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**Men's Interest in Allying with a Previous Combatant for Future Group Combat**

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### Abstract

**Purpose:** Intra-group and inter-group conflict are likely to have been recurrent features of human evolutionary history. Little research has investigated the factors that affect men's combat alliance decisions, however. The current study investigated whether features of previous one-on-one combat with an opponent affects men's interest in allying with that opponent for future group combat.

**Method:** Fifty-eight undergraduate men recruited from a psychology department subject pool participated in a one-on-one laboratory fight simulation. We manipulated fight outcome (between-subjects), perceived fighter health asymmetry (within-subjects), and the presence of witnesses (within-subjects) over six sets of five rounds of fighting. Following each set, we asked men how interested they would be in allying with their opponent for future group combat.

**Results:** Men were more interested in allying with their opponent for future group combat if their opponent won the fight or if there were witnesses present, but perceived fighter health asymmetry did not affect men's decision to ally with their opponent. Exploratory analyses revealed a two-way interaction between fight outcome and the presence of witnesses, such that winners without witnesses present expressed less interest in allying with their opponent for future group combat.

**Conclusion:** Our findings suggest that men attend to the benefits of allying with a man who has demonstrated relatively superior fighting ability. Alliance with a previous opponent for group combat may vary with the relationship value of the opponent and the utility of demonstrating cooperativeness to third-party observers. These findings inform our understanding of coalition formation.

*Keywords: combat; valuable relationships; conflict; post-conflict reconciliation; coalitions; evolutionary psychology.*

### **Men's Interest in Allying with a Previous Combatant for Future Group Combat**

Inter-group conflict and intra-group conflict have been recurrent features of human evolution. Cross-cultural research indicates that inter-group conflict occurs in the vast majority of cultures studied (Brown, 1991; Pinker, 2011; Wrangham & Peterson, 1996). Evidence from nonhuman primates documents clear cases of inter-group conflict—for example, raids of neighboring territories conducted by male chimpanzees (Wrangham & Peterson, 1996)—suggesting phylogenetic consistency across social primates.

Evidence suggests that human males have evolved information-processing heuristics for solving ancestrally-recurrent adaptive problems related to combat and coalitional aggression (see McDonald, Navarrete, & Van Vugt, 2012). Historical and cross-cultural research documents that inter-group and intra-group conflict is overwhelmingly perpetrated by men (Goldstein, 2001)—a proposition corroborated by physiological, psychological, and behavioral evidence of male-specific adaptations for combat in humans (reviewed in Sell, Hone, & Pound, 2012). The causes of combative fights are predictable (Ong, 2012), such that the events leading to combat include structured escalations (Sell, 2011) that mirror nonhuman escalations of violence (Clutton-Brock, Albonm & Gibson, 1979; Payne, 1998). Because fighting can inflict substantial costs on males (e.g., physical injury, death), escalations typically lead to combat only between relatively evenly matched opponents (Daly & Wilson, 1988; Gould, 2003). As expected, then, men can accurately assess the formidability and physical strength of other men, in part, to gauge whether escalation to physical combat will be successful (Sell et al., 2009).

Combative contexts include one-on-one combat, such as status contests (Wilson & Daly, 1985) and inter-group conflict, such as warfare (Van Vugt, 2009). Research documents cross-cultural acceptability of combative tactics of varying severity across different combative contexts—referred to as *implicit rules of combat* (Romero, Pham, & Goetz, 2014). Following conflict, men often engage in *post-conflict reconciliatory behaviors* (also referred to as post-conflict affiliative behaviors) (Beneson & Wrangham, 2016; see also, Pham, Barbaro, Mogilski, & Shackelford, 2017).

Post-conflict reconciliatory behaviors are any “friendly” behaviors that combatants engage in following a conflict (de Waal, 2000). Post-conflict reconciliatory behaviors have been documented in nonhuman primates, including chimpanzees (de Waal & van Roosmalen, 1979), macaques (Aureli & van Schaik, 1991), and baboons (Castles & Whiten, 1998a, 1998b). In humans, reconciliatory behaviors may include verbal praise and physical contact, such as a hug or a handshake (Beneson & Wrangham, 2016; Pham et al., 2017; Wang & Li, 2007). The *valuable relationships hypothesis* (Cords, 1994; de Waal & Aureli, 1997) posits that post-conflict reconciliation between two combatants occurs when the benefits of future cooperation with a combatant outweigh the costs of prolonged conflict.

Behaviors that promote cooperation with a previous combatant (de Waal, 2000; McDonald et al., 2012) may be particularly likely to occur in intensely social species (Koski, Koops, & Sterck, 2007), such as humans. Men, in particular, may have evolved psychological mechanisms that motivate the formation of male coalitions for inter-group conflict—referred to as *the male warrior hypothesis* (McDonald et al., 2012). Compared to women, men spend more time engaged in affiliative behaviors following conflict, even after intense competition (Beneson & Wrangham, 2016). Research has demonstrated a reduction of future conflict between former opponents following post-conflict reconciliation (Aureli et al., 2002), and that post-conflict reconciliatory behaviors are associated with increases in the perceived relationship value of the transgressor (McCullough, Pedersen, Tabak, & Carter, 2014). Post-conflict reconciliation has also been shown to reduce anxiety in third-party observers, suggesting that public reconciliation between competitors may enhance group cohesion by diminishing the threat of prolonged interpersonal conflict (Judge & Bachmann, 2013).

Post-conflict reconciliation, then, appears to facilitate the maintenance of relationships that may be particularly valuable for future inter-group conflict (de Waal & Aureli, 1997; McDonald et al., 2012). Valuable relationships may arise via formation of future cooperative alliances or through reputation management within the social group. The success of inter-group conflict—and, ultimately, the success of each individual fighter—depends, in part, on the fighting abilities of individual group members. Men may therefore be interested in cooperating with prior one-on-one combatants who honestly demonstrated

relatively good fighting ability. In the present study, we test this by asking participants to compete against another individual in simulated physical combat and provide assessments of their competitor's performance and suitability as a future ally. We hypothesize that men will be more interested in allying with a competitor in a future (hypothetical) two-on-two matchup if that opponent demonstrates an ability to fight well. In the current study, we operationalize good fighting ability in two ways: (1) consistently winning one-on-one matchups, given that better fighting ability (e.g., effective striking, defense) reliably leads to victorious outcomes (Association of Boxing Commissions, 2009); and (2) fighting at a relative health disadvantage, given that men, in particular, can accurately detect opponent differences in formidability, such as size and status (Chiao et al., 2009; Sell et al., 2009). We predict that if an opponent consistently wins one-on-one fights, then the participant will be more interested in allying with the opponent for future group combat (Prediction 1). We also predict that if an opponent fights with a relative disadvantage then the participant will be more interested in allying with that opponent for future group combat (Prediction 2).

To the extent that cooperation between two in-group members is valued by others (Apicella, Marlowe, Fowler, & Christakis, 2012), and given that one-on-one contests are often witnessed by members of the social group, we hypothesize that the presence of witnesses during combative contests will affect men's interest in allying with their opponent for future intergroup combat. Specifically, we predict that men will report more interest in allying with their opponent when in the presence of a witness (Prediction 3).

## Method

### Participants and Procedure

We recruited 58 men ( $M$  age = 20.5 years,  $SD$  age = 3.1 years) from a Midwestern US state university psychology department subject pool<sup>1</sup>. Participants arrived to the laboratory at a scheduled time,

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<sup>1</sup> Data and results reported here were collected as part of a larger project (Pham, M. N., Barbaro, N., Mogilski, J. K., Shackelford, T. K., & Zeigler-Hill, V. (2017). Post-fight respect signals valuations of opponent's fighting performance. *Personality and Social Psychology Bulletin*, 43, 407-417), which examined predictors of post-fight

and were presented with a consent form (all study sessions were conducted by a male researcher). Consenting participants were seated at a private desktop computer station. Participants played *Street Fighter 2*, a one-on-one fight simulation game in which each player controls an avatar that performs various combat behaviors (e.g., punches, kicks, throws). *Street Fighter 2* was originally released on the Super Nintendo gaming console. For the current research, participants played *Street Fighter 2* on a desktop computer version using ZSNES—a software package that emulates the original Super Nintendo console version with high fidelity. ZSNES contains two features relevant to the current research: (1) multiplayer functionality over Local Area Networks that allow multiple players across different desktops to participate in the game, and (2) modifications to the game's software, such as manipulating a player's health. The experimenters informed participants of these unique ZSNES features. Players fought each other in a series of six sets of five rounds (30 rounds total). A colored bar above each player's avatar was displayed at the top of the screen to signify their avatar's health (i.e., the number of times the player can be hit before he loses the round). A round concluded when one player's health bar reached zero.

The experimenter introduced the participant to the game controls and allowed the participant five minutes to learn and practice the game controls prior to beginning the study trials. Participants were provided a verbal cover story by the experimenter in which the participant was informed that he would compete against another participant in a different room. The experimenter then explained the objective of the game (i.e., to win as many rounds as possible), and informed the participant that he would complete 30 rounds against the opponent in the other room. In fact, the participants played against a computer-controlled player. Across all rounds, participants used the same avatar (Ryu) and their opponent (the computer-controlled player) used the same avatar (Ken). Unlike other avatars, all the combative moves of these two particular avatars can be performed by either computer-controlled players or human-controlled players.

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respect. Pham et al. (2017; Study 3) contains further detailed procedures and protocol, and all study materials are available online.

Before each set of rounds, the experimenter acted as if he was communicating with another experimenter on a cell phone to coordinate the start of each fight. The experimenter provided the participants with information about the health of their opponent prior to the start of each set of rounds (i.e., their opponent would have equal, double, or half the amount of health as the participant). After each set of five rounds, participants responded to several questions specific to that set of rounds. Participants provided their responses to these questions privately on a computer for half of the sets, and verbally to the experimenter for half of the sets. On completion of the study, participants were informally probed for suspicion that they were not playing a real participant (no participants reported suspicion), debriefed, and compensated with course research credits.

### **Manipulations and Materials**

We employed a 2 (fight outcome; between-subjects)  $\times$  2 (witnesses; within-subjects)  $\times$  3 (perceived fighter health asymmetry; within-subjects) research design. We manipulated fight outcome by randomly assigning each participant to play against either an easy opponent (win condition) or a difficult opponent (lose condition). Participants assigned to the win condition won more rounds ( $M = 23.97$ ,  $SD = 3.61$ ) than participants assigned to the lose condition ( $M = 2.76$ ,  $SD = 3.35$ ),  $t(56) = 23.20$ ,  $p < .001$ . To manipulate fighter health asymmetries between the participant and the opponent, participants were informed prior to each set of rounds that the experimenter had manipulated the game so that their opponent had (1) equal, (2) double, or (3) half the amount of health as the participant. In fact, neither combatant's health was manipulated. Health bars on the computer screen were occluded to mask the fact that health was not actually manipulated. To manipulate the presence of witnesses, participants responded to questions privately at the computer (witness absent) for 15 rounds, and verbally to the experimenter (witness present) for 15 rounds. The order in which participants responded with a witness present or absent was counterbalanced across participants. Each set of rounds contained a unique combination of the "witnesses" variable (two levels) and the "perceived fighter health asymmetry" variable (three levels), such that each participant received all possible combinations of "witnesses" and "perceived fighter health asymmetry" manipulations by the conclusion of the study. At the conclusion of each set (i.e., every five

rounds), participants answered questions about the set of rounds just completed, including “Would you want your opponent on your team in a two-person versus two-person match-up?” on a 10-point Likert-type scale ranging from 1 (*definitely not*) to 10 (*definitely yes*). Participants also answered several demographic questions (i.e., age, ethnicity, sexual orientation)<sup>2</sup>.

### Results

We conducted a 2 (fight outcome)  $\times$  2 (witness presence)  $\times$  3 (perceived health asymmetry) mixed-model ANOVA to examine whether fight outcome, presence of witnesses, or perceived fighter health asymmetry affected men’s interest in allying with their opponent for future group combat. There was a main effect for fight outcome ( $F(1, 56) = 6.08, p < .05, \eta_p^2 = .10$ , Cohen’s  $f = .33$ ), whereby men who lost ( $M = 7.13, SE = 0.37$ ) were more interested than men who won ( $M = 5.87, SE = 0.37$ ) in allying with their opponent. There was also a main effect for witness presence ( $F(1, 56) = 7.62, p < .01, \eta_p^2 = .12$ , Cohen’s  $f = .37$ ). Men with a witness present ( $M = 6.76, SE = 0.27$ ) reported greater interest in allying with their opponent than men without a witness ( $M = 6.24, SE = 0.28$ ). There was no effect for perceived fighter health asymmetry ( $F(2, 55) = 0.49, p = .62, \eta_p^2 = .01$ , Cohen’s  $f = .01$ ).

We investigated two-way interactions between the manipulated variables on an exploratory basis. A two-way interaction emerged between fight outcome and presence of witnesses ( $F(1, 56) = 6.34, p < .05, \eta_p^2 = .10$ , Cohen’s  $f = .34$ ; see Figure 1). Men who won were more interested in allying with their opponent when there were witnesses present ( $M = 6.37, SE = 0.38$ ), compared to when witnesses were absent ( $M = 5.37, SE = 0.39; t = 2.94, p < .01$ ). For men who lost their fights, the presence ( $M = 7.15, SE = 0.38$ ) or absence ( $M = 7.10, SE = 0.39$ ) of a witness had no effect on their interest in allying with their opponent ( $t = 0.28, p = .78$ ). No additional interactions emerged.

### Discussion

The current study investigated whether three features of one-on-one combat with an opponent—fight outcome, perceived fighter health asymmetry, and the presence of witnesses—affected men’s

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<sup>2</sup> Participants also completed the HEXACO personality inventory (Lee & Ashton, 2004) and a spitefulness inventory (Marcus, Zeigler-Hill, Mercer, & Norris, 2014).

interest in allying with that opponent for future inter-group combat. We hypothesized that men would be more interested in allying with a previous opponent if that opponent demonstrated good fighting ability—operationalized as winning the fight (Prediction 1) and fighting with a health disadvantage (Prediction 2). The results support Prediction 1 but not Prediction 2, in that men were more interested in allying with their previous opponent if their opponent had won the fight, but not when they thought their opponent had a health disadvantage. We also found support for the prediction that men would be more interested in allying with an opponent if there were witnesses present (Prediction 3). Exploratory analyses revealed a two-way interaction between fight outcome and presence of witnesses, such that the presence of witnesses only affected men's interest in allying with their opponent if their opponent had lost the fight.

Given an evolutionary history of inter-group conflict (McDonald et al., 2012) and the benefits afforded to men who engage in strategic combat (Pinker, 2011), it is reasonable to expect that men may attend to features of one-on-one combat to inform their decisions about cooperative alliances. Our results show that men are more interested in allying with an opponent who is successful in one-on-one combative contests. This result accords with evidence indicating that men are attentive to combat-relevant features of other men, such as other men's formidability and physical strength (Sell et al., 2009), and their willingness to display signs of respect to combatants following combat (Pham et al., 2017; Romero et al., 2014). Our results support the proposition that men are interested in allying with combatants that honestly demonstrate competent fighting ability—ability that can, in part, be displayed during one-on-one combative contests.

The results of the current study did not support the prediction that perceived health asymmetries between one-on-one combatants affect men's interest in allying with their opponent. Given the costs associated with physical combat, one-on-one fights do not occur often between unevenly matched opponents insofar as handicapped opponents typically avoid risky encounters (Gould, 2003)—though, men who engage in a handicapped fight in which they are at a disadvantage garner greater respect from their opponent (Pham et al., 2017). Although we caution over-interpretation of a null result, we speculate that the lack of an effect of perceived fighter health asymmetry for combat ally decisions suggests that

fighter symmetry among group combatants (at least with regard to health) may be less important than for one-on-one combat. Future research might explore the composition of group combat members with regard to characteristics known to play a role in one-on-one combative fights, such as opponent size and physical strength. Online group video games, such as Call of Duty, could also be used in future research to test hypotheses with regard to combat ally decisions and formidability assessments—such methods could be applied at a large scale, given national and international eSports tournaments. The null result may also be attributable the lack of salience of the manipulation, given that opponent health bars were occluded from view during the study. A more effective manipulation of health may alternatively reveal that individuals would be less interested in allying with a previous unhealthy combatant, given a general aversion to unhealthy individuals (Schaller & Park, 2011).

Research on humans and on non-human primates shows that combatants sometimes engage in behaviors that promote reconciliation and future cooperation following physical conflict (de Waal, 2000; Sell et al., 2012). One explanation for this behavior is that reconciliation following conflict may signal one's cooperativeness or prestige to the social group—a form of reputation management—or may promote intra-group cooperation that is advantageous for future inter-group conflict (Judge & Bachmann, 2013; McDonald et al., 2012). Our results accord with this explanation, in that men in our sample reported more interest in cooperating with an opponent when witnesses were present. Exploratory analyses revealed that the effect of witnesses being present is qualified by an interaction with fight outcome: losers are generally interested in allying with winners with or without witnesses present; winners of one-on-one combative contests, however, are more interested in allying with their opponent in the future when witnesses were present, as compared to when witnesses were not present. That winners offer future cooperation only if witnesses are present may reflect a means by which socially dominant men maintain prestige (i.e., freely conferred status; Snyder, Kirkpatrick, & Barrett, 2008) in their social group by displaying willingness to cooperate with others, despite their dominant position and ability to supplant competitors. Future research is needed, however, to test this hypothesis.

Several limitations to the current study should be taken into account for appropriate interpretation of the results. First, the relationship between the two fighters was not measured or manipulated in the current research. We cannot confidently speculate whether the participants in the current research perceived their opponent as an in-group member or outgroup member—either of which may influence men’s willingness to ally with a previous combatant. Future research could manipulate in-group and out-group membership of an opponent to investigate how or whether this affects future cooperation. Second, the interaction analyses were conducted as exploratory analyses and should be interpreted with caution and as speculative, not conclusive. Third, the current study is the first, to our knowledge, to investigate the associations between decision-making processes for one-on-one combat and group combat. The reported study is best viewed as a pilot study for future investigation in this domain of inquiry. Finally, the findings of the current study are limited in their generalizability to women. We recruited only men given that they were the primary participants in group combat (Daly & Wilson, 1998; Pinker, 2011) and given that men, more frequently than women, play combative video games, specifically (Lucas & Sherry, 2004). We suspect, however, that similar, although weaker, effects would occur for women participants, in accord with research on combat and formidability with women that show generally weaker effects as compared to men (e.g., Beneson & Wrangham, 2016; Sell et al., 2009).

Research suggests that men have evolved mechanisms designed to address adaptive problems before, during, and after conflict (McDonald et al., 2012; Sell et al., 2012). We investigated whether features of one-on-one combat with an opponent (i.e., fight outcome, perceived fighter health asymmetry, presence of witnesses) affected men’s interest in allying with that opponent for future inter-group combat. The results show that losers are more interested in future cooperation with winners—suggesting that men attend to the benefits of allying with a man who has demonstrated superior fighting ability. The results also show that men are more interested in allying with an opponent when witnesses are present—suggesting that men’s interest in future cooperation may function to maintain prestige or signal cooperativeness to others. The findings of the current study thus contribute valuable data to the understanding of how humans form coalitions (see also, Glowacki et al., 2016). We suggest that allying

with a previous opponent for group combat may vary with the relationship value of the opponent and with the benefits afforded by demonstrating cooperativeness to third-party observers.

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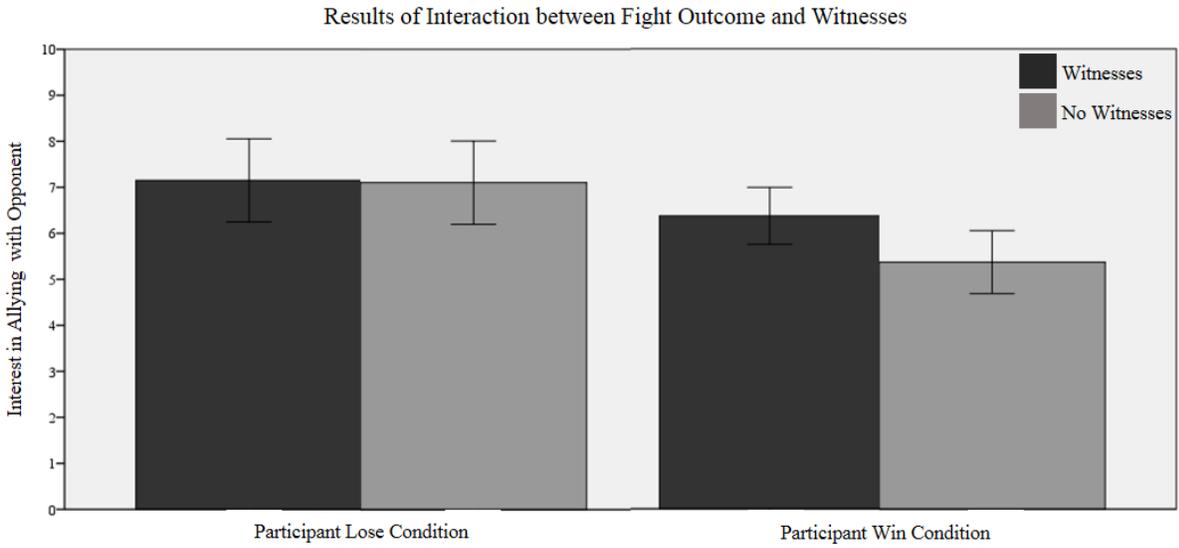


Figure 1. Results of two-way interaction between fight outcome and witnesses predicting men’s interest in allying with an opponent for future combat. Error bars represent 95% confidence intervals.

**Bio-sketch**

**Nicole Barbaro** is a PhD student in evolutionary psychology at Oakland University, studying under the advisement of Todd K. Shackelford. Her primary research program examines the etiology, development, and genetic underpinnings of interpersonal aggression and romantic attachment dynamics. For more information on her research and publications, please visit [www.nicolebarbaro.com](http://www.nicolebarbaro.com)

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