade or convince others, (4) giving help, advice, or support, (5) impressing others or concerns about a person's prestige, or (6) strong emotions of a person in response to another person. The implicit power motive scores were calculated from the sum of all power codings throughout the six picture stories and were significantly linked to the number of words written in the PSE ($r = .51$, $p < .001$). Participants on average wrote $M = 504$ words ($SD = 163$). Both variables (implicit power motive score and word count) were not normally distributed and consequently log-transformed. We regressed the implicit power motive scores onto the number of words written and used the residualized value of the word-corrected implicit power motive for testing our hypothesis (see recommendations in Schultheiss and Pang 2007).

Explicit power motive

Students' explicit power motives were assessed using the dominance scale of the German version of the Personality Research Form (PRF; Stumpf et al. 1985; Jackson 1967). The dominance scale as a measure of the explicit power motive represents an evaluation of oneself as being dominant, including, for example, questions regarding attempts to control one's environment, influencing or directing others, expressing opinions forcefully, or enjoying leadership. The scale consists of 16 items with self-statements such as *I try to control others rather than permit them to control me*. Participants have to respond to these items in a dichotomous format using the labels "*right*" or "*wrong*". The internal consistency for the PRF dominance scale in the present study was .81.

Estimating the score in televised sports competitions

We used the task of Furley and Schweizer (2014b) that showed video footage of televised basketball games from the NBA and the highest German league and table tennis matches from the World Cup, the European Cup, the Chinese Super League, and the highest German League.[1] The video stimuli showed athletes during breaks in the game—including time-outs, free throws in basketball, and breaks between points in table tennis and avoided showing any kind of obvious nonverbal signals associated with pride such as raising both fists above the head or obvious signals displaying shame such as hiding the face behind the hands (cf. Tracy and Matsumoto 2008), that have empirically been linked to the final outcome in sport and therefore would be too informative cues for estimating the score. The selected basketball videos had a mean duration of 3.9 s ($SD = 2.8$; $Mode = 1$; $Range = 13$) and selected table tennis videos had a mean duration of 3.5 s ($SD = 3$; $Mode = 1$; $Range = 11$).

[1] In order to maximize transparency in the conducted research we provide hyperlinks to the stimulus material utilized in the studies. Note that the software randomly selected and displayed the stimulus material from the video stream according to the described procedure and not as shown in the video streams: Basketball: (http://www.youtube.com/watch?edit=vd&v=UsviKNsOkUM), Table tennis: (http://www.youtube.com/watch?v=2Y3YeYqTnSY).

The videos differed depending on the actual score of the game during the video. There were three[2] different categories of scores: (i) far behind, displaying a team or player trailing substantially, which was defined in basketball as at least fifteen points behind and in table tennis as at least five points behind. Moreover, in this category the team or player shown always lost the game in the end; (ii) close score, this category was in fact a combination of three subcategories: (a) close behind, showing a team or player losing in a fairly close game situation which was defined in basketball as no more than five points behind and in table tennis no more than two points behind; (b) a draw in which the score was equal; (c) close lead, showing a team or player leading in a fairly close game situation which was defined in basketball as no more than five points ahead and in table tennis no more than two points ahead; (iii) high lead, displaying a team or player leading substantially, which was defined in basketball as at least fifteen points ahead and in table tennis as at least five points ahead. Moreover, in this category the team or player shown always won the game in the end. The reason why athletes in the high trail/lead categories always won/lost the game was that athletes were more likely to show cues related to submissiveness/dominance in comparison to situations in which high trailing/leading athletes still won/lost the game. The rationale for creating three categories was that previous research (Furley and Schweizer 2016) showed that stimuli in these three categories differed significantly in terms of submissiveness/dominance, while there were no significant differences in the three subcategories of the close score category. The final test included a pool of 20 videos in each experimental category for both respective sports (200 video clips in total).

Measure

Perceivers rated the short video scenes on an 11-point digital semantic differential scale after every video. In order to give their ratings, perceivers moved a mouse cursor from the middle of the scale which represented a tied score towards either pole of the scale and logged in their rating by clicking the left mouse button. The software converted the ratings into a value (with 2 decimals) between 0 reflecting the left pole of the scale with the label "*far behind*" and 1 reflecting the right pole of the scale with the label "*high lead*." The utilized scale was continuous, ranging from 0.00 to 1.00 and was visually presented as 11 points in order to assist participants in providing a clear indication of their ratings. From this scale we calculated three different scores as indices of a person's receptiveness towards dominant and submissive cues. The rationale for having three different (albeit similar) scores was to gain confidence that any potential effects were not due to a highly specific scoring procedure, but provided evidence for (or against) our hypothesis.

Individualized-difference score

As our main measure of a participant's receptiveness towards submissive cues we calculated difference scores between the means of all stimuli (24) when athletes were in close game situations and when they were trailing by far (24 stimuli). We further calculated a score representing participants' receptiveness towards dominant cues by calculating difference scores between the means of all stimuli (24) when athletes were leading by far and when they were in close game situations (24 stimuli). The rationale behind this calculation is that perceivers who are highly receptive towards submissive cues should assign lower scores to trailing athletes than perceivers who are less receptive towards submissive cues. In other words, the more receptive towards submissive cues perceivers are, the more they should perceive trailing athletes to be trailing. This is because trailing athletes send submissive nonverbal cues, and perceivers who are receptive towards them use them for making their score estimates. The same holds for perceivers who are highly receptive towards dominance cues: They should assign higher scores to leading athletes, that means they should perceive them to be more in the lead than perceivers who are less receptive towards dominance scores. To account for differential use of the continuous scale we used the individual means of the close score category as individual baseline to calculate the respective receptiveness for dominant and submissive cues.

Mean score

As an additional measure of a participant's receptiveness towards submissive and dominant cues, we simply calculated the mean in the respective high lead and high trail categories (24 videos respective). Both the individualized-submissive-difference and the individual-dominance-difference scores correlated highly with the mean scores in submissive (i.e., high trail) and dominant (i.e., high lead) categories (correlation submissive $r = .66$; $p = .0001$; correlation dominant $r = .62$; $p = .0001$).

Point-score

As an additional measure of a participant's receptiveness towards submissive and dominant cues, we calculated points for the high-leading (receptiveness for dominant cues), close (receptiveness for neutral cues), and high-trailing (receptiveness for submissive cues) videos. Participants were awarded a point for every stimulus (24) in the high-leading category they estimated above 0.6 on the

[2] We would like to thank an anonymous reviewer for this suggestion.

scale. The sum of the scores within these 24 videos was their dominance-point score. Participants were awarded a point for every stimulus (24) in the close category if their estimate was between 0.4 and 0.6. The sum of the scores within these 24 videos was their point-score in the close category. Participants were awarded a point for every stimulus (24) in the high-trailing category they estimated below 0.4. The sum of the scores within these 24 videos was their submissive-point score. The dominance-point score correlate highly with the individualized-dominance-difference score (i.e., mean individual high-lead minus mean individual close-score) (correlation $r = .52$; $p = .0001$) and the mean-dominance score (correlation $r = .76$; $p = .0001$). The submissive-point score correlate highly with the individualized-submissive-difference score (i.e., mean individual close minus mean individual high-trail) (correlation $r = .52$; $p = .0001$) and the mean-submissive score (correlation $r = .78$; $p = .0001$). These high correlations indicate that all three receptiveness-towards-dominant cues and all three receptiveness-towards-submissive cues measured similar constructs (i.e., receptiveness-towards cues associated with dominance or submissiveness).

Procedure

Before commencing the study, participants filled in a questionnaire gathering demographic data. Every perceiver was tested individually on a standard 17-inch computer screen placed 60 cm away from the perceivers. Participants then completed the power motive assessment. Subsequently, participants were instructed that they had to estimate who was leading or trailing based on the video footage presented to them by moving a mouse cursor to either the "*high-lead*" or "*far-behind*" pole of the semantic differential scale. They were further instructed to answer as accurately as possible, while speed was not emphasized. E-prime 2.0 professional (Psychology Software Tools 2007) was used to present the stimuli and collect the judgments. All videos were presented silently to ensure that ratings were based on NVB and not, for example, crowd noise. For every perceiver the software randomly chose twelve videos from the categories far behind, close score, and high lead for both basketball and table tennis. Hence, every perceiver viewed 72 videos out of the 200-video-clip battery in random order. This methodology reduces the likelihood that results are dependent on one particular set of stimuli and therefore increases external validity (Fiedler 2011).

Data analyses

We first analyzed the overall effect of how well participants could estimate the current score based on thin slices of athletes' nonverbal behavior with a 1×3 (far behind, close score, and high lead) repeated-measures ANOVA on the averaged score estimates within the respective experimental categories.

In order to analyze individual differences in participants' receptiveness towards submissive and dominant cues, we initially correlated participants' implicit (one-tailed due to our directional main hypothesis) and explicit power motive scores (two-tailed) with the three separate indicators (individualized difference score, mean score, and point score) of participants receptiveness towards dominant and submissive cues. In order to test the effect of implicit and explicit power motives on these receptiveness measures we conducted two separate regression analyses both including the implicit and explicit power motives as predictors and (i) including receptiveness to submissive cues and (ii) receptiveness to dominant cues as criterion variables.

We further conducted extreme-group analyses (all tests two-tailed) using the upper- and lower-quartiles of the log-transformed (word corrected) *n*Power scores to create a low and a high *n*Power group. Individual difference research has frequently made use of extreme-group analyses as a high-powered alternative to continuous correlation and regression analyses (e.g., Engle 2002; Feldt 1961). Using a mixed-methods ANOVA we tested for differential receptiveness towards dominant and submissive cues as a function of *n*Power. We followed up this ANOVA with a series of independent *t* test on the different receptiveness measures. The extreme-group analyses were intended to provide converging evidence for our main hypothesis that people who are high in *n*Power show an increased receptiveness towards cues associated with submissiveness.

Results

Preliminary analyses and descriptive statistics

A 1×3 (far behind, close score, and high lead) ANOVA revealed a significant main effect of score category on overall score estimates, $F(2, 310) = 307.790$, $p < .001$, $\eta_p^2 = .665$, indicating that perceivers were accurate at estimating whether both basketball and table tennis players were leading or trailing and thereby replicated the findings of Furley and Schweizer (2014b) (Fig. 1).

In Table 1, intercorrelations are presented between the implicit and explicit power motives and our main receptiveness scores in identifying dominant and submissive nonverbal

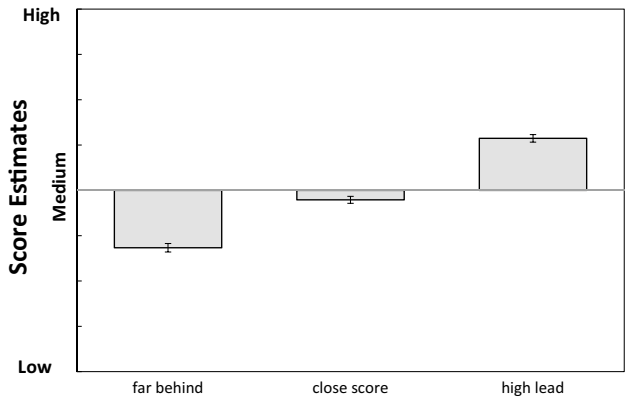

Fig. 1 Mean score (0 = *far behind*; 1 = *high lead*) estimates as a function of score category. Error bars represent standard errors

behavior in the video scenes (i.e., individualized-difference-score). As Table 1 illustrates, the implicit power motive but not the explicit power motive was significantly related to the receptiveness in identifying athletes being behind in the game (individualized-difference-score; $M = .053$, $SD = .057$). The same result pattern emerged concerning the significant correlation between *n*Power and the mean-submissive score ($r = .14$; $p = .044$; $M = .437$, $SD = .059$) and no correlation between *n*Power and the mean-dominance score ($r = .045$; $p = .289$; $M = .557$, $SD = .052$). There was also a significant correlation between *n*Power and submissive-point score ($r = .14$; $p = .041$; $M = 10.490$, $SD = 3.679$) and no correlation between *n*Power and the dominance-point score ($r = -.07$; $p = .38$; $M = 10.626$, $SD = 3.413$). The explicit power motive was not significantly ($r = .15$; $p = .066$) correlated with the receptiveness in identifying videos with athletes being ahead in the game (individualized-difference score). The same was true for the mean-dominance ($r = .011$; $p = .16$) and point-dominance ($r = .07$; $p = .36$) scores. Hence, the results did not support our speculative hypothesis that the explicit power motive was associated with a higher receptiveness towards dominant cues. No significant correlations emerged between *n*Power and the neutral/close-point score ($r = -.012$; $p = .88$; $M = 9.948$, $SD = 4.361$) and the neutral/close-mean score ($r = .041$; $p = .61$; $M = .489$, $SD = .048$).

Two follow-up regression analyses were conducted in order to explain variance in the receptiveness of identifying athletes being behind or ahead (using our main receptiveness measure; the individualized-difference measure) in the game using the implicit power motive measure as well as the explicit power motive measure. Participants' gender was initially integrated in the regression analyses because it was assumed that this could moderate the perception of the all-male video scenes. This was not the case for any of the variables. Moreover, gender was not a moderator of the effect of the implicit power or explicit power motive scores on any of the receptiveness measures towards submissive or dominant athletes used in this study (all p's > .240). For this reason, gender was not included as a predictor in the following analyses.[3] For additional analyses not related to our primary hypothesis.

The power motive and estimating the score based on athletes' NVB

In the first analysis, we intended to explain variance in the receptiveness score for videos displaying athletes being behind. This model could explain $R^2 = .032$ in variance of receptiveness for athletes being behind, $F(2,153) = 2.504$, $p = .085$, CI [0.023,0.326]. The implicit power motive ($\beta = .18$) was a significant single predictor of receptiveness for being behind, $t = 2.229$, $p = .027$, CI [.001, .019], while the explicit power motive score ($\beta = -.02$) was not, $t = -0.226$, $p = .822$, CI [−.010, .008]. This means that athletes high in the implicit power motive were better able to detect who is behind (i.e., showing relatively more submissive cues) in the video scenes shown.

In the second regression analysis, the receptiveness score for videos displaying athletes being ahead were regressed onto the implicit and explicit power motive. This regression model explained $R^2 = .028$ of the variance in receptiveness for leading videos, $F(2,153) = 2.177$, $p = .117$, CI [0.011, 0.315]. Both the implicit power motive [$\beta = -.08$; $t = -0.968$, $p = .335$, CI (−.013, .005)] and the explicit power motive [$\beta = .15$; $t = 1.860$, $p = .065$, CI (.000, .005)] were not significant predictors of receptiveness for being ahead.

[3] Although it was not the aim of the current study, for further comprehensibility of possible motives involved we additionally coded the present motive stories for the affiliation and achievement motives and tested their effects on the receptiveness scores measured through the video scenes. The mean value for the implicit and explicit affiliation motives in this study were $M_{IM} = 3.42$, $SD_{IM} = 1.91$ ($min = 0$, $max_{IM} = 11$), $M_{EM} = 12.60$, $SD_{EM} = 3.01$ ($min_{EM} = 2$, $max_{EM} = 16$), respectively. For the achievement motive the implicit measure was $M_{IM} = 3.80$, $SD_{IM} = 2.31$ ($min_{IM} = 0$, $max_{IM} = 12$) and the explicit measure $M_{EM} = 10.17$, $SD_{EM} = 2.80$ ($min_{EM} = 1$, $max_{EM} = 16$). Both motives were also positively correlated with word count (implicit achievement motive: $r = .41$, $p < .001$; implicit affiliation motive: $r = .48$, $p < .001$). The implicit affiliation ($r = .12$, ns) and achievement motives ($r = .03$, ns) were neither significantly correlated with the implicit power motive nor with their respective explicit counterpart (achievement: $r = -.013$, *ns*; affiliation: $r = .069$, *ns*). Including the explicit and implicit affiliation and achievement motives in the three regression analyses that were conducted to test our hypotheses and reported above show non-significant effects of the achievement and affiliation motives. Also, all bivariate correlations between the implicit affiliation and implicit achievement motives and any of the receptiveness scores toward submissiveness or dominance in the present study were non-significant (all p's = ns). Moreover, we added an interaction term of explicit × implicit power motive (also affiliation and achievement) to the respective regression models. All interaction terms did not significantly explain additional variance in the regressions models.

Table 1 Means (*M*), standard deviations (*SD*), range (*min, max*), and intercorrelations between implicit and explicit power motives, receptiveness scores for videos illustrating being behind and ahead

	M	SD (min, max)	2	3	4
1 Implicit power motive	2.92	2.16 (0, 10)	.012 [−.16, .18]	.18* [.05, .31]	−.08 [−.21, .05]
2 Explicit power motive	8.65	3.78 (0, 16)		−.02 [−.18, .17]	.15 [−.01, .29]
3 Behind (submissive)	.053	.057 (−.13, .34)			−.29* [−.42, −.15]
4 Ahead (dominant)	.068	.057 (−.07, .24)			

$N = 156$ for all cells. Numbers in brackets indicate the lower and upper limits of 95% confidence intervals
*$p < .05$

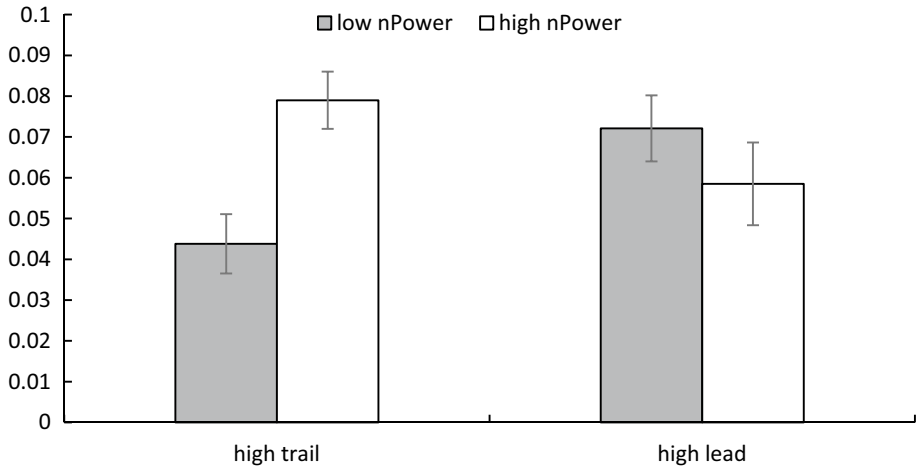

Fig. 2 Mean individualized-difference scores (i.e., receptiveness for submissive cues on the left and receptiveness for dominant cues on the right) as a function of *n*Power and whether the videos showed trailing or leading athletes. Error bars represent standard errors

The same pattern of results emerged (albeit showing slight derivations in the exact coefficients) when using the other two receptiveness measures.[4] However, we have to acknowledge that the evidence resulting from the regression analyses in favor of our main hypothesis is rather weak. This might be explained by the fact that individuals neither high nor low in *n*Power (i.e., falling in the middle of our sample's *n*Power distribution) potentially obscured evidence for our primary hypothesis. In order to test this, we conducted extreme-group analyses testing our main hypothesis that people who are high in *n*Power show an increased receptiveness towards cues associated with submissiveness.

Extreme-group analyses

The descriptive differences in receptiveness to submissive and dominant cues as a function of *n*Power are displayed in Fig. 2 (using the individualized-difference score). A 2 (receptiveness to submissive cues vs. receptiveness to dominant cues) × 2 (low *n*Power vs. high *n*Power) ANOVA revealed no significant main effects, but importantly a significant interaction effect $F(1, 76) = 7.368$, $p = .008$, $\eta_p^2 = .088$, indicating that high *n*Power people were more receptive towards submissive cues but not towards dominant cues compared to low *n*Power people (for whom this pattern was reversed, see Fig. 2). Follow-up pairwise comparisons confirmed this interpretation by revealing significant differences between low and high *n*Power individuals in their receptiveness towards submissive cues $t(76) = -3.479$, $p = .001$, $d = 0.79$; low *n*Power $M = .044$, $SD = .045$; high *n*Power $M = .079$, $SD = .044$), but not for their receptiveness towards dominant cues $t(76) = 1.046$, $p = .299$, $d = 0.28$; low *n*Power $M = .072$, $SD = .051$; high *n*Power $M = .059$, $SD = .063$). The same pattern of results emerged when using the other two receptiveness measures (mean and point-scores) with

[4] We additionally conducted regression analyses for the two alternative receptiveness measures (point score and mean score). *Point score*. For the point scores awarded to participants for correct estimates in each category (trail, lead) the pattern of results resembles the pattern in the difference scores. For athletes being behind, the model could explain $R^2 = .027$ in variance, $F(2,153) = 2.086$, $p = .128$, CI [0.008, 0.313]. Neither the implicit power motive ($\beta = .14$), $t = 1.735$, $p = .085$, CI [−0.071, 1.093] nor the explicit power motive ($\beta = .08$), $t = 1.056$, $p = .293$, CI [−0.271, 0.894] were a significant single predictor of receptiveness for being behind. The same was true for the leading category with $R^2 = .011$, $F(2,153) = 0.821$, $p = .442$, CI [−0.053, 0.257]. *Mean score*. For the mean scores, the implicit and explicit power motives only explained small amounts of variance in receptiveness for athletes trailing ($R^2 = .019$), $F(2,153) = 1.520$, $p = .222$, CI [−0.019, 0.288], in draw ($R^2 = .005$), $F(2,153) = 0.346$, $p = .708$, CI [−0.088, 0.224], or leading ($R^2 = .015$), $F(2,153) = 1.173$, $p = .312$, CI [−0.035,0.273].

significant differences between low and high *n*Power individuals in receptiveness towards submissive cues (mean-score: $p = .045$; low *n*Power $M = .446$, $SD = .059$; high *n*Power $M = .419$, $SD = .052$; point-score: $p = .026$; low *n*Power $M = 9.564$, $SD = 3.582$; high *n*Power $M = 11.256$, $SD = 2.989$), but not for receptiveness towards dominant cues (mean-score: $p = .743$; low *n*Power $M = .562$, $SD = .053$; high *n*Power $M = .557$, $SD = .063$; point-score: $p = .729$; low *n*Power $M = 10.769$, $SD = 3.869$; high *n*Power $M = 10.487$, $SD = 3.267$). No differences between low and high *n*Power individuals were evident in receptiveness towards neutral cues (mean-score: $p = .393$; low *n*Power $M = .490$, $SD = .046$; high *n*Power $M = .499$, $SD = .049$; point-score: $p = .433$; low *n*Power $M = 10.743$, $SD = 5.082$; high *n*Power $M = 9.923$, $SD = 4.048$).

Discussion

The goal of the present research was to test if the power motive is associated with an individual's receptiveness towards athletes' nonverbal behaviors during sport competitions as these have been shown to signal dominance and submissiveness depending on the current score. In this respect, the present study sought to provide converging evidence for emerging findings showing that individual differences in people's implicit need for power predicted observers' receptiveness towards other people's nonverbal submission signals. Taken together, the present results suggest that the implicit power motive is positively associated with the ability to distinguish athletes who are far behind from athletes who are close behind or neither behind nor leading (draw). In other words, the higher participants' implicit power motive, the more strongly did they estimate athletes to be trailing when they were actually far behind (i.e., deemed submissive). Conversely, the same was not true for the identification of athletes who were far leading (i.e., deemed dominant). The present results do not suggest that the implicit power motive is correlated with the ability to distinguish athletes who are far leading from athletes in close game situations.

However, the present findings suggest that the implicit power motive specifically predicts the ability to identify athletes who are far behind in an ongoing competition (i.e., deemed submissive). This pattern of results suggests that people who are high in the power motive are particularly receptive either for the *presence* of nonverbal cues related to submissiveness or for the *absence* of nonverbal cues related to dominance. The observation that participants were able to identify particularly those athletes who were far behind (and not those who were far leading) suggests that the effect is mainly driven by a receptiveness to nonverbal cues that are related to submissiveness, as these are supposed to be signaled by athletes who are far behind. This finding is in line with previous research showing that individuals high in the implicit power motive direct attention more strongly towards faces signaling low dominance (e.g., surprise) than to faces signaling high dominance (e.g., anger) (Schultheiss and Hale 2007). However, the present research cannot answer the question whether (a) perceivers high in *n*Power were better at perceiving cues related to submissiveness than perceivers low in *n*Power, or (b) both groups perceived the same cues but assigned different weights to them or (c) both groups perceived the same cues but interpreted them differently.

Hence, the present research extends evidence from previous studies that have found an association between the implicit power motive and staged pictures related to dominance and submissiveness (Schultheiss and Hale 2007; Schultheiss et al. 2008) to naturalistic videos showing athletes in more dominant or submissive states. The study extends previous findings by showing that the explicit power motive was not associated with this increased receptiveness towards submissive cues. The results further did not support our speculations that the explicit power motive might be associated with a greater receptiveness towards dominance cues. However, we consider it a fruitful avenue for future research to further investigate into the attentional orienting functions of different implicit and explicit motives and how these might differentially impact on behavior. In this respect, explicit motives have been argued to be sensitive to what is accepted in the social environment (Schultheiss and Brunstein 2010). They depend on conscious thought and deliberation about what is acceptable behavior given the social circumstances. Hence, power cues that are socially accepted, for example, winning in achievement oriented society, might be rather something to orient one's attention to than nonverbal signs of losing, which might be perceived as enjoying the miserable state of others. We acknowledge that this reasoning is speculative at present, but might serve as an interesting hypothesis for future research. Additionally, future research in sports on the relationship between the implicit power motive and NVB might benefit from taking the role of perceived instrumentality into account, as perceived instrumentality (i.e., the opportunity to gain influence over others) has been shown to moderate attention towards submissive cues for people high in the implicit power motive (Stoeckart et al. 2018). This line of reasoning could be used to predict, for example, selection of team mates and team captains based on their NVB and participants' implicit power motive.

As previous research (Gröpel et al. 2015; Wegner et al. 2014) has shown that elite athletes in interactive sports tend to score higher on the implicit power motive than recreational athletes or non-athletes, it seems feasible that this motivational orientation could benefit athletes in these sports (see also, Wegner et al. 2015, 2017), for example by helping them

to adapt their behavior according to opponents' nonverbal signals of submissiveness. A stronger receptiveness towards submissiveness in athletes would, for example, be helpful in knowing when to increase pressure according to an opponent's signs of weakness/submissiveness. In this respect, the present research indicates that athletes scoring high on the implicit power motive could implicitly benefit from being more receptive towards nonverbal signals related to submissiveness. This might help them to avoid power stress, that is the negative affective reaction people high on the implicit power motive experience when they fail to successfully exert influence over others (e.g., Raihala and Hansen 2019). However, so far these considerations remain speculative, as participants in our study were not elite athletes. Based on both our study and the research described above, further research may investigate into the question whether athletes really benefit from being more receptive towards nonverbal cues and how this receptiveness relates to their power motive.

A shortcoming of the present research and the studies by Furley and Schweizer (2014b) is that they do not answer the questions of which nonverbal cues informed the ratings of participants. Previous research with the same stimulus material has shown that observers use facial, bodily, and kinematic cues to similar degrees and none of these cues are indispensable (Furley and Schweizer 2016) for arriving at accurate ratings. In general, a dominant body language in a sport context (Furley et al. 2012) has been described as an erect posture, shoulders back, chest out, and head straight (i.e., occupying more space), whereas a submissive body language as slouched posture, shoulders forward, chest in, head down (i.e., occupying less space). Further research outside the sports domain has shown that power and dominance is conveyed via a magnitude of cues in different nonverbal channels (e.g., Hall et al. 2005; Schmid Mast and Hall 2004): for example, dominant people show more eye-contact with other people (Aguinis et al. 1998), panache, and self-assurance (Burgoon et al. 1998). Regarding submissiveness, the most frequently mentioned nonverbal cues that were likely used by participants in the present study are a lowered head position, raised eyebrows, a slouched posture, a still posture, leaning backward, and self-touch (Schmid Mast and Hall 2004). Additionally, it seems likely that participants used facial cues as described in Schultheiss and Hale (2007) in evaluating submissiveness, for example, dropping the jaw (Action Unit 26, e.g., Matsumoto and Ekman 1988). In this respect, future research would benefit from identifying the precise nonverbal behaviors that people scoring high on the implicit power motive use in representative interactions (see for example the methodology of Schmid Mast and Hall 2004) that help them satisfy their dispositional motive of having an impact on others and avoiding to be controlled by others (Schultheiss 2008).

In addition, the present study adds to the growing body of literature on nonverbal behavior in sports and replicated the findings of Furley and Schweizer (2014b) in a high-powered sample. Direct replications are a research necessity and should not be regarded a trivial research step considering the increasing calls for replication in the psychological literature (Open Science Collaboration 2015; Simons 2014; Schweizer and Furley 2016). Moreover, so far research has not identified individual difference variables that affect receptiveness to nonverbal behavior of leading or trailing athletes (see Furley and Schweizer 2018 for an overview). In this respect, the study provides first evidence that individual differences in a person's need for power are associated with the receptiveness of drawing inferences based on athletes' nonverbal behavior. In addition, the study extends previous findings by providing indirect evidence for the reasoning of Furley and Schweizer (2016) that athletes do in fact change their nonverbal behavior when competing with others along the vertical dimension of social relationships (see Hall et al. 2005, for a review). The vertical dimension in social relations stands in contrast to the horizontal dimension of emotional closeness of relationships (Burgoon and Hoobler 2002; Hall and Friedman 1999). Modern sports competitions have been argued to be institutionalized forms of status or power contests (Furley and Schweizer 2018; Lombardo 2012; Mazur 2005). Hence, signaling dominance when winning in these contests and submissive nonverbal behavior when losing serves adaptive functions at the level of individual goal attainment: that is, sending submissive signals when losing increased the chances of avoiding further potentially life-threatening attacks (e.g., in the martial arts), whereas sending dominant signals has the potential of saving valuable resources by communicating superiority over an opponent (Furley and Schweizer 2016). Therefore, the association between observers' implicit need for power and performance on the score estimation tasks provides further support that athletes change their nonverbal behavior along the vertical dimension of social relationships that is associated to status, power, and dominance and gives order to social groups by ranking its members hierarchically (see Hall et al. 2005, for a review).

In conclusion, the present research shows how the power motive is associated with basic cognitive processes. More specifically, the implicit power motive predicted a greater receptiveness to naturally occurring nonverbal behavior related to submissiveness in sports competitions.

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Data availability All study materials and data will be made available at reasonable request from the corresponding author.

Compliance with ethical standards

Conflict of interest The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Disclosure The authors declare that (1) (a) the total number of excluded observations and (b) the reasons for making these exclusions have been reported in this manuscript; (2) that all independent variables or manipulations, whether successful or failed, have been reported in the manuscript; (3) that all dependent variables or measures that were analyzed for this article's target research question have been reported in in the manuscript; (4) that (a) how sample size was determined has been reported in this manuscript.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Research involving human participants and/or animals and informed consent Informed consent was obtained from all individual participants included in the study.

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