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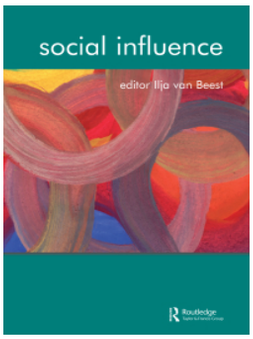

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Whom do we trust to lead us? effects of leaders' dominance-based leadership, prestige-based leadership and physical formidability

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ABSTRACT

Drawing on evolutionary perspectives of leadership and hierarchy, we argue that hierarchical strategies and physical formidability of leaders affect followers' trust. Specifically, prestige should increase trust, dominance should reduce trust and physical formidability should strengthen these effects. We tested these hypotheses in three experimental studies (total $n = 1884$), using survey and behavioral measures of trust. We found that a dominance-based leadership style consistently reduced trust in leaders whereas using a prestige-based leadership style consistently increased it. However, physical formidability didn't moderate these effects, nor did it affect trust directly. Although more research seems needed to understand more fine-grained effects of physical formidability on different factors of trustworthiness, our results suggest that leadership styles are important predictors of how much leaders are trusted.

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Leadership; dominance; prestige physical formidability; trust

Making decisions that affect others is inherent to leadership positions (e.g., Dirks & Skarlicki, 2004). Followers affected by such decisions rarely have access to all the information (including potentially conflicting interests) that these decisions are based on. Yet sometimes followers are willing to trust a leader to make decisions on their behalf: they are 'willing to be vulnerable to the actions of another party [i.e., their leader] … irrespective of the ability to monitor or control that other party' (Mayer et al., 1995, p. 712). Such trust in a leader has been construed as an emergent, psychological state (Burke et al., 2007; Dirks & Ferrin, 2002; see also Rousseau et al., 1998). It is believed to result from observed past behaviors signaling the leader's trustworthiness (i.e., their ability, benevolence, and integrity: e.g., Burke et al., 2007; Mayer et al., 1995). However, as we will assert, psychological processes shaped by evolution may lead people to also rely on other cues to a leader's trustworthiness, and the leader's advancement strategies and physical formidability may be two such cues.

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Evolutionary psychology argues that human psychology was shaped to deal with recurrent challenges humans faced throughout their evolutionary history (e.g., Tooby & Cosmides, 2005). Our inclinations to trust others and to monitor others' trustworthiness may have resulted both from the importance of cooperative norms and behaviors for collectively dealing with challenges like natural threats and competing tribes, and from their fragility in the face of cheating and freeriding (Simpson, 2007). Leaders in contemporary small-scale societies help groups coordinate their actions and deal with free riders (von Rueden et al., 2014), suggesting that only individuals who are trusted attain such positions. However, the relatively high status of a leadership position also wields important benefits, as has been observed in both small-scale societies (e.g., rights to polygyny: von Rueden & Van Vugt, 2015) and in modern organizations (e.g., exceedingly high salaries: Ronay et al., 2020). This makes leadership positions attractive for selfish reasons, even to those who lack the attributes to fulfill them effectively (cf., Ronay et al., 2020). People may therefore carefully monitor and strongly react to the means by which leaders attain and maintain their position. Moreover, as both advancement strategies (Cheng et al., 2013) and physical formidability (e.g., Blaker & Van Vugt, 2014; Lukaszewski et al., 2016) were instrumental for attaining and maintaining high-status leadership positions throughout evolutionary times, they may still function as important cues to the trustworthiness of leaders to which people remain highly sensitive.

Leadership style and followers' trust

Two essentially different and largely orthogonal behavioral strategies are seen as central to status attainment in humans: dominance and prestige (e.g., Cheng et al., 2013; De Waal-Andrews et al., 2015). Moreover, both are associated with distinctly different leadership styles (Andrews et al., 2022; McClanahan, 2020; Van Vugt & Smith, 2019). Dominance refers to actively 'claiming' influence (De Waal-Andrews et al., 2015; Maner & Case, 2016) by relying on coercion, (the threat of) punishment, and aggression (Maner, 2017; Maner & Case, 2016). Leaders who use a *dominance-based leadership style* may serve a group to aggress against another group or to deal with internal disputes (De Waal-Andrews & Van Vugt, 2020; Petersen & Laustsen, 2020). However, they also prioritize self-interest over group-interest (Cheng et al., 2013; Maner, 2017), for example by demoting and closely controlling talented individuals (Maner & Mead, 2010; Mead & Maner, 2012). Consequently, using a dominance-based style is likely to undermine followers trust in a leader (Hypothesis 1).

Prestige refers to influence being freely 'granted' by others (De Waal-Andrews et al., 2015; Henrich & Gil-White, 2001; Maner & Case, 2016). Individuals who influence others through prestige display intelligence, knowledge, and superior skills form which that benefit others (Cheng et al., 2013; Maner, 2017), who in turn respect and admire their expertise (Cheng et al., 2010; Ronay et al., 2020). Leaders who use a *prestige-based leadership style* may also generously share resources (Cheng et al., 2010; Maner, 2017; Van Vugt & Smith, 2019), for example by making large contributions to public funds (Willer, 2009), and prioritize the wellbeing of their group and its members (Cheng et al., 2013; Henrich et al., 2015). Consequently, using a prestige-based style should enhance followers' trust in a leader (Hypothesis 2).

Physical formidability and followers' trust

The importance for hierarchy formation of physical formidability – the ability to inflict physical damage on others in hand-to-hand combat (Sell et al., 2009) – predates the emergence of hominids (Garfield et al., 2019). Like the non-human ancestors from which we evolved, the highest ranking 'alpha' in non-human primate hierarchies is usually the most formidable male (e.g., Wright et al., 2019). People's ability to accurately estimate physical formidability from photographs of human faces and bodies (Sell et al., 2009), attests to the attention they pay to visual cues that may reveal it (e.g., muscularity and height: Sell et al., 2009; see also Lukaszewski et al., 2016). Moreover, physical formidability continues to be important for leadership (Murray, 2014) and status dynamics (Knapen et al., 2017; Lukaszewski et al., 2016), and its importance may be such that men calibrate their behavior according to their formidability (Sell et al., 2012).

Physical formidable males tend to be more aggressive, volatile, and self-centered (Sell et al., 2012), and are more supportive of inequality (Petersen & Laustsen, 2019). Moreover, physically formidable leaders are seen as more able to aggressively intimidate their followers (Lukaszewski et al., 2016). However, having a physically formidable leader may also benefit followers. When challenged by another group, a group with a formidable leader may instill fear or respect in opponents (Murray, 2014; Murray & Schmitz, 2011), and so avoid harm. Moreover, physical formidable leaders are perceived as able to enforce intra-group rules and negotiate with representatives of other groups (Lukaszewski et al., 2016). Thus, physical formidability may act as a cue to both low and high trustworthiness. In line with this, physical formidability strengthens perceptions of both dominance and prestige (Blaker & Van Vugt, 2014). This suggest physical formidable leaders with both a dominance-based style and a prestige-based style of leadership may be perceived as using this style more potently. As such, physical formidability should enhance both the negative effect of dominance-based leadership and the positive effect of prestige-based leadership on followers' trust in a leader (Hypothesis 3).

Method

To test our hypotheses, we ran three ethically approved, pre-registered studies. Across studies, we used different leadership style manipulations. In Study 1 (preregistration 1) we used three scenarios (control, dominance, prestige). In Study 2 (preregistration 2) we also used three scenarios, but this time with more subtle descriptions of dominance and prestige. In Study 3 (preregistration 3) we used the same scenarios as in in Study 2, but included an additional (mixed) scenario to test the joint effects of dominance and prestige on trust. Moreover, to determine whether dominance and prestige affect trust beyond the social perceptions that these leadership styles may evoke, we also measured social perceptions of the leader in this study and ran additional analyses in which we controlled for their effects.

Apart from these differences, the studies had similar designs. In all three studies, we manipulated leader formidability (low, high) with a picture of the leader, manipulated leadership styles with scenario-based descriptions, and measured trust with two survey measures and a behavioral measure (i.e., the distrust game: McEvily et al., 2012; Thielmann & Hilbig, 2014). Therefore, we report a combined methods section of all

three studies here. We also report the results of these studies side-by-side in the results section. We included sensitivity power analyses, correlational analyses, and all stimulus materials in a supplementary file.

Participants

We initially recruited 852 American Amazon Mechanical Turk workers in Study 1. They received $1.20 for their participation. After applying exclusion criteria (see below), we retained the data of 696 respondents (M_{age} = 42.49 years, SD_{age} = 12.05 years, 358 women, 336 men, 2 non-binary).[1] These respondents were approximately evenly distributed across six conditions (113–119 participants per condition).

Study 2 initially consisted of 213 first year psychology students studying at a large Dutch university who participated for course credit. After applying our exclusion criteria, we retained a sample of 151 participants (M_{age} = 20.22 years, SD_{age} = 2.00 years, 130 women, 21 men). The majority of the Study 2 participants had the Dutch nationality (n = 115; 76.2%) with the rest of the sample having other European nationalities. The participants were approximately evenly distributed across six conditions (19–30 participants per condition).

For Study 3, we initially recruited 1197 American Amazon Mechanical Turk workers who received $1.20 for their participation. After deleting incomplete responses and applying exclusion criteria, we retained the data of 1037 respondents (M_{age} = 39.16 years, SD_{age} = 11.17 years, 472 women, 565 men; 125–133 participants per condition). We report the results of the distrust game for the subsample who understood the game (n = 302; 30–40 participants per condition). However, given that an unexpectedly high number of respondents did not pass the understanding checks of the distrust game (n = 735)[2] and the results did not meaningfully differ when including them, we deviated from our pre-registration and include these participants in the sample for the other analyses.[3]

Procedure

After providing informed consent and demographic information, participants read instructions on the distrust game. To make sure they understood, they took part in a non-incentivized game with a non-specified target person and answered two questions about this game. Participants who answered a question incorrectly, received feedback, and were presented with the instructions and questions a second time.

In Study 1 and Study 2, participants were then randomly allocated to one of six hypothetical leaders in a 2 (formidability) x 3 (leadership style) design, and completed the distrust game as if coupled with this leader. Following the game, they rated their trust in the leader, completed the manipulation checks, and were debriefed.

Study 3 followed a similar procedure. However, participants were allocated to one of eight hypothetical leaders in a 2 (formidability) x 2 (dominance-based leadership) x 2 (prestige-based leadership) design. Moreover, participants completed additional control measures that we included to obtain a deeper understanding of their perceptions of the leader and how these perceptions may have affected trust.

Materials

Trust measures

Participants rated their affect-based trust (5 items, e.g., 'I can talk freely to this individual about difficulties I am having at work and know that he will want to listen') and cognition-based trust (6 items, e.g., 'This person approaches his job with professionalism and dedication') in the leader on a seven-point Likert scale (1 = *strongly disagree* and 7 = *strongly agree*; McAllister, 1995). Moreover, we assessed behavioral trust with the distrust game (McEvily et al., 2012; Thielmann & Hilbig, 2014). We created an aggregate score of two monetary sums reflecting distrust in the leader (the sum they expected the leader to take of their €50.- and the sum they would pay of their €50.- to prevent the leader from taking any of their money; cf., Thielmann & Hilbig, 2014), that we reverse coded to ease its interpretation. The decisions were all hypothetical meaning that respondents did not receive an actual monetary payoff based on their decisions.

Social perception measures

In Study 3 the participants rated the leader on two fundamental dimensions of social perceptions (Cuddy et al., 2008) by scoring both a single item measure of warmth (i.e., 'how much do you like the leader?') and a single item of competence 'how competent do you consider this leader to be?') on a seven-point Likert scale (1 = *not at all* and 7 = *a great deal*).

Manipulation checks

To check the effectiveness of our manipulations, participants rated dominance (8 items, e.g., 'he is willing to use aggressive tactics to get his way') and prestige (9 items, e.g., 'members of your group respect and admire him'; Cheng et al., 2010) of the leader on a five-point Likert scale (1 = *strongly disagree and* 5 = *strongly agree;* α's > .76). Participants also rated the leader's physical formidability by indicating his strength (1 = *very low physical strength* and 5 = *very high physical strength*) and height (1 = *very short* and 5 = *very tall;* Study 1 $\alpha = .59$; Study 2 $\alpha = .63$).

Moreover, in Study 3 we introduced the mixed condition where the leader followed both a prestige-based and a dominance-based style. This combination might result in ambivalent attitudes of the followers as prior work has shown that combining positive and negative trait information results in ambivalence (e.g., Nohlen et al., 2016), We therefore checked how ambivalent respondents were toward the leaders. We did this both in terms of attitudinal ambivalence by asking independently about how positive and negative they felt about the leader and their subjective ratings of ambivalence (e.g., how conflicted they felt about the leader) on five 11-point bipolar scales (Priester & Petty, 1996). To calculate attitudinal ambivalence, we used the formula by Thompson et al. (1995). Specifically, the formula is: (positive evaluation+negative evaluation)/2 - [positive evaluation-negative evaluation) and gives a score between −4 and 11 where higher scores mean more ambivalence. Details results regarding these measures can be found in the supplementary files.

Exclusion criteria

We disregarded the data of all participants who incorrectly answered the instructed response questions that were embedded in the survey (e.g., *please select strongly disagree;* Barends & De Vries, 2019). Additionally, as noted in the participants section, in Study 1 and Study 2 we dropped all data of respondents who repeatedly failed the understanding check questions of the distrust game whereas in Study 3 we dropped only the distrust game data of participants who repeatedly failed these understanding check questions.

Results

In all three studies, the three trust measures were all positively and significantly correlated (all r's ≥ .30, all p's < .001). Descriptive statistics and correlations of these measures are reported in Tables S2, S3, and S4.

Manipulation checks

As indicated by MANOVAs and follow-up analyses of the perceived leader formidability, leader prestige, and leader dominance (see Table S1 for full details), our manipulations of physical formidability, dominance-based leadership and prestige-based leadership were generally successful, but the manipulation of mixed leadership (i.e., high in both dominance and prestige) did not have the expected effects. Notably, in all three studies the manipulations always influenced the relevant perception in the intended direction (e.g., the leader in the high leader formidability condition was always perceived as significantly higher in physical formidability than the leader in the low physical formidability condition). However, sometimes a leadership style manipulation also affected the perceptions of the non-manipulated leadership style (e.g., in Study 1 and Study 3, but not in Study 2 the dominance-based leader was perceived as significantly less prestigious than the leader in the control condition). Moreover, sometimes a leadership style manipulation affected perceptions of physical formidability or vice versa (e.g., in Study 2, but not in Study 1 or Study 3, both the prestige and the dominance-based leader were seen as more formidable than the leader in the control condition and in Study 2, but not Study 1 or Study 3, the physically formidable leader was seen as more dominant than the less formidable leader). Importantly, these contaminations were weak and inconsistent across the studies.

Finally, as expected the leader with the mixed (high dominance-based, high prestige-based) leadership style was perceived as more dominant than the leader in the control condition, but unexpectedly the leader with the mixed style was not perceived as higher in prestige than the leader in the control condition. Thus, this manipulation did not have the intended effects. Moreover, analyses of the ambivalence measures (see supplemental file for details) suggested that the leader with the mixed style increased feelings of ambivalence relative to the prestige-based leader, but not relative to the leader in the control condition, and even reduced feelings of attitudinal ambivalence but not subjective ambivalence relative to the dominance-based leader. Given these findings, all analyses on the mixed leadership condition should be considered exploratory and any findings should be interpreted with caution.

Hypotheses testing

To test our hypotheses in Study 1 and Study 2 we conducted 2 (physical formidability: low vs. high) x 3 (leadership style: control vs. dominance-based vs. prestige-based) x MANOVAs across the three trust measures (i.e., behavioral trust, affect-based trust, and cognition-based trust).

The Study 1 MANOVA revealed a significant main effect of leadership style on the three trust outcomes, $F(6, 1376) = 242.60$, $p < .001$, Wilk's $\Lambda = .24$, $\eta_p^2 = .51$. As predicted, dominance-based leadership decreased trust (Hypothesis 1) and prestige-based leadership increased trust (Hypothesis 2). Specifically, the Study 1 follow-up ANOVAs for each trust outcome were all significant as affect-based trust, $F(2,690) = 714.18$, $p < .001$, $\eta_p^2 = .67$, cognition-based trust, $F(2, 690) = 749.48$, $p < .001$, $\eta_p^2 = .69$, and behavioral trust, $F(2, 690) = 396.20$, $p < .001$, $\eta_p^2 = .54$, were all significantly influenced by leadership style. Furthermore, the planned contrasts for each trust outcome – see Table 1—revealed the predicted patterns of the dominance-based leader being trusted significantly less than the leader in the control condition (all p's < .01). Similarly, the prestige-based leader was trusted significantly more than the leader in the control condition (all p's < .001).

We found similar results in Study 2. Specifically, the Study 2 MANOVA also revealed a significant main effect of leadership style on the three trust outcomes, $F(6, 286) = 44.45$, $p < .001$, Wilk's $\Lambda = .27$, $\eta_p^2 = .38$. Moreover, the follow-up ANOVAs revealed that affect-based trust, $F(2,145) = 144.51$, $p < .001$, $\eta_p^2 = .67$, cognition-based trust, $F(2,145) = 73.84$, $p < .001$, $\eta_p^2 = .51$, and behavioral trust, $F(2,145) = 69.24$, $p < .001$, $\eta_p^2 = .49$, were all significantly affected by leadership style. Furthermore, the planned contrasts per trust outcome – see Table 1 —revealed the predicted patterns of the dominance-based leader being trusted significantly less than the leader in the control condition (all p's < .01). Similarly, the prestige-based leader was trusted significantly more than the leader in the control condition (all p's < .001).

We found no support for hypothesis 3 in Study 1 and Study 2. Specifically, in both MANOVAs regarding the three trust outcomes, the interaction between leadership style and physical formidability was non-significant, Study 1, $F(6, 1376) = .93$, $p = .473$, Wilk's $\Lambda = .99$, $\eta_p^2 = .00$; Study 2, $F(6, 286) = .98$, $p = .441$, Wilk's $\Lambda = .98$, $\eta_p^2 = .02$. Therefore,

Table 1. Trust means (standard deviations) per condition for both studies.

	Control		Dominance		Prestige	
Study 1	LPF	HPF	LPF	HPF	LPF	HPF
Cognition-based trust	3.18^a (1.11)	3.25^a (1.30)	2.31^b (1.10)	2.15^b (1.10)	5.90^c (.99)	6.04^c (.83)
Affect-based trust	2.57^a (1.24)	2.64^a (1.46)	1.88^b (1.30)	1.63^b (1.09)	5.67^c (1.05)	5.79^c (.95)
Behavioral trust	32.76^a (14.07)	34.43^a (13.37)	18.41^b (9.34)	16.42^b (9.59)	45.67^c (8.56)	45.49^c (8.05)
	Control		Dominance		Prestige	
Study 2	LPF	HPF	LPF	HPF	LPF	HPF
Cognition-based trust	3.76^a (.98)	3.56^a (1.21)	3.31^b (.87)	2.90^b (.92)	5.45^c (.88)	5.36^c (.82)
Affect-based trust	3.15^a (1.22)	2.78^a (1.26)	1.85^b (.70)	1.79^b (.76)	5.11^c (.87)	5.16^c (.78)
Behavioral trust	36.41^a (10.39)	28.07^a (12.70)	21.36^b (13.47)	19.34^b (9.39)	45.64^c (5.96)	45.33^c (6.04)

Note. LPF = Low physical formidability. HPF = High physical formidability. Means with different subscripts in the same row differed at the $p < .01$ level.

we didn't conduct follow-up analyses in these studies regarding the interaction between formidability and leadership style.

Moreover, as the effect of the leader's physical formidability was also non-significant in both studies, Study 1 $F(3, 688) = .12$, $p = .950$, Wilk's $\Lambda = 1.00$, $\eta_p^2 = .00$; Study 2, $F(3, 143) = 2.05$, $p = .110$, Wilk's $\Lambda = .96$, $\eta_p^2 = .04$, these results suggest that the leaders' physical formidability didn't influence how much they were trusted.

To test our hypotheses in Study 3, we conducted a 2 (physical formidability: low vs. high) x 4 (leadership style: control vs. dominance-based vs. prestige-based vs. mixed) MANOVA across the two survey trust measures (i.e., affect-based trust, and cognition-based trust). Moreover, we conducted an ANOVA with these same independent variables for behavioral trust in the subsample who passed the understanding check items of the distrust game.

Our Study 3 findings were generally consistent with Studies 1 and 2 as we found a significant main effect of leadership style on trust, $F(6, 2056) = 16.28$, $p < .001$, Wilk's $\Lambda = .91$, $\eta_p^2 = .05$ in the MANOVA of the affect-based and cognition-based trust and a significant main effect of leadership style in behavioral trust ANOVA, $F(3, 294) = 25.47$, $p < .001$, $\eta_p^2 = .21$. Moreover, the follow-up ANOVAS for leadership style were significant for both affect-based trust, $F(3, 1029) = 17.97$, $p < .001$, $\eta_p^2 = .05$, and cognition-based trust, $F(3, 1029) = 28.54$, $p < .001$, $\eta_p^2 = .08$.

The planned contrasts (Table 2) showed support for hypothesis 1 as dominance-based leadership decreased trust compared to the leader in the control condition for all three trust measures (all p's $< .001$). However, the planned contrasts showed mixed support for hypothesis 2. Specifically, the planned contrasts showed that the prestige-based leader was trusted more than the leader in the control condition for affect-based trust and cognition-based trust (all p's $< .001$), but no difference in between the two leaders for behavioral trust ($p = .256$).

Additionally, the exploratory findings regarding the leader in the mixed (high dominance-based, high prestige-based) leadership condition were inconsistent. Specifically, affect-based and cognition-based trust in the leader did not differ significantly in the mixed leadership condition and the control condition for (all $p > .101$), but behavioral trust was significantly lower in the mixed leadership condition than in the control condition ($p < .001$).

We did not find any support for hypothesis 3 as the interaction between formidability and leadership style interaction was non-significant in the MANOVA of the survey measures of trust, $F(6, 2056) = .54$, $p = .780$, Wilk's $\Lambda = 1.00$, $\eta_p^2 = .00$, and in the ANOVA of behavioral trust, $F(3, 294) = 2.09$, $p = .102$, $\eta_p^2 = .02$.

Finally, we obtained a significant main effect of the formidability of the leader, $F(2, 1028) = 5.25$, $p = .005$, Wilk's $\Lambda = .99$, $\eta_p^2 = .01$ in the MANOVA of the survey measures of trust, however, this was likely a false positive as the follow-up ANOVAs were non-significant for both affect-based trust, $F(1, 1029) = .01$, $p = .943$, $\eta_p^2 = .00$, and cognition-based trust, $F(1, 1029) = 3.63$, $p = .057$, $\eta_p^2 = .00$. Similarly, the ANOVA of leader formidability was non-significantly related to behavioral trust, $F(1, 294) = 1.80$, $p = .181$, $\eta_p^2 = .01$. Again, these findings show that leader formidability did not influence trust.

Table 2. Trust means (standard deviations) per condition.

	Control		Dominance		Prestige		Mixed	
Study 3	LPF	HPF	LPF	HPF	LPF	HPF	LPF	HPF
Cognition-based trust	4.84^{a} (.76)	4.68^{a} (.93)	4.47^{b} (1.13)	4.32^{b} (1.43)	5.19^{c} (.70)	5.09^{c} (.66)	4.91^{a} (.83)	4.88^{a} (.78)
Affect-based trust	5.17^{a} (1.07)	4.99^{a} (1.29)	4.67^{b} (1.64)	4.60^{b} (1.91)	5.45^{c} (.82)	5.55^{c} (.85)	4.92^{a} (1.44)	5.09^{a} (1.38)
Behavioral trust	36.51^{a} (13.77)	39.49^{a} (14.14)	21.53^{b} (12.13)	21.63^{b} (12.36)	39.10^{a} (13.25)	31.82^{a} (16.26)	27.34^{b} (12.83)	23.02^{b} (14.64)

Note. LPF = Low physical formidability. HPF = High physical formidability. Means with different subscripts in the same row differed at the $p < .001$ level.

Additional analyses: controlling for social perceptions

To test whether leadership style affected trust beyond social perceptions, we repeated the analyses for Study 3 while including the standardized scores of perceived liking and perceived competence as covariates in the models. First, the MANCOVA revealed that the two covariates were significantly related to trust as liking, $F(2, 1026) = 311.51$, $p < .001$, Wilk's $\Lambda = .62$, $\eta_p^2 = .38$, and perceived competence $F(2, 1026) = 122.23$, $p < .001$, Wilk's $\Lambda = .81$, $\eta_p^2 = .19$ were both significant in the model. However, even after controlling for these covariates, a significant main effect of leadership style on the two trust outcomes was found, $F(6, 2052) = 5.57$, $p < .001$, Wilk's $\Lambda = .97$, $\eta_p^2 = .02$. Moreover, when controlling for these covariates, the formidability of the leader was also significantly related to trust, $F(2, 1026) = 5.37$, $p = .005$, Wilk's $\Lambda = .99$, $\eta_p^2 = .02$. Finally, the interaction between the leader formidability and leadership style interaction was non-significant, $F(6, 2052) = .50$, $p = .809$, Wilk's $\Lambda = 1.00$, $\eta_p^2 = .00$.

The follow-up ANOVA for physical formidability revealed that leader formidability in this covariate controlled model was only significantly related to cognition-based trust, $F(1, 1027) = 2.85$, $p < .001$, $\eta_p^2 = .02$, but not to affect-based trust, $F(1, 1027) = .33$, $p = .567$, $\eta_p^2 = .00$. The planned contrast for cognition-based trust showed that the low formidability leader was trusted significantly more than the high formidability leader ($p = .014$).

The follow-up ANOVA for leadership style revealed that leadership style was significantly related to cognition-based trust, $F(3, 1027) = 7.61$, $p < .001$, $\eta_p^2 = .02$, but not to affect-based trust, $F(3, 1027) = 1.62$, $p = .057$, $\eta_p^2 = .01$, when the covariates were included in the model. The planned contrasts for cognition-based trust showed that the dominance-based leader was trusted significantly less than the leader in the control condition ($p = .035$), and the prestige-based leader was trusted significantly more than the leader in the control condition ($p = 011$). The mixed leader did not significantly differ from the leader in the control condition ($p = 208$).

Second, we ran an ANCOVA with these same variables for behavioral trust in the subsample who passed the understanding check items of the distrust game. Interestingly, in this model both covariates were non-significant, specifically liking was non-significant, $F(1, 292) = 1.13$, $p = .289$, $\eta_p^2 = .00$, and perceived competence was non-significant, $F(1, 292) = .91$, $p = .342$, $\eta_p^2 = .00$. Moreover, leader formidability was also non-significantly related to behavioral trust, $F(1, 292) = 1.21$, $p = .272$, $\eta_p^2 = .00$. However, leadership style was significantly related to behavioral trust, $F(3, 292) = 16.21$, $p < .001$, $\eta_p^2 = .14$. Finally, the interaction between leader formidability and leadership style was non-significant, $F(3, 292) = 2.50$, $p = .060$, $\eta_p^2 = .03$.

The planned contrasts revealed that controlling for social perceptions did not affect the results for behavioral trust as the leader in the control condition was trusted significantly more than the dominance-based leader and but also more than the leader in the mixed condition (p's $< .001$). Moreover, again, behavioral trust in the leader in the control condition did not differ from behavioral trust in the prestige-based leader ($p = .061$).

Discussion

Across three studies using different manipulations and measures, drawing on different samples, and with a total of 1884 participants (1149 for the behavioral trust measures), we generally found that dominance-based leadership reduced, and prestige-based leadership increased follower's trust in leaders. These results are in line with prior findings that dominance reduces, and prestige increases perceptions of people's ethicality, cooperativeness, and helpfulness (Cheng et al., 2010) and that dominance-based leadership is related to lower and prestige-based leadership to higher perceptions of effectiveness (Andrews et al., 2022). We add to these findings that dominance-based leadership reduces, and prestige-based leadership increases followers' trust in leaders. Moreover, given the close association between these leadership styles and the hierarchical strategies they derive from (e.g., Van Vugt & Smith, 2019), our findings suggest that the strategies that leaders use to attain and maintain their high-status leadership positions may have important implications for followers' trust in them.

The effects of dominance-based leadership and prestige-based leadership on trust remained significant when controlling for social perceptions of warmth and competence in Study 3, at least on some trust measures (i.e., cognition-based trust and behavioral trust). This may seem surprising, given that prior research found that being perceived as competent is central to attaining both prestige and dominance (e.g., Andersen & Kilduff, 2009; Cheng et al., 2010), whereas engaging or not engaging in warm behavior is a crucial distinction between these two strategies (De Waal-Andrews et al., 2015). Moreover, these social perceptions are closely related to respectively ability (i.e., competence) and benevolence (i.e., warmth), both of which are important dimensions of trustworthiness (Mayer et al., 1995). Thus, at first glance, one might assume that controlling for perceived warmth and competence should remove the key mechanisms via which dominance-based and prestige-based leadership influence trust. However, such an assumption would disregard the possible importance of a third important dimension of trustworthiness: integrity (Mayer et al., 1995). Recent findings suggesting that perceptions of 'morality' (a construct similar to integrity) affect social cognition (e.g., Ray et al., 2021) and social judgments (e.g., Brambilla & Leach, 2014) to a larger extent than warmth and competence, the two dimensions previously assumed to be most central to social perceptions (Cuddy et al., 2008). Although we did not assess perceptions of integrity, it seems likely that these perceptions will also be affected by dominance-based and prestige-based leadership, and that these perceptions in turn affect people's cognition-based trust and behavioral trust in leaders using these styles.

Moreover, followers may have different needs from leaders in different organizational contexts (e.g., if steep competition threatens the survival of an organization people may have a need for a dominance-based leader who might be able to-disagreeably-crush the competition and so protect them from this threat, whereas if technological or societal changes lead to uncertainty about the organizations' future direction people may have a need for a prestige-based leader whose competence might guide the organization toward a viable future (cf. De Waal-Andrews & Van Vugt, 2020), which may affect the relative importance of different dimensions of social perception for whom they trust. Understanding these types of interplay between context, leadership style, and desired

social perceptions promises to provide rich insights into trust in leaders and offers many fruitful avenues for future research to explore.

Controlling for perceptions of warmth and competence diminished the effects of dominance-based leadership on affect-based trust, and reduced (but did not fully diminish) the results for cognition-based trust, but had little effect on the results for behavioral trust. Moreover, we found that social perceptions of warmth and competence were significantly related to affect-based trust and cognition-based trust, but not to behavioral trust. These results are in line with earlier findings that survey measures and behavioral measures of trust relate differently to various characteristics of (trusted) individuals (e.g., their personality, beliefs: see Ben-Nehr & Halldorsson, 2010) and have relatively weak inter-relations (e.g., Naef & Schupp, 2009; Wilson, 2018). As such, they provide support for the view that different aspects of trust may be measured by survey measures (e.g., trust in people's willingness and ability to be helpful) and game-based measures (e.g., trust in their fairness and cooperativeness; cf. Ben-Nehr & Halldorsson, 2010) and underscore the importance of including both these complementary measures in research to obtain more comprehensive insights into different aspects of trust.

In Study 3, we included a description of a leader with a high dominance-based as well as high prestige-based leadership style to assess people's trust in such 'mixed' leadership. Comparing the perceptions of the leader with this mixed leadership style with a leader with a low dominance-based, low prestige-based style revealed that the mixed leader was, as expected, perceived as higher in dominance but, unexpectedly, not higher in prestige. Moreover, although, as expected, people felt more ambivalent toward the leader with the mixed leadership style than toward the leader with a purely prestige-based style, they, unexpectedly, felt equal levels of subjective ambivalence and higher levels of attitudinal ambivalence toward the leader with a purely dominance-based style than toward the leader with the mixed style. In subsequent exploratory analyses of the effects of the mixed leadership style on trust revealed that the mixed leadership style reduced behavioral trust (similarly to a dominance-based style) but not cognition-based and affect-based trust relative to the low dominance-based, low prestige-based style. Moreover, after controlling social perceptions of warmth and competence only the effect of dominance-based leadership on behavioral trust remained significant.

Although these inconsistent and partly unexpected findings should be treated with caution, they suggest that the simultaneous use of both a dominance-based and a prestige-based leadership style may have had an additive effect on some outcomes, such that that the positive effect of a dominance-style and the negative effect of a prestige-based style resulted in a lack of change (e.g., for cognition-based and affect-based trust), whereas the effect of using a prestige-based style was dwarfed by the effect of the use of a dominance-based style on other outcomes (e.g., for behavioral trust). As such they diverge from some studies of ambidextrous leadership that found that combining a transformational and a laisser-faire style reduced trust in the leader (e.g., Breevaart & Zacher, 2019) and that combining a benevolent and an authoritarian style resulted in follower moral disengagement (Shaw et al., 2020) and may suggest additional mechanisms may be at play as people interpret and react to combinations of socially desirable and undesirable behaviors by leaders.

Leaders' physical formidability, another important predictor of high-status leadership positions (see Lukaszewski et al., 2016) didn't affect followers' trust in our studies.

Moreover, and contrary to our predictions, physical formidability also did not moderate the effects of dominance-based and prestige-based leadership on trust. Why may this be the case?

One reason may be that our studies lacked the statistical power to find these effects. The power analyses showed that Study 2 could only detect medium-sized interaction effects and may have been be underpowered. However, the much large samples included in Study 1 and Study 3 ensured we had enough power to detect even small sized interaction effect. Moreover, given that the results of our relatively underpowered study – Study 2—are generally in line with those of the other two, adequately-powered studies, we don't believe that our failure to find support for the interaction hypothesis resulted from insufficient power.

A second reason may be that leadership style was relevant to the task at hand (distrust game) which our respondents may have seen as the central task, but physical formidability was not. Prior research found that physical formidability is related to winning physical competitions (e.g., arm wrestling) but not to winning nonphysical competitions (e.g., pinball: Kordsmeyer et al., 2019; see also Nguyen et al., 2021). In line with this, our participants may have assumed that physical formidability would not be related to how much the leader in the distrust game would take from them, and this may have limited the effect of this leader's physical formidability on their trust in him. Future research may disentangle such context effects by assessing the effects of leadership style and physical formidability in contexts in which they are more or less immediately relevant (cf. Barends et al., 2019; Tett & Guterman, 2000).

Additionally, the images we used of physical formidability may have limited the effect we found on trust. These images were pretested in pilot studies and the manipulation checks suggest they sufficiently affected perceptions of physical formidability in the current studies. However, the images contained subtle differences, including small differences in clothing and posture, that may have affected the trustworthiness of the people featured in other ways. In contrast, the descriptions used to manipulate leadership styles were relatively strong, especially in Study 1. We reduced this potential issue by using more subtle vignettes in Studies 2 and 3, but we cannot exclude the possibility that leadership style vignettes remained relatively strong and overshadowed the effect of the physical formidability images. To avoid these potential issues, future research may use visually enhanced rather than natural images of managers as well as yet more subtle manipulations of leadership styles. Moreover, stronger, more immersive manipulations of physical formidability (e.g., as part of face-to-face interactions) may further enhance their effect. Formidability (like other visual cues of strength, see e.g., Kniffin et al., 2021) may have been less salient in the virtual environment in which our study was conducted than it would be in face-to-face interactions. Contrasting the effects of physical formidability using more or less immersive manipulations may also be a fruitful avenue for future research. It may provide insights into building trust in leadership in the virtual environments in which so many employees currently work.

Alternatively, physical formidability may have affected followers' perceptions of different factors of leaders' trustworthiness (i.e., integrity, benevolence, and ability: Mayer et al., 1995) in opposing ways, and may have done so irrespective of their

leadership style. Physical formidability may make leaders seem more competent (Murray & Schmitz, 2011), and thus more trustworthy. However, some research finds that followers may perceive physically formidable leaders as more forceful and self-interested (Lukaszewski et al., 2016) and therefore less trustworthy. Thus, physical formidability can act as a double-edged sword: it may make people believe leaders more potently can achieve results and at the same time make them believe those leaders may turn against them (Lukaszewski et al., 2016). Although, such opposing effects might explain why physical formidability didn't affect trust in our study, our results do not provide detailed insights into such mechanisms. Given the importance of trust for effective leadership, they offer intriguing avenues for future research to further explore.

Conclusion

Our results suggest that their use of hierarchy-based leadership styles affects our trust in leaders, but not that their physical formidability strengthens these effects. We trust leaders more when they use a prestige-based style and trust them less when they use a dominance-based style.

Notes

1. Note that due to a clerical error we included only one instead of the pre-registered two noncompliance check questions in Study 1.
2. The high number of respondents not passing these questions surprised us as the same instructions of the distrust game were used in all studies and the MTurk worker requirements were the same in Study 1 and Study 3. However, notably, these two studies were ran two years apart. Other research has found a large reduction in the quality of responses when running the exact same survey on this platform in a similar timespan, with 12.5% of respondents providing low quality responses in 2019 and 88.5% respondents providing low quality responses in 2022 (Marshall et al., 2023). They argue that this is due to more MTurk workers with lower levels of English proficiency working on the platform in recent years. A similar argument could be made with regard to our findings. Given that understanding the distrust game instructions is more complex than answering items about trust it offers a parsimonious explanation for why this issue only occurs in the distrust game and not in the other measures or instructions.
3. As an additional check on the robustness of our findings we also report the results only on the subsample who passed all check questions in the supplementary file.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The datasets, syntax, and codebook can be found via the following link: https://osf.io/m4ehz/?view_only=bb1d8cb99ff44e9ab07d8cb9395c9758

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