



prominently in this regard. Conspicuously signaling coalition membership in any social context not composed exclusively of one's coalition-mates may constitute both an implicit challenge to any members of rival coalitions present and an objective commitment device. An objective commitment device is any action that narrows the available range of options (Fessler & Quintelier, 2013), in this case making it difficult for the individual to disavow membership in the advertised coalition should conflict erupt. Objective commitment differs from subjective commitment in that issues of sentiment are germane to the latter but not to the former—if violence breaks out, an objectively committed actor must side with his coalition regardless of how strongly he identifies with that group. This is relevant both because objective commitment devices can be observed by others (whereas sentiments cannot), and because, unlike subjective commitment, objective commitment cannot wane. Together, these make it possible for observers to predict an individual's behavior on the basis of objective commitment with greater certainty than is true with regard to subjective commitment (Fessler & Quintelier, 2013). Hence, in situations in which one may encounter members of rival coalitions, advertising coalitional membership can both invite conflict with others and make it likely that, if conflict occurs, the advertiser will be an active participant.

In situations in which conflict may erupt, actors must quickly decide whether to fight, flee, negotiate, or appease. A fundamental determinant of this decision is relative formidability (i.e., the threat that an opponent poses, determined in part by relative fighting capacity), as individuals must rapidly assess the prospective foe's aggressive capabilities relative to their own. Individuals should therefore be sensitive to cues that reveal attributes of others contributing to relative formidability. We propose that advertising coalitional membership in social contexts that include members of rival coalitions may be taken both as an implicit challenge to rivals, and as an objective commitment device that cements the association between the advertiser and one side in any conflict. Therefore, witnessing an actor visibly advertise coalitional membership in such contexts should inflate observers' assessments of the actor's formidability, for three reasons. Firstly, an individual who invites conflict may be presumed to be more dangerous than an individual who shies away from conflict. Secondly, individuals who are objectively committed to their coalitions, having removed the option of feigning neutrality, are more motivated to fight for their side. (Note that this will be true regardless of whether allies are present—although the enhanced formidability attributed to an objectively committed actor will be bolstered by the presence of fellow fighters, it is not

inherently dependent on this.) Finally, both the willingness to risk conflict and the decision to commit oneself to one side of a potential conflict will often be indicative of an aggressive disposition.

Knowing that an actor advertises coalitional membership in the presence of members of a rival coalition is one of many relevant factors when calculating relative formidability. This complex assessment must often be completed rapidly, as ponderous decision-making in situations of potential conflict can be disastrous. Complex decision-making can often be facilitated via a single representation that acts as a running tally, summarizing factors contributing to the likely outcome, and possible costs, of violent conflict. Our research group has previously postulated that, reflecting both the phylogenetic antiquity and ontogenetic ubiquity of the importance of physical size and strength in violent conflicts, these dimensions constitute the basis for a summary representation of formidability (Fessler, Holbrook, & Snyder, 2012). Below, we explain this logic and summarize evidence in support of it.

Despite the equalizing nature of modern weapons, size, and strength continue to play a role in aggressive behavior today. As is evident in martial arts competitions, height is a factor in human fighting ability (Collier, Johnson, & Ruggiero, 2012), and, correspondingly, observers assess fighting ability in part as a function of a man's height (Sell et al., 2009). Likewise, relative size is a key factor when determining whether to escalate agonistic interactions (Archer & Benson, 2008), and, correspondingly, larger people report engaging in physical aggression more than smaller people (Archer & Thanzami, 2007; Felson, 1996). Similarly, in keeping with their reduced vulnerability to attack, taller men are less sensitive to cues of dominance than shorter men (Watkins et al., 2010). Parallel patterns are evident with regard to strength, a fundamental factor in men's fighting capacity (Sell, Hone, & Pound, 2012). A man's strength predicts observers' judgments of his fighting capacity (Sell et al., 2009) as well as his own aggressive and self-interested attitudes and actions (Archer & Thanzami, 2009; Hess, Helfrecht, Hagen, Sell, & Hewlett, 2010; Muñoz-Reyes, Gil-Burmann, Fink, & Turiegano, 2012; Petersen, Sznycer, Sell, Cosmides, & Tooby, 2013; Sell, Tooby, & Cosmides, 2009; Sell et al., 2012; but see also Price, Dunn, Hopkins, & Kang, 2012 for caveats).

In regard to both behavior and observers' predictions thereof, humans thus maintain a pattern found throughout the animal kingdom wherein size and strength are positively correlated with fighting capacity. This association is reinforced during development, as children experience conflicts (including with caregivers) in which size and strength determine which party gets their way; correspondingly, even before they can speak,

infants expect larger agents to best smaller agents when interests conflict (Thomsen, Frankenhuys, Ingold-Smith, & Carey, 2011).

Abstract concepts across domains have been proposed to be grounded in sensorimotor simulations drawn from relatively concrete domains of embodied experience (Barsalou, 1999; Lakoff & Johnson, 1980), and a growing literature shows that metaphorical conceptualizations can structure reasoning in threat-related domains, such as decision-making about how best to address violent crime (e.g., Thibodeau & Boroditsky, 2011). Combined with the above observations, this suggests that, as we have previously proposed, the mind will harbor a deep association between size, strength, and fighting capacity. In turn, this association provides the dimensions for a representation that can be employed to summarize diverse factors influencing the threat that an antagonist poses. In essence, a minds-eye image of the envisioned bodily features of an antagonist encapsulates evaluations of many features of the self and the other relevant to threat assessment (Fessler et al., 2012). Consistent with this hypothesis, knowing that an antagonist possesses a weapon (Fessler et al., 2012) or is inclined to take physical risks (Fessler, Holbrook, Tiokhin, & Snyder, 2014; Fessler, Tiokhin, Holbrook, Gervais, & Snyder, 2014) increases how large and muscular observers think he is. Such judgments are likewise affected by the observer's own physical strength (Fessler, Holbrook, & Gervais, 2014) and, conversely, temporary incapacitation (Fessler & Holbrook, 2013a); being the parent of vulnerable children (Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014); being in a vulnerable phase of the menstrual cycle (Fessler, Holbrook, & Fleischman, 2015); the physical proximity of one's friends (Fessler & Holbrook, 2013b); and information regarding the effectiveness of leaders (Holbrook & Fessler, 2013) or a target's ethnic identity (Holbrook, Fessler, & Navarrete, 2015). Complementing these findings, Yap, Mason, and Ames (2013) have demonstrated that leading participants to experience themselves as having more or less social power causes inverse changes in their estimates of another's size and weight. Likewise, Duguid and Goncalo (2012) have shown that feelings of power lead participants to overestimate their own height and underestimate another's.

Understanding the representational system employed in agonistic contexts provides a tool for exploring the impact of advertisements of coalitional membership, as follows:

(1) If people conceptualize the relative formidability of a potential antagonist in terms of the target individual's envisioned size and strength, and

- (2) If advertising coalitional membership in socially heterogeneous contexts is both an implicit challenge and a corresponding objective commitment, then
- (3) Knowing that the target individual advertises his coalitional membership while in the presence of members of rival coalitions should lead people to envision him as larger and stronger than others who do not engage in such behavior.

We tested this prediction in two experiments.

Some coalitions exist primarily or exclusively to achieve their objectives via violent conflict. Given the above considerations, it is understandable that visible ritual body modification is more common in societies in which intergroup warfare occurs frequently than in societies that are peaceful or suffer intragroup conflict (Sosis, Kress, & Boster, 2007). Likewise, U.S. prison gangs engaged in endemic violent conflict employ tattoos to mark coalitional affiliation. Consonant with the signaling function discussed above, these tattoos differ in their prestige value as a function of their visibility (Phelan & Hunt, 1998): the more visible the tattoo, the stronger the challenge it presents to rivals, and the more it commits the bearer to side with the gang, and thus the greater the prestige accorded it within the group; correspondingly, tattoos correlate with involvement in violence (Bales, Blomberg, & Waters, 2013). Although these examples illustrate how coalitional marking operates under extreme conditions, the aforementioned logic of signaling is not limited to coalitions that exist solely to pursue goals through violent conflict. Rather, this logic potentially applies to any situation in which there is a possibility that conflicts between coalitions could turn ugly. Although isolated incidents of violence between fans of rival sports teams have occurred in the United States, American sports do not suffer the perennial violence that has plagued European football (soccer) matches. Accordingly, fandom in the United States offers an opportunity to investigate the proposal that individuals who mark their coalitional affiliation in socially heterogeneous contexts should be viewed as more formidable even when the coalitions at issue do not primarily revolve around violent conflict.

Because visual markers are the most common form of signaling coalitional affiliation, we sought to initially test the prediction at issue using visual stimuli. However, although clothing is a common means of signaling team affiliation, it is important that participants not have access to information regarding the target individual's actual bodily proportions, as our prediction concerns how participants will envision the target, not how accurately they can assess the target's physique when given the opportunity. We therefore manipulated facial decoration in photographs depicting only a sports fan's face.

The complete datasets for both studies reported in this paper are archived at <http://www.escholarship.org/uc/item/28k1048m>.

## STUDY 1

### Methods

#### Participants and overview of procedure.

After obtaining ethical approval from the University of California, Los Angeles Institutional Review Board, 250 adult UCLA students were recruited on the UCLA campus for a field study advertised as a survey of “Visual Inferences Across Domains,” for \$3 compensation. Data were prescreened to ensure participants completed the entire study, reported being native English speakers, and identified with UCLA. The final sample consisted of 222 adults (60.4% female; 45.5% White; 23.0% Asian; 31.5% Other) ranging in age from 18 to 47 ( $M = 21.01$ ,  $SD = 3.55$ ).

Following the collection of informed consent, in a within-subjects design, participants rated the physical formidability of two men based on cropped images of their faces (see Fig. 1). The images, presented in color, were actually composites created using methods described in Tiddeman, Burt, Perrett (2001); each composite was composed of photos of 25 different men displaying a neutral expression (average age for each composite = 24.2 years;  $SD = 3.65$  years for one composite, and 4.37 years for the other). Both photographs were described as having been taken at a recent sports event held at UCLA. Constituting the experimental condition, one of the two faces was digitally modified, making it appear that the man’s face was painted in support of the University of Southern California, UCLA’s crosstown rival; the other face, constituting the control condition, was unpainted. Which of the two composite faces was painted was counter-balanced across participants, as was the order in which the images were presented.

Participants estimated the target’s bodily muscularity, overall size, and height, in fixed order. Height was estimated in feet and inches; muscularity and overall size were estimated using 6-point image arrays (see Fig. 1). Estimated physical formidability was composited using standardized values for estimated height, overall size, and muscularity ( $\alpha = .70$ ). The standardized values were calculated by subtracting the mean rating in the entire sample from the individual rating, then dividing this difference by the standard deviation for the sample. Accordingly, composite scores above zero are above average for the entire sample, and composite scores less than zero are below average for the entire sample. The physical formidability measures were camouflaged within several filler perceptual judgments involving intuitive estimates based on incomplete information.

Formidability is necessarily relative, and the threat that an antagonist poses will be a function of a variety of attributes of the self. To help gauge whether participants’ estimates of the bodily proportions of the target indeed reflect the threat that the participant views the target as posing, within a set of demographic questions we therefore asked participants “Relative to the typical person of your gender, how good at physical fighting would you be, if attacked?” (1 = *No good at all/Defenseless*; 9 = *Extremely capable/Lethal if necessary*).

### Results

**Envisioned physical formidability.** To compare the overall estimated physical formidability of the signaling versus control targets in this within-subjects design, the height, muscularity, and size estimate scores were first reformatted as long form variables, then standardized and averaged into a single measure of composite physical formidability (a z-score). As predicted, the target individual’s envisioned physical formidability was greater in the signaling condition ( $M = .07$ ,  $SD = .66$ ) than in the control condition ( $M = -.07$ ,  $SD = .80$ ),  $F(1, 442) = 3.93$ ,  $P < .05$ ,  $\eta^2_p = .01$ , 95%CI =  $(-.275, -.001)$ . We next conducted follow-up repeated-measures ANOVAs assessing the individual dimensions of envisioned physical formidability. The target in the signaling condition was estimated to be significantly taller, but did not differ in envisioned muscularity or overall size (see Table I). There were no effects of participant gender, or interactions between gender and condition, on the envisioned physical height, size, or muscularity of the target,  $P_s > .12$ .

**Self-assessed fighting ability and envisioned physical formidability.** Consistent with predictions, the envisioned physical formidability of the signaling target was negatively correlated with participants’ self-assessed defensive fighting ability,  $\beta = -.15$ ,  $P < .03$ . The negative correlation between self-assessed fighting ability and estimations of the control target’s envisioned physical formidability was not significant,  $\beta = -.11$ ,  $P < .10$ . Participants differed in self-assessed fighting ability by gender (females:  $M = 3.43$ ,  $SD = 1.36$ ; males:  $M = 4.15$ ,  $SD = 1.34$ ), but we observed no Gender  $\times$  Fighting Ability moderation of the link between fighting ability and the envisioned formidability of either target,  $P_s > .06$ .

### Discussion

Consonant with the thesis that displaying coalitional affiliation in the presence of members of a rival coalition signals a willingness, and a commitment, to engage in agonistic interaction, the envisioned physical formidability of an attendee at a sporting event is enhanced when the target is a putative supporter of a rival sports team who is

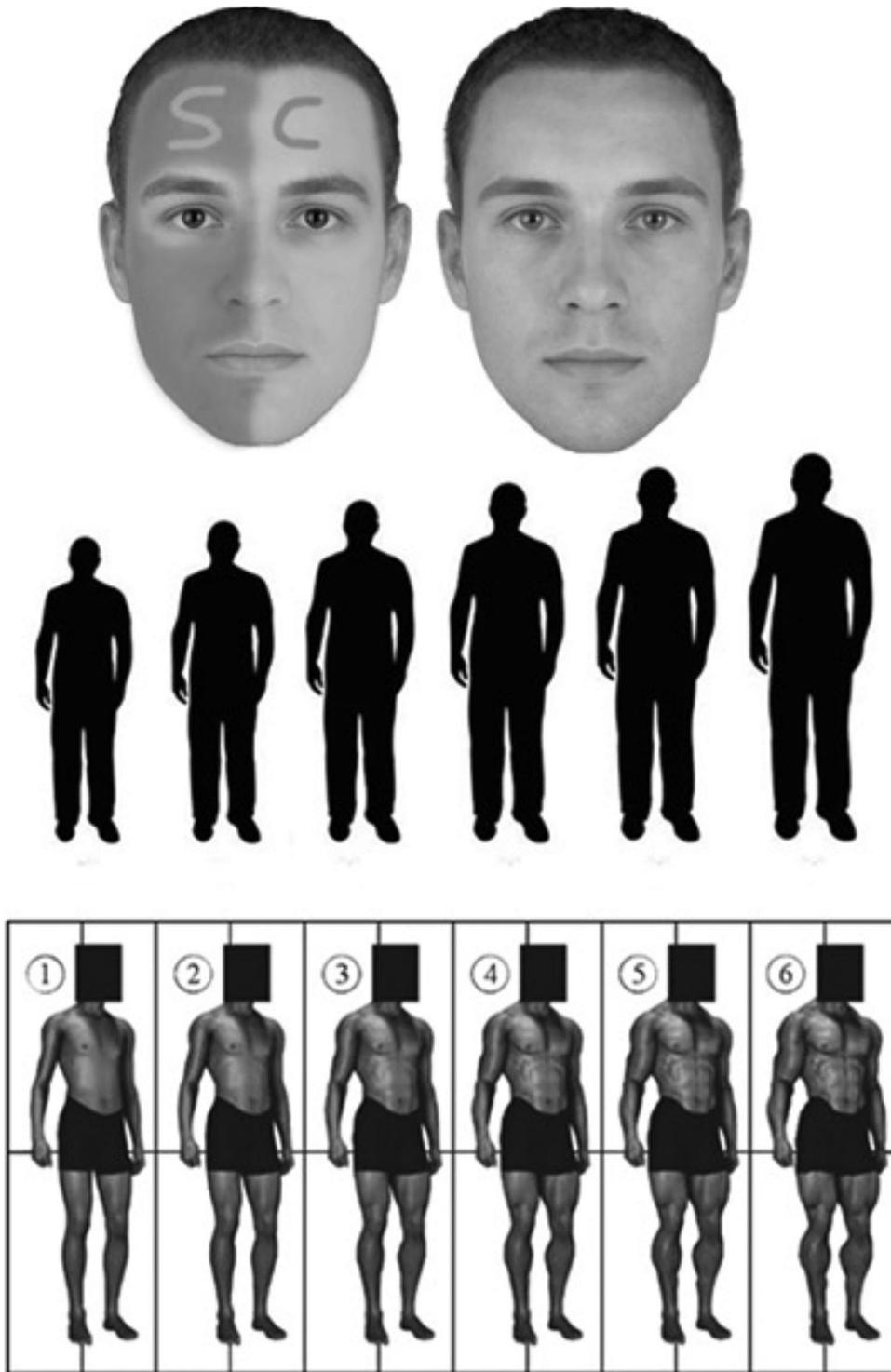


Fig. 1. *Top*: In Study 1, two different composite faces were presented in color with or without University of Southern California (USC) facepaint; one such pair is depicted here. *Middle*: Array used by participants in Studies 1 and 2 to estimate overall size. *Bottom*: Array used by participants in Studies 1 and 2 to estimate muscularity; modified with permission from Frederick and Peplau (2007).

**TABLE I. Mean Estimated Height, Size, and Muscularity (Study 1)**

	Signaling Mean (SD)	Control Mean (SD)	<i>F</i>	<i>P</i>	$\eta^2_p$
Height	70.40 (2.12)	68.03 (5.52)	47.47	<.001	.18
Size	3.90 (.96)	3.98 (.88)	1.95	.164	.01
Muscularity	2.47 (.83)	2.50 (.88)	.50	.482	.00

Note. *N* = 222. Estimated heights are in inches.

wearing face paint in support of his team. Bolstering the conclusion that this reflects a construal of the painted individual as more threatening, participants' self-reported defensive fighting ability was negatively correlated with the envisioned bodily dimensions of the painted target.

Though consistent with our thesis, the core results of Study 1 might be due to the influence of folk models incidental to the hypothesis at issue, such as the observation that avid sports fandom is associated with athleticism and masculinity (Wann, Waddill, & Dunham, 2004), attributes that may influence envisioned bodily dimensions without being directly tied to potential threat. Moreover, it is possible that, independent of issues of coalitional conflict, the act of simply painting one's face in a flamboyant manner for presentation in a highly public context conveys a propensity to take risks, a trait that leads participants to envision the target as physically formidable (Fessler, Holbrook, Tiokhin et al., 2014; Fessler, Tiokhin et al., 2014). Lastly, half of the painted individual's face was red, and prior research indicates that observers may view individuals associated with this color as more aggressive and dominant (Hagemann, Strauss, & Leißing, 2008; Wiedemann, Burt, Hill, & Barton, 2015), an assessment that, in turn, would lead to greater envisioned physical formidability.

In Study 1, we measured envisioned bodily traits, but did not directly measure perceptions of the threat posed by the target individuals, hence ideas orthogonal to violence, such as notions of athleticism, might well be involved. Moreover, although the signaling hypothesis holds that information regarding relative formidability is being broadcast, and hence is available to allies and third parties as well as opponents, nevertheless, given that our participants in Study 1 were presented with a signaling target belonging to a rival coalition, it is possible that the effect obtained in Study 1 does not generalize beyond the limited situation of individuals who are assessing members of an opposing faction.

To address these limitations, we conducted a second study, using vignettes to present a context of political—not athletic—rivalry, one in which there is a long history of violent coalitional conflict, but in which our participants were not involved. In addition to the measures used in Study 1, we employed direct

assessments of the danger that the target is seen to pose, and his intentions as regards possible violence.

## STUDY 2

### Methods

#### Participants and overview of procedure.

After obtaining ethical approval from the UCLA Institutional Review Board, 300 adult participants living across the United States were recruited via Amazon's MechanicalTurk.com survey platform for an online study advertised as a survey of "Social Intuitions from Limited Information," in exchange for \$0.25 compensation. Data were prescreened for complete participation, repeat participation, and correctly answering a "catch question." The final sample consisted of 265 adults (32.8% female; 77.7% White) ranging in age from 18 to 67 ( $M = 28.87$ ,  $SD = 9.59$ ).

Following the collection of informed consent, in a between-subjects design, participants were randomly assigned to read a vignette about a fictional man who either did or did not signal his coalitional affiliation in a context of potential conflict:

Since the 1960s, Northern Ireland has been plagued by violent conflict between two groups. Most members of the Protestant community want Northern Ireland to remain part of the United Kingdom. Most members of the Catholic community want Northern Ireland to join the Republic of Ireland. Although large-scale bombings and attacks have been significantly reduced for the past 15 years, sporadic violence continues to this day. For historical reasons, the color orange symbolizes the Protestant community, while green symbolizes the Catholic community.

Jack is a Protestant who attends college in Belfast, the largest city in Northern Ireland. He enjoys soccer and avidly follows games on television. On Saturday nights, he and his friends like to watch the soccer match on TV and play darts at a pub near the university which caters to both Protestant and Catholic students. Whenever they do, Jack wears a nondescript grey tee shirt and a jacket with a soccer ball [a bright orange tee shirt and a jacket with a British flag] painted on the back.

Next, participants estimated the target's bodily traits in fixed order: height, muscularity, and size, using the measures employed in Study 1. Estimated physical formidability was composited using standardized values for estimated height, overall size, and muscularity ( $\alpha = .60$ ).

Following the ratings of the target's bodily traits, participants rated the threat that he posed: "How dangerous do you think the man might be if a fight were to break out?" (1 = *Not at all Dangerous*; 9 = *Extremely Dangerous*). To assess the possibility that participants might infer that the man's choice of attire reflects a desire to initiate a confrontation, we asked: "What sort of intentions do you think that the man has in the bar?" (1 = *Innocent/Non-violent Intentions*; 9 = *Extremely Violent Intentions*). As in Study 1, participants rated their own defensive fighting ability, answered a suspicion probe, and were debriefed.

## Results

**Envisioned physical formidability.** Replicating the findings of Study 1, the target individual's envisioned physical formidability was greater for the target in the signaling condition ( $M = .11$ ,  $SD = .77$ ) than for the control target ( $M = -.13$ ,  $SD = .67$ ),  $F(1, 263) = 7.60$ ,  $P < .01$ ,  $\eta^2_p = .03$ ,  $95\%CI = (-.421, -.070)$ . Follow-up tests assessing the individual dimensions of envisioned physical formidability showed significant differences in estimated height and estimated size according to the silhouette array, with a similar trend for estimated muscularity (see Table II). There were no effects of participant gender, or interactions between gender and condition, on the envisioned height, size, or muscularity of the target,  $P_s > .15$ .

**Envisioned physical formidability and self-assessed fighting ability.** Envisioned target physical formidability was significantly negatively correlated with participants' self-assessed defensive fighting ability in the sample as a whole,  $b = -.06$ ,  $SE = .02$ ,  $\beta = -.17$ ,  $P < .01$ . Subsequent moderation analyses showed no significant two-way interactions with gender or condition on the correlation between self-assessed fighting ability and envisioned physical formidability,  $P_s > .14$ . Nevertheless, exploratory tests showed that, within the signaling condition, self-assessed fighting ability was negatively correlated with envisioned physical formidability,  $\beta = -.23$ ,  $P < .01$ , whereas no such association held within the control condition,  $\beta = -.07$ ,  $P = .45$ .

We next tested for potential three-way interactions between participant condition, gender, and self-assessed fighting ability. In a model including participant gender, condition, and fighting ability as predictors, the interactions between these variables, and the three-way interaction term, the overall regression was significant,  $R = .291$ ,  $R^2 = .084$ , adjusted  $R^2 = .060$ ,  $F(7, 257) = 3.39$ ,  $P < .01$ , and there was a marginally significant Gender  $\times$  Condition  $\times$  Fighting Ability interaction,  $b = -.18$ ,  $SE = .09$ ,  $\beta = -1.96$ ,  $P = .053$ . Within the control condition, neither male nor female participants evinced significant correlations between self-assessed fighting ability and the target's envisioned formidability,  $P_s > .48$ . Within the male subsample of the signaling condition, however, there was a strong negative correlation between self-assessed fighting ability and the envisioned physical formidability of the target,  $\beta = -.37$ ,  $P < .001$ ; no such association held within the female subsample,  $P = .98$ .

**Envisioned threat and violent intentions.** As predicted, the target individual's envisioned threat was significantly greater for the target in the signaling condition than for the control target (see Table II). Likewise, consistent with the notion that participants associate choosing to display coalitional affiliation with aggression, the signaling target was rated as having greater violent intent than the control target (see Table II). There were no effects of gender, or interactions between gender and condition, on the envisioned threat or violent intentions of the target,  $P_s > .08$ .

**Envisioned threat and physical formidability.** As predicted, envisioned target physical formidability was positively linked to perceived target threat (pooling conditions),  $\beta = .23$ ,  $P < .001$ . Subsequent moderation analyses revealed no significant interaction with condition on the correlation between perceived threat and envisioned physical formidability,  $P > .09$ . Exploratory follow-up tests revealed that, within the signaling condition, perceived threat was positively correlated with envisioned physical formidability,  $\beta = .25$ ,  $P < .01$ , whereas no such association held within the control condition,  $\beta = .06$ ,  $P > .48$ . Thus, the positive correlation between envisioned physical

TABLE II. Mean Estimated Height, Size, Muscularity, Threat, and Violent Intent (Study 2)

	Signaling Mean (SD)	Control Mean (SD)	<i>F</i>	<i>P</i>	$\eta^2_p$	95%CI
Height	71.34 (2.42)	70.73 (2.33)	4.34	.038	.02	-1.184, -.033
Size	4.12 (.81)	3.89 (.83)	5.04	.026	.02	-.425, -.028
Muscularity	2.36 (.95)	2.17 (.74)	3.13	.078	.01	-.392, .021
Threat	3.45 (1.35)	2.28 (1.03)	62.10	<.001	.19	-1.455, -.873
Violent intent	3.24 (1.40)	1.78 (1.00)	94.37	<.001	.26	-1.755, -1.164

Note.  $N = 265$ . Estimated heights are in inches.

formidability and threat observed in the entire sample was driven by the signaling condition.

We observed a significant interaction with participant gender. In a model including gender, envisioned formidability, and the interaction term, the overall regression was significant,  $R = .274$ ,  $R^2 = .075$ , adjusted  $R^2 = .064$ ,  $F(7, 261) = 7.06$ ,  $P < .001$ , and there was a significant Gender  $\times$  Formidability interaction,  $b = .47$ ,  $SE = .24$ ,  $\beta = .46$ ,  $P < .05$ . Within the male subsample of the signaling condition, there was a strong positive correlation between perceived threat and the envisioned physical formidability of the target,  $\beta = .31$ ,  $P < .001$ , whereas no such association held within the female subsample,  $P = .62$ . We observed no three-way Gender  $\times$  Condition  $\times$  Formidability moderation of the link between perceived threat and formidability.

**Mediation analysis.** To assess whether the heightened physical formidability attributed to the signaling target was mediated by attributions of threat, we conducted a mediation test utilizing the bias-corrected bootstrapping procedure (5,000 samples) in the INDIRECT macro for SPSS (Preacher & Hayes, 2008). The signaling condition was the independent variable, estimated physical formidability was the dependent variable, and the threat score was the mediating variable. As predicted, perceptions of relatively greater threat mediated the effect of the signaling condition on estimated physical formidability. The direct effect of condition on estimated physical formidability ( $b = .25$ ,  $SE = .09$ ,  $\beta = .17$ ,  $P < .01$ ) was reduced with threat included in the bootstrap model ( $b = .12$ ,  $SE = .10$ ,  $\beta = .08$ ,  $P = .22$ ), the indirect effect of threat on estimated physical formidability remained significant ( $b = .11$ ,  $SE = .04$ ,  $\beta = .20$ ,  $P < .01$ ), and the confidence intervals did not overlap with zero (95% CI = [.04, .24]).

## Discussion

Reading vignettes describing a situation of political conflict with a history of actual violence, third-party observers assessed an individual who conspicuously advertised his coalitional affiliation as more physically formidable, posing a greater threat to others, and more inclined to violence, than an individual who, despite having the same coalitional affiliation, did not signal it in this manner.

Previously, our research group demonstrated that men's own muscular strength is negatively correlated with their assessments of the bodily dimensions of armed individuals, who pose an implicit threat, but is not correlated with their assessments of unarmed individuals, who pose no such threat (Fessler, Holbrook, & Gervais, 2014). Paralleling these findings, in the present study we found a marked negative correlation between

male participants' self-assessed fighting ability and the envisioned physical formidability of the target individual when the latter displays a signal of coalitional affiliation (and thus reveals an inclination for, and objective commitment to, aggression), but not when the target displays no such signal. Similarly, again only in the signaling condition, we found a substantial positive correlation between male participants' assessments of the threat posed by the target and his envisioned physical formidability. Although the basic representational system at issue appears to operate similarly in men and women (see Fessler, Tiokhin et al., 2014; Fessler, Holbrook, Pollack et al., 2014; Fessler, Holbrook, Tiokhin et al., 2014; Fessler et al., 2012), nevertheless, we can expect that, by virtue of men's greater participation in coalitional aggression, male psychology will be particularly sensitive to factors relevant to intergroup conflict (McDonald, Navarrete, & Van Vugt, 2012; Van Vugt, 2009), and thus men will be more attuned than women to indications that a man is advertising coalitional affiliation in a manner that constitutes both an implicit challenge to members of rival groups and an objective commitment device.

## CONCLUSION

In situations involving interaction with members of rival coalitions, individuals who overtly display indications of coalitional affiliation can be seen as simultaneously challenging their opponents to engage in conflict, and committing themselves to enter such conflict should it erupt. If violence is a possibility, those who are willing to engage in it, and are committed in a manner that makes it difficult to escape, constitute more dangerous adversaries than those who lack these properties; that is, they should be assessed as more formidable. Across two studies, using very different stimuli and quite different samples, we investigated people's assessments of individuals who, via intentional aspects of their appearance, conspicuously advertised their coalitional affiliation in potentially conflictual situations. In both studies, we found that participants envisioned such signalers to be more physically imposing than individuals who did not advertise their coalitional affiliation, a pattern explicable in terms of the use of envisioned size and strength to summarize another's relative formidability.

Our research is subject to a number of limitations. First, given both the small number of contexts we explored and our reliance on samples from the United States, our results should be taken as preliminary. Second, although we interpret participants' estimates of the size and strength of the signaling targets as reflecting the workings of a representational system

that summarizes issues of threat and relative formidability using these dimensions, we cannot rule out an alternative explanation, one based on participants' possible prior beliefs. Given that, as discussed in the Introduction, bodily size and physical strength influence a man's propensity to engage in violence and other assertive or coercive behavior, participants' responses could conceivably reflect epidemiological knowledge derived from quotidian observations. Larger, stronger men may be more likely than smaller, weaker men to conspicuously display signals of coalitional affiliation in situations of potential conflict with rival groups, and hence participants could be drawing upon past experience when estimating the target's size and muscularity. We have previously demonstrated that accounts of this type cannot explain other applications of the representation-of-relative-formidability hypothesis, namely gun ownership (Fessler et al., 2012) and risk-proneness (Fessler, Tiokhin et al., 2014). Nevertheless, we cannot rule out such an explanation here, hence future investigations should address this question. Third, because men pose a greater threat of violence than do women, we limited our stimuli to male targets, reasoning that such stimuli should present the clearest test of participants' predicted reactions to signals of coalitional affiliation. Although prior research indicates that the same representational system is employed in assessments of both male and female targets (Fessler, Tiokhin et al., 2014; Fessler, Holbrook, Tiokhin et al., 2014), and although our theory of objective commitment and dispositional cuing predicts that responses to coalitional signals should apply to actors of both sexes, nevertheless, because we did not employ female targets in our experiments, this possibility remains unexplored at present. Fourth, given the preliminary nature of our investigation, we have favored experimental control over ecological validity, hence our stimuli and dependent measures are considerably removed from real-world interactions. In the future, it will be important to determine whether actual behavior toward target individuals is influenced by the latter's signaling of coalitional affiliation in socially heterogeneous contexts, and whether such behavior is undergirded by representations of relative formidability. Relatedly, given the size and cultural plurality of contemporary industrialized nations such as the United States, and the correspondingly broad range of coalitions, absent compellingly salient contexts of rivalry such as athletic or political contests, the average person may well be relatively indifferent to signals of coalitional affiliation. Identifying the boundary conditions, and determinants thereof, of the phenomenon at issue will therefore be important.

Although prior work summarized in the Introduction indicates that both envisioned size and envisioned muscularity are used to represent relative formidability, in the present studies, only the target's envisioned stature/size displayed the predicted pattern, with envisioned muscularity not differing across conditions in Study 1, and displaying only a trend in the predicted direction in Study 2. Given that stature is associated with both dominance and prestige, while muscularity is more clearly linked to dominance (reviewed in Blaker & van Vugt, 2014), might participants be construing targets who signal coalitional affiliation not as more formidable, but as more prestigious? This is unlikely given that (i) the target in Study 1 was a member of a rival coalition, making participants more likely to disparage than admire him, and (ii) per predictions, the target in Study 2 was viewed as prone to violence, a characteristic generally antithetical to prestige. The prior literature on representations of formidability indicates that the precise relationships between envisioned height, envisioned size, and envisioned muscularity fluctuate somewhat from study to study, most likely reflecting noise. If so, then future experiments, employing larger samples and a broader range of stimuli, should reveal that targets who signal coalitional affiliation in potentially conflictual contexts are conceptualized as both larger and more muscular.

Although the propensity for violence reduces prestige in most contexts, situations of actual or potential agonistic intergroup conflict are a prominent exception. As evidenced by the status implications of different types of tattoos among gang members, in violent intergroup conflict prestige is frequently assigned to in-group members who evince properties of value in combat, including both objective commitment to the in-group and aggressive propensities. The present research examined assessments of a rival out-group member (Study 1) and a contestant in a conflict to which the observer is not a party (Study 2); hence, these investigations do not afford examination of the assignment of prestige to in-group members during conflicts. In conducting such research, it will be important to measure both perceived threat and prestige in addition to, and independent of, envisioned physical formidability, as prior research indicates that, consonant with a phylogeny wherein hominid hierarchies have largely shifted from a dominance basis to a prestige basis, the same representational system employed to summarize formidability can also be used to represent prestige (Holbrook et al., 2016).

If supported by subsequent research, there are numerous implications to our conclusion that observers' impressions of the bodily dimensions of those who conspicuously display coalitional affiliation reflects

their assessments of the threat that such actors pose by virtue of intent, inclination, and objective commitment. For example, this could offer an unobtrusive avenue for investigating the extent to which the potential for aggression may lurk behind such seemingly innocuous actions as consumer displays of brand loyalty—a behavior that, in at least some instances, can lead to violent coalitional conflict (Ewing, Wagstaff, & Powell, 2013). Ultimately, a fuller understanding of the impact of indices of coalitional affiliation may enhance our ability to predict when and where violence will break out, potentially affording preventative measures in a wide variety of contexts.

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