

## THE PSYCHOLOGY OF RIVALRY: A RELATIONALLY DEPENDENT ANALYSIS OF COMPETITION

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**We investigate the psychological phenomenon of rivalry and propose that competition is inherently relational, thus extending the literatures on competition between individuals, groups, and firms. Specifically, we argue that competitors' relationships, determined by their proximity, attributes, and prior competitive interactions, influence the subjective intensity of rivalry between them, which in turn affects their competitive behavior. Initial tests in NCAA basketball support these ideas, indicating that teams' similarity and interaction histories systematically predict rivalry, and that rivalry may affect team members' motivation and performance. Implications for the management of employees, as well as for organizations' competitive strategies, are significant.**

When the new schedule would come out each year, I'd grab it and circle the Boston games. To me, it was The Two and the other 80.

—Magic Johnson

The first thing I would do every morning was look at the box scores to see what Magic did. I didn't care about anything else.<sup>1</sup>

—Larry Bird

Competition is a fact of life; employees compete for promotions, groups of researchers vie for grants, and companies fight for market share. Typically associated with competition is the drive to win, or defeat one's opponents. However, not all opponents are alike. Certain competitors, or rivals, can instill a motivation to perform that goes above and beyond an ordinary competitive spirit or the objec-

tive stakes of the contest. It is clear from the opening quotes that Magic Johnson and Larry Bird viewed contests with each other as far more significant than games against other teams and players and that they were heavily focused on, indeed almost obsessed with, their relative levels of performance.

Although these sorts of rivalries are prominent in sports, they may arise in many other settings as well. A student may be particularly motivated to outperform certain peers; an academic may closely monitor the citation counts of certain other scholars. In the business world, rivalry may be especially common. Within firms, employees who find themselves repeatedly competing for bonuses or promotions may come to see one another as rivals in the race for career advancement. Between firms, long-standing industry competitors, such as Oracle and SAP, Coke and Pepsi, or Microsoft and Apple, may come to define success by their performance vis-à-vis one another. In turn, these rivalries can grow so intense as to lead to abnormal, suboptimal, or downright shocking competitive behavior. For example, in 1993, Virgin Atlantic won a libel suit against British Airways after the latter admitted to having launched a "dirty tricks" campaign against its rival, which included calling Virgin's customers to tell them their flights had been cancelled in addition to circulating rumors that Virgin CEO Richard Branson was infected with HIV (Branson, 1998). In a slightly less scandalous example, Bos-

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We thank Cameron Anderson, Dan Elfenbein, Adam Grant, David Kenny, Ajay Mehra, Chris Rider, Philip Tetlock, and Robb Willer for their helpful feedback and comments, as well as our three anonymous reviewers and Associate Editor Peter Bamberger. We also thank Alexander Song and Syed Rizvi for their assistance with data collection. Lastly, we recognize the support provided by the Institute for Research on Labor and Employment at the University of California, Berkeley.

<sup>1</sup> The source of these quotes is [http://www.nba.com/encyclopedia/ryan\\_rivalries.html](http://www.nba.com/encyclopedia/ryan_rivalries.html). Magic Johnson and Larry Bird were professional basketball players and key members of the Los Angeles Lakers and the Boston Celtics, respectively.

ton Scientific recently overpaid for its acquisition of Guidant—later called “arguably the second-worst” acquisition ever (Tully, 2006)—in large part because it was bidding against rival Johnson & Johnson (Malhotra, Ku, & Murnighan, 2008; Tully, 2006).

It is evident from these examples that rivalry is a powerful psychological phenomenon with substantial behavioral consequences. To date, however, researchers have paid little attention to the psychology of rivalry, which is symptomatic of a broader lack of study of the relationships between competitors. We attempt to fill this gap by presenting a theory of rivalry as a subjective relationship between competitors and by investigating its antecedents and consequences. In doing so, we draw upon the literatures on competition between individuals, groups, and organizations. After outlining our theoretical model, we report a first test of our hypotheses in a setting known to be rife with rivalry: National Collegiate Athletic Association (NCAA) basketball.

## BACKGROUND AND THEORY DEVELOPMENT

### Prior Research on Competition

A logical starting point for the study of rivalry is the broader topic of competition. Because research on competition has addressed the individual, group, and organizational levels, we briefly review each of these literatures. A common theme among them is an underemphasis on the relationships—and by extension, the rivalries—that exist between competitors.

**Competition between individuals.** Deutsch (1949) defined competition in purely situational terms, as a setting in which the goal attainment of participants is negatively linked, so that the success of one participant inherently comes at the failure of the other. Following from this definition, studies of interindividual competition have typically examined participants in a laboratory setting, pitting them against one another or against confederates of the experimenter (e.g., Beersma, Hollenbeck, Humphrey, Moon, & Conlon, 2003; Deci, Betley, Kahle, Abrams, & Porac, 1981; Reeve & Deci, 1996; Scott & Cherrington, 1974; Stanne, Johnson, & Johnson, 1999; Tauer & Harackiewicz, 1999). For example, participants are paired with a confederate and told to try to complete more puzzles than him or her (Deci et al., 1981). Although this approach has been successful in isolating the effects of competition as defined by Deutsch, it may fail to fully capture the essence of competition in the real world, where competitors often know one another

and have histories of prior interaction. Indeed, the vast majority of studies on interindividual competition match unacquainted individuals in the laboratory, and even field studies of competition do not typically distinguish participants on the basis of their prior relationships (e.g., Brown, Cron, & Slocum, 1998; Tauer & Harackiewicz, 2004).

In contrast, we believe that the nature of competition may vary depending on the relationship between competitors. For instance, competing against a familiar foe may be quite a different experience than competing against a stranger. Although little research has directly examined relationships between competitors, related literatures suggest their importance. For instance, game theorists have shown that the decisions made by participants in a prisoner's dilemma game are affected by the prior interactions they have had with their partners (Bettenhausen & Murnighan, 1991). Such findings have led researchers to focus on repeated game scenarios as opposed to isolated interactions (e.g., Boles, Croson, & Murnighan, 2000; Chen & Bachrach, 2003; Sivanathan, Pillutla, & Murnighan, 2008). Similarly, researchers in the area of negotiations have shown that relationships and prior interactions can affect both negotiators' behaviors and outcomes (Curhan, Elfenbein, & Eisenkraft, 2009; Drolet & Morris, 2000; Thompson, Valley, & Kramer, 1995; Valley, Neale, & Mannix, 1995). Finally, a recent study on auction behavior indicates that people are more likely to exceed their bidding limits when facing a few, rather than many, competing bidders, suggesting that rivalry may develop between bidders and push them to try to achieve “victory” (Ku, Malhotra, & Murnighan, 2005).

**Competition between groups.** Studies examining competition between groups have closely resembled those on competition between individuals. In the typical laboratory experiment, participants are placed into groups, these groups are pitted against one another, and measures of motivation, cohesion, and performance are then collected (e.g., Mulvey & Ribbens, 1999). Sometimes, an individual-level competition condition is included as well, with the goal of comparing interindividual with intergroup competition (Erev, Bornstein, & Galili, 1993; Hammond & Goldman, 1961; Julian & Perry, 1967; Tauer & Harackiewicz, 2004; Young, Fisher, & Lindquist, 1993). Regardless, the relationships between competing groups are rarely measured or manipulated.

Certain studies on the related topic of intergroup bias, however, support the idea that intergroup attitudes and behavior can be relationally dependent. Intergroup bias refers to tendency for people to perceive their own groups more positively than

other groups (Brewer, 1979; Sherif, Harvey, White, Hood, & Sherif, 1961; for a recent review, see Hewstone, Rubin, and Willis [2002]). Although much of this work is steeped in the “minimal group paradigm,” wherein arbitrary characteristics are used to divide participants into groups (e.g., Brewer, 1979; Tajfel, Billig, Bundy, & Flament, 1971), a number of studies have addressed the moderating effects of the relationship between groups. These studies indicate that the strength of intergroup bias can depend on the amount of interaction between groups (e.g., Janssens & Nuttin, 1976; Rabbie & Wilkens, 1971), the nature and outcomes of these interactions (e.g., Pettigrew, 1998; Rabbie, Benoist, Oosterbaan, & Visser, 1974; Wilson & Miller, 1961), perceived similarity (e.g., Jetten, Spears, & Manstead, 1998), and relative status (Branthwaite & Jones, 1975; for a recent meta-analysis, see Bettencourt, Dorr, Charlton, and Hume [2001]).

**Competition between organizations.** Historically, much of the research on interfirm competition has also ignored the role of relationships. Organizational ecologists have typically conceived of competition as occurring between organizational forms, or populations of similarly structured organizations (Carroll & Hannan, 1989; Hannan & Freeman, 1989). Network researchers have typically examined competition between firms as defined by their structural equivalence—that is, the degree to which they conduct transactions with the same suppliers and consumers (e.g., Burt, 1988). Although this type of analysis involves a consideration of relationships with third parties, there has been little study of the direct relationship between competitors themselves. Lastly, in classical economic theory, competition is generally treated as a property of aggregate market structure (e.g., free market versus oligopoly [Scherer & Ross, 1990]), with competing firms depicted as anonymous actors (Porac, Thomas, Wilson, Paton, & Kanfer, 1995), again leaving little role for interfirm relationships.

However, over the past two decades, there has been increasing focus on the role of relationships in interfirm competition (e.g., Baum & Korn, 1999; Chen, 1996; Chen, Su, & Tsai, 2007). Following Porter (1980), researchers have studied the exchange of competitive moves between firms—referred to as “interfirm rivalry”—such as market entry or new-product launches (Chen, 1996; Chen & Hambrick, 1995; Chen, Smith, & Grimm, 1992). A number of studies have suggested that the competitive strategies competing firms pursue are influenced by aspects of their relationship, such as relative size (Chen et al., 2007), market overlap (Baum & Korn, 1996), multimarket contact (Baum & Korn,

1996, 1999), and resource similarity (Chen, 1996). This work underscores the importance of considering relational factors in interfirm competition; however, it still leaves much to be learned. First, this work tends to focus on the relative attributes of competing firms (e.g., size, resource similarity), leaving the role of prior interactions between firms largely unstudied (although Chen et al. [2007] did consider how recent competitive exchanges may influence ensuing strategic endeavors). Second, the conception of interfirm rivalry could be expanded to encompass more than just the exchange of competitive moves. These moves are but one possible consequence of rivalry, and factors orthogonal to rivalry, such as market conditions, may also influence them.

### **Rivalry: A Relational and Subjective Phenomenon**

We believe that understanding of competition can be increased by considering its relational context. As reviewed, research on interindividual and intergroup competition has generally overlooked relationships between competitors, thus effectively excluding the study of rivalry, despite evidence from related literatures that suggests its importance. Research on competition at the firm level has made greater progress, having identified a number of relational predictors of competitive behavior (e.g., levels of market overlap, resource similarity, etc.); however, much remains to be studied.

Prior research has sometimes used rivalry as simply a synonym for competition; by contrast, we treat it as a distinct construct. We conceptualize *rivalry* as a subjective competitive relationship that an actor has with another actor that entails increased psychological involvement and perceived stakes of competition for the focal actor, independent of the objective characteristics of the situation. In other words, rivalry exists when an actor places greater significance on the outcomes of competition against—or is more “competitive” toward—certain opponents as compared to others, as a direct result of his or her competitive relationships with these opponents (with any financial, reputational, or other objective stakes held constant). Thus, this conception of rivalry captures the extent to which competition is relational, unlike models of competition in which competitiveness is driven purely by objective threat or the extent to which actors’ goals are in opposition. Several additional aspects of this conceptualization warrant further discussion.

First, in addition to being relationally driven, rivalry is subjective; that is, it exists in the minds of competitors. This means that, in contrast to objec-

tive conceptions of competition, in a relational view rivals cannot be identified solely by their positions in markets, hierarchies, or other competitive arenas (e.g., Bothner, Kang, & Stuart, 2007; Garcia, Tor, & Gonzalez, 2006), nor can rivalry be inferred simply from the characteristics of a competitive setting (e.g., Deutsch, 1949).<sup>2</sup> Second, prior interaction is central to rivalry, as relationships are generally formed over time and via repeated interaction. Although the role of relative attributes in determining competitive behavior has been explored in certain literatures, the role of prior interaction has gone largely unstudied. We believe that competitive experiences can leave a lasting psychological residue that may influence competitors' behaviors even long after the contests have been resolved.

Third, rivalry magnifies competitors' psychological stakes independent of objective stakes, and as a result, it may lead to departures from economically rational behavior. Examples include Boston Scientific's costly acquisition of Guidant and the general tendency for bidders to exceed their preauction limits when facing fewer competitors (Ku et al., 2005). Similarly, as contests between rivals are relationally embedded, their competitive behavior toward one another may be influenced by aspects of their relationship—such as prior contests long since decided—that may be irrelevant from a rational standpoint. Furthermore, outcomes of competition against rivals are apt to provoke stronger reactions, in terms of emotions and ensuing attitudes and behaviors, than outcomes of competition in the absence of rivalry. Fourth, rivalry may vary in strength, much like friendship or other relationships. Lastly, although it may often be two-sided, the subjective nature of rivalry means that reciprocity is not a requirement; one side can feel rivalry while the other does not.

### Rivalry at Multiple Levels of Analysis

Anecdotal evidence indicates that rivalry can form between individuals, groups, organizations, and even countries. Although some aspects of rivalry are surely level-specific, we attempted to develop hypotheses that are general enough to apply across levels of analysis and leave the investigation of differences for future work. Our theoretical argu-

ments are largely psychological; however, there is reason to believe that they apply to collectives as well as to individuals. At least since Cyert and March's (1963) forwarding of the behavioral theory of the firm, organizational researchers have used psychology-based theories to predict firm-level competitive behavior. Social comparison theory (Festinger, 1954) formed the basis for the study of "aspiration levels" among firms, which in turn have been shown to predict organizational strategy and growth (Greve, 1998, 2008). Cognitive biases have been argued to affect firms' decisions to enter new markets and make acquisitions (Zajac & Bazerman, 1991). Managerial confidence has been posited as a predictor of competitive inertia (Miller & Chen, 1994) and the complexity of firms' strategic repertoires (Miller & Chen, 1996). Lastly, the "awareness-motivation-capability" perspective is a prevailing theoretical framework in recent competitive strategy research (e.g., Chen, 1996; Chen et al., 2007). More generally, given that a few key individuals and decision makers typically determine a firm's strategy, the dispositions, cognitions, and motivations of these individuals can influence firm-level outcomes (Hambrick & Mason, 1984; Hayward & Hambrick, 1997; Hiller & Hambrick, 2005; Miller & Dröge, 1986; Staw & Sutton, 1992).

### THEORETICAL MODEL AND HYPOTHESES

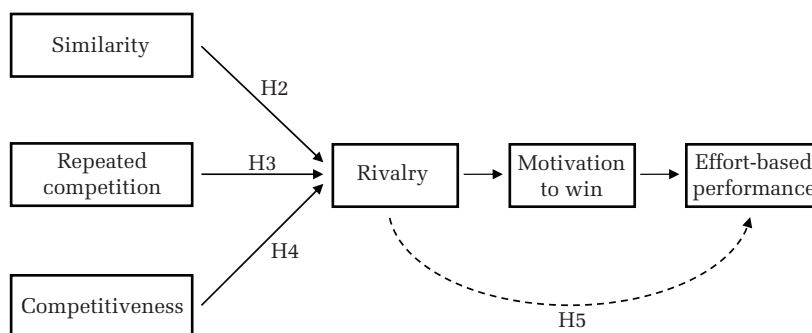
Figure 1 depicts our theoretical model of rivalry and highlights the hypotheses that we tested empirically. These hypotheses are written in general terms, with "actor" and "competitor" meant to include competing individuals, groups, and organizations.

#### Rivalry Varies at the Relationship Level

On the basis of our arguments with respect to the relational nature of competition, we predict that, in a given competitive environment, perceptions of rivalry between actors will vary meaningfully at the relationship, or dyad, level. That is, actors will reliably identify certain opponents as rivals because of the relationships they have with these opponents. Again, this notion stands in contrast to the idea that competition is driven purely by the characteristics of a given competitive environment—that is, by the extent to which competitors are vying for scarce resources. Further, this prediction implies that the attributes of the individual actors cannot fully predict rivalry, and hence, competitive intensity. For example, although high-status actors may elicit higher competitive intensity from their opponents on average, we predict the

<sup>2</sup> Some researchers working at the macro level have similarly argued for the importance of considering subjective perceptions of competition in addition to more objective measures (Chen et al., 2007; Porac et al., 1995; Porac & Thomas, 1994; Reger & Palmer, 1996).

**FIGURE 1**  
**Theoretical Model**



emergence of additional patterns of rivalry that only the unique relationships between competitors can capture.

*Hypothesis 1a. Perceptions of rivalry vary significantly at the dyad level.*

Furthermore, we predict that perceptions of rivalry will not only vary at the dyad level, but that they will be driven more by competitors' relationships than by their individual characteristics.

*Hypothesis 1b. Perceptions of rivalry are determined more by the relationship between competitors than by their individual characteristics.*

### Antecedents of Rivalry

In addition to testing the extent to which rivalry varies according to competitors' relationships, we investigate how and why rivalry forms. How is it that actors may come to have this subjective desire to outperform certain other opponents, even independent of objective stakes? Although idiosyncratic events likely play a role, certain general conditions may also contribute to the formation of rivalry. We focus our theorizing on three broad factors that influence relationships: actors' proximity, relative characteristics, and history of interaction. A common theme runs through the first two factors: similarity, both in terms of location and actors' attributes, may be an antecedent of rivalry.

A large body of research in psychology and sociology suggests that similarity fosters increased liking, attraction, and cooperation as well as greater cooperation (Byrne, 1971; McPherson, Smith-Lovin, & Cook, 2001; Newcomb, 1963). However, with respect to competitors, this may not be the case—instead, greater similarity may breed greater rivalry, for several reasons. First, with regard to location, closely located competitors are more visible and salient in actors' minds, and thus they may be more likely to be seen as rivals (e.g., Porac et al.,

1995). Indeed, research has indicated that geographically proximate firms compete more intensely than distant ones do (Baum & Mezias, 1992; Porac, Thomas, & Badenfuller, 1989; Yu & Cannella, 2007). Of course, geographic proximity may be less relevant to large, geography-spanning organizations, although a recent study of competition between multinational automakers found that geographic distance between home countries still predicted the likelihood and frequency of competitive action (Yu & Cannella, 2007). Further, many large companies, such as hotel chains and airlines, compete in geographically defined markets, suggesting that the geographic overlap of firms' markets may drive rivalry as well (Chen, 1996).

Second, with regard to actors' characteristics, social comparison theory states that people strive to evaluate themselves, and as a consequence, tend to compare their performance with that of others of similar ability levels (Festinger, 1954; for similar firm-level arguments, see Greve [1998, 2008] and Porac et al. [1989]). In turn, this focus on the relative performance of similar others can heighten perceptions of competitiveness (Goethals, 1986; Hoffman, Festinger, & Lawrence, 1954). Similarly, group researchers have found that similarity between groups can foster greater feelings of threat and increased intergroup bias (e.g., Henderson-King, Henderson-King, Zhermer, Posokhova, & Chiker, 1997; Jetten et al., 1998). Further, firms that are similar in size (Baum & Mezias, 1992), form (Porac & Thomas, 1994), and resource or market profile (Baum & Korn, 1996; Chen et al., 2007) tend to compete more intensely than those without such similarities.

Lastly, competitors that are similar, either in location or characteristics, may have similar "valued identities," or identities they strive for. For example, two closely located universities may both covet the title of top school in their region; two runners of the same gender and similar age may both strive to

be among the best in the subcategory of runners defined by that age range and gender. Thus, competition against similar others tends to be identity relevant, which in turn should increase the psychological stakes of competition and hence rivalry. Indeed, Britt (2005) showed that people's levels of motivation and stress increase when a task is seen as relevant to their valued identities, and Tesser (1988) argued that people are threatened by the success of close others on self-relevant dimensions (also see Menon, Thompson, & Choi, 2006).

Overall, we predict that similarity between competitors, in terms of their location and their characteristics, will foster greater rivalry. Of course, economically rational reasons exist for why similarity should result in increased competitiveness; for example, similar competitors often compete for the same scarce resources and thus pose greater objective threats to one another (e.g., Chen et al., 2007). However, as discussed above, similarity may also affect subjective perceptions of competitive stakes independent of these objective factors, suggesting that it is an antecedent to rivalry.

*Hypothesis 2. Rivalry between competitors is positively related to their similarity.*

We next turn our attention to competitors' histories of prior competitive interaction, in terms of both quantity and quality. Although several prior studies have suggested a relationship between similarity and competitiveness, the role of prior interaction between competitors has been less studied. As reviewed above, much of the research has been conducted in one-shot settings, and researchers have generally argued that the characteristics of a current setting (e.g., its reward structure or market conditions) determine competitive behavior, without considering past contests. Indeed, from a purely rational standpoint, little reason may exist for contests no longer relevant to a current setting to continue to influence competitive perceptions. Taking a psychological perspective, however, we posit that the experience of competition can leave a competitive residue that endures even after contests have been decided; in other words, that competition is path-dependent. In support of this idea, a recent study showed that participants who were randomly assigned to compete with each other continued to compete even after the task conditions were changed in such a way that cooperation was in their best interest (Johnson, Hollenbeck, Humphrey, Ilgen, Jundt, & Meyer, 2006). At the firm level, research has shown that managers' perceptions of their firms' primary competitors often reflect past competitive conditions as opposed to current ones (Reger & Palmer,

1996), also in line with the idea that competition can leave a lasting psychological residue.

With regard to the quantity of competitive interactions, therefore, repeated competition is likely to foster greater rivalry, as the competitive residue from past contests accumulates. In a reversal of the "mere exposure" effect (Zajonc, 1968), researchers found that repeated exposure to initially aversive stimuli led to increasingly negative evaluations (Brickman, Redfield, Crandall, & Harrison, 1972). Similarly, repeated exposure to the same competitive stimulus (i.e., an opponent) may lead to increasing perceptions of competitiveness. Thus, we predict that the sheer quantity of competition between actors will predict rivalry.

*Hypothesis 3. Rivalry between competitors is positively related to the number of competitive interactions in which they have engaged.*

It is worth noting that although competitive relationships can often be broken down into a series of contests—such as games between sports teams and exchanges of competitive moves (e.g., product innovations) between firms—competition can also be continual, such as the case in which two firms are continually jockeying for market share. Therefore, repeated competition can also be conceptualized as simply the length of time during which actors have competed with each other. Further, some macro-level research has shown that high levels of multimarket competition can actually lead firms to limit their aggressive moves toward one another, a phenomenon known as *mutual forbearance*. However, this is likely due to increased concern over possible retaliation (e.g., Baum & Korn, 1996) rather than any reduction in feelings of rivalry. That is, although multimarket contact can indeed constrain firms' competitive moves, underlying feelings of rivalry may still exist and may influence behavior in other domains.

The outcomes of past competitive interactions may also influence the formation of rivalry; certain contests may leave more of a lasting trace than others. Specifically, we predict that rivalry will be positively related to the "competitiveness" of prior contests, or the extent to which competitors have been evenly matched, for two reasons. First, contests decided by small margins are likely to elicit counterfactual thoughts about what might have been (e.g., "If things had gone slightly differently, I would have won") as well as strong emotional reactions (Kahneman & Miller, 1986; Medvec, Madey, & Gilovich, 1995; Medvec & Savitsky, 1997). This increased rumination and affect may cause these close contests to remain especially accessible to competitors, thus more strongly influencing their ensuing competitiveness and ri-

valry. Second, competitors who have been evenly matched in the past will likely anticipate being evenly matched in the future, which may also increase subjective competitiveness, or rivalry. Indeed, research has shown that outcome significance (i.e., the importance that people place on success) tends to be highest under moderately difficult conditions, as opposed to easy or impossible ones (Brehm, Wright, Solomon, Silka, & Greenberg, 1983).

*Hypothesis 4. Rivalry between competitors is positively related to the historic competitiveness of their match-up.*

At the firm level, competitiveness can be measured in terms of firms' relative performance during past financial periods. For example, airlines measure performance as revenues per available seat mile flown (Miller & Chen, 1996) and via Federal Aeronautics Administration statistics on lost luggage and on-time arrivals. Therefore, we might predict that airlines that have been historically evenly matched on these metrics will have stronger rivalries. More broadly, a variety of regularly released performance metrics exist at the firm level, including sales, earnings, changes in market share, changes in stock price, and quality ratings (e.g., from J.D. Power and Associates), all of which could form the basis for a historically competitive match-up.

Overall then, we predict that similarity, repeated competition, and past competitiveness will all lead to rivalry. Again, we are in effect proposing a path-dependent conception of competition, wherein contests between competitors are expected to continue to influence competitive perceptions even after outcomes have been decided. This view contrasts with that expressed in most prior research on competition in psychology, organizational behavior, and economics, and it suggests the potential for financially irrational competitive behavior.

It is important to note that the proposed antecedents of similarity (in ability or status) and competitiveness can be closely related. For example, sports rivalries may involve competitors who are roughly equal in ability and who have also been historically evenly matched. Rival firms may hold similar market shares, in addition to having achieved comparable profitability during prior financial periods. However, although similarity and competitiveness may often be correlated, they are conceptually distinct. Similarity is measured in terms of relative, observable characteristics; competitiveness, in terms of the outcomes of prior contests. We expect past competitiveness to predict rivalry even when we control for similarity in status or ability, thus supporting our notion of rivalry as path-dependent.

## Consequences of Rivalry

We believe that rivalry may have a range of important consequences for the attitudes, decisions, and behaviors of competitors. In this initial investigation, however, we focused on motivation and task performance, the dependent measures that have historically attracted the most attention from psychological researchers of competition. Indeed, in what is recognized as the first published study in the field of social psychology, Triplett (1898) documented a link between competition and task performance. Specifically, Triplett observed that bicyclists were faster when racing together than when racing alone and that cyclists racing in direct competition with each other produced the fastest times, which Triplett attributed to the "power and lasting effect of the competitive stimulus" (1898: 4–5).

Since Triplett, many researchers have studied the effects of competition on motivation and performance, with mixed results. On one hand, a number of studies have similarly linked competition to enhanced motivation (e.g., Mulvey & Ribbens, 1999; Tauer & Harackiewicz, 2004) and task performance (e.g., Brown et al., 1998; Erev et al., 1993; Scott & Cherrington, 1974; Tauer & Harackiewicz, 2004). On the other hand, some studies have shown that competition, as compared to cooperation, results in reduced motivation and productivity (e.g., Deci et al., 1981; Deutsch, 1949; Hammond & Goldman, 1961; Kohn, 1992; Stanne et al., 1999). A number of apparent moderators help to explain these divergent findings. For example, individuals high in achievement orientation appear to be particularly motivated by competition (Epstein & Harackiewicz, 1992; Tauer & Harackiewicz, 1999). Also, cooperation appears to benefit performance under conditions of high task interdependence, whereas competition may be better under low interdependence (Miller & Hamblin, 1963).

In addition to noting these moderators, it is worth noting that researchers have largely relied on experimental paradigms in which participants are induced to compete with people they have never met before and may see little reason to compete against. Indeed, to the extent that people feel coerced to compete, self-determination theory predicts a negative effect on motivation (Reeve & Deci, 1996). However, in the real world actors often choose to compete—for instance, an individual enters a political race, or a firm enters a new market. Thus, naturally occurring rivalry may differ substantially from competition in the lab. In fact, recent studies linking competition to improved performance have typically been based on field rather

than laboratory data (e.g., Brown et al., 1998; Tauer & Harackiewicz, 2004).

All things considered, we predict a positive link between rivalry and motivation: real-world contests against known rivals will push competitors to succeed. Given our conceptualization of rivalry as a relationship that magnifies the subjective valence of competitive outcomes, this prediction also follows from established theories of work motivation, such as expectancy theory (Van Eerde & Thierry, 1996; Vroom, 1964).

How will this motivational boost manifest itself in task performance? Researchers have long recognized that increased motivation and arousal can both benefit and hamper individuals' performance, depending on task characteristics such as complexity and degree of novelty (e.g., Zajonc, 1965). We therefore propose that rivalry will benefit performance on tasks for which a clear, positive link exists between motivation and performance—that is, tasks for which success is based more on effort than on precision or accuracy. Indeed, in some sense, effort-based task performance can be seen as a behavioral measure of motivation.

*Hypothesis 5. Feelings of rivalry toward one's competition leads to increased performance on effort-based tasks.*

At the group and organizational levels, factors such as the extent to which members are working independently versus interdependently may complicate the rivalry-to-performance link. In general, however, performance on effort-based tasks should be similarly enhanced by intergroup and interorganizational rivalry. Assuming some level of group or organizational identification on the part of individual members, these rivalries should motivate them to help their groups and organizations succeed, once again because of the increased psychological stakes of competition. In turn, greater effort on the part of individual members will generally lead to greater collective performance.

#### **EMPIRICAL SETTING: NCAA BASKETBALL**

We conducted a first test of our theory within NCAA Men's Basketball, examining rivalries between teams. This was an excellent setting for an initial test of our hypotheses, particularly with regard to the relational nature of rivalry and its antecedents, for several reasons. First, it is a setting in which many rivalries are known to exist, allowing us to be confident that we were studying the true phenomenon as well as providing a large enough sample for statistical analysis. Second, a wealth of publicly available data on teams and their histories

of competition exists. Third, the stakes are high: NCAA basketball is a launching pad into professional basketball for individual players, as well as a multibillion-dollar industry in which university earnings are linked to team success. Fourth, NCAA basketball provides objective performance data from a controlled setting—that is, the rules and playing fields are identical across games. Finally, NCAA basketball teams are characterized by high levels of homogeneity due to intense socialization processes (Adler & Adler, 1988), thus mitigating concerns about treating them as unitary actors (Hamilton & Sherman, 1996; Klein, Dansereau, & Hall, 1994).

It is also worth mentioning that sports settings have long been recognized as conducive to organizational research, given that many of the core elements of organizations, such as hierarchy, teamwork, and the importance of strategic decision making are present (Wolfe et al., 2005). Indeed, sports studies have provided insight on wide range of organizational topics, including equity theory (Harder, 1992), sunk costs (Staw & Hoang, 1995), leadership (Day, Sin, & Chen, 2004; Pfeffer & Davis-Blake, 1986), organizational status (Washington & Zajac, 2005), and risk taking (Bothner et al., 2007). In our case, as NCAA basketball involves long-standing competitors with measurable interaction histories, relative characteristics, and organizational performance, the setting satisfied the key prerequisites for studying rivalry.

We drew upon three data sets in our analyses. First, we polled student sportswriters and asked them to rate the levels of rivalry that their teams felt toward opposing teams. Second, we collected archival data on each team and all pairs of teams, to investigate the predictors of rivalry. Third, we collected game-level statistics for analyses of the consequences of rivalry.

#### **EMPIRICAL ANALYSES, PART I: RIVALRY AS A RELATIONSHIP**

To systematically study rivalry between NCAA basketball teams, it was necessary to measure the strength of rivalry between teams in a sample large enough to allow for statistical analyses. To accomplish this, we surveyed sportswriters at the student newspapers of all 73 of the universities in the NCAA Division I Men's Basketball major conferences: the ACC ( $n = 12$ ); the Big 12 ( $n = 12$ ); the Big East ( $n = 16$ ); the Big Ten ( $n = 11$ ); the Pac-10 ( $n = 10$ ); and the SEC ( $n = 12$ ); we thus collected data from a total population ( $N$ ) of 73 universities.



## Participants

Survey responses were collected from 421 student sportswriters at the 73 universities in our sample. The surveys were typically distributed via a single contact individual at each school newspaper. Although this procedure made it difficult to calculate an exact response rate, because we did not know the number of sportswriters at each school, the average of 5.77 respondents per school (s.d. = 2.91) is likely to represent a large proportion of the total population of student sportswriters. Two of the universities (DePaul and South Florida, of the Big East), provided only a single response, and so they were dropped from further analyses.

To ensure that our respondents were knowledgeable about basketball at their schools, we asked them whether or not they covered the men's basketball team ("Do you cover the men's basketball team at X university?" [yes/no]) and to indicate their level of expertise on the subject ("How closely do you follow the men's basketball team at your school and men's basketball in the conference as a whole?" [1 = "not closely at all" and 7 = "very closely"]). Thirty-nine respondents (9.3%) who indicated that they did not cover the basketball team and that their level of expertise warranted fewer than 5 out of 7 points were dropped from the sample. This exclusion left 380 respondents with an average level of expertise rated at 6.34 out of 7 points.

## Ratings of Rivalry

Ratings of rivalry were collected conference-by-conference. Each respondent was asked: "Indicate the extent to which you see the other teams in your conference as rivals to your basketball team." Respondents were provided with a list of the other teams in the conference, along with an 11-point rating scale (0 = "not a rival"; 5 = "moderate rival"; 10 = "fierce rival"). Given that we aimed to analyze naturally occurring variation in these ratings, we did not provide a formal definition of rivalry for fear of influencing responses. For instance, had we defined rivalry as a relationship between teams, we might have biased the data toward supporting Hypotheses 1a and 1b. Further, the lack of a formal definition allowed us to access respondents' lay perceptions of rivalry.

To allow for the possibility of asymmetric rivalries, participants were told that "we are only interested in how strongly your team feels the rivalry, so your ratings should not be influenced by whether or not you think the other team sees your team as a rival." The surveys were collected in September

and October of 2005, during the weeks leading up to the start of the 2005–06 basketball season, so that our measures of rivalry were as up to date as possible without being influenced by any games played during the 2005–06 season.

To assess interrater reliability on these rivalry ratings, we computed intraclass correlation coefficients (ICCs), using a two-way mixed-effects model (McGraw & Wong, 1996; Shrout & Fleiss, 1979), which yields a total reliability statistic equivalent to a Cronbach's alpha coefficient. The mean ICC for the 71 schools was equal to .92, and all but two teams (Boston College and Penn State) had ICCs of at least .79. These values indicate a high level of agreement among respondents and mitigate concerns that different respondents may have defined rivalry differently. We next removed respondents whose ratings did not indicate consensus with their coworkers, defined as those whose average correlation with others at their school was at least .20 below the mean agreement among other respondents at that school. Eighteen such respondents (4.7%) were removed, an exclusion yielding a final sample of 362 respondents (5.10 per school; at least 2 for every school), with ICCs ranging from .74 to .99 (mean = .93).

Despite the high levels of agreement and self-reported expertise amongst our participant sportswriters, their ratings provided an indirect measure of rivalry between college basketball teams, because sportswriters are not actual team members. Therefore, we sought to validate the sportswriter perceptions by surveying actual players and coaches. We initiated contact with athletic directors and coaches at the 30 schools in our sample for which contact information was available via the internet and received responses from 11.<sup>3</sup> From these 11 teams, 134 players (mean = 12.2, s.d. = 1.60) and 23 coaches (mean = 2.1, s.d. = 1.97) returned completed surveys that asked for the same rivalry ratings as described above. Reliability for rivalry was extremely high, with ICCs ranging from .92 to .99 across the 11 teams (mean = 0.95, s.d. = 0.02), confirming the expected homogeneity in feelings of rivalry. Furthermore, the level of agreement between team members and sportswriters was very high ( $r = .89$ ,  $p < .01$ ). We could therefore be confident that our student sportswriters were well attuned to the feelings of rivalry held by college basketball team members.

<sup>3</sup> Arizona State; University of California, Berkeley; Duke; University of Michigan; University of Nebraska; Notre Dame; University of Oklahoma; University of Oregon; Oregon State; St. John's; and Washington State.

TABLE 1  
Pac-10 Rivalry Matrix<sup>a</sup>

Perceivers	Targets									
	Arizona	Arizona State	California	Oregon	Oregon State	Stanford	UCLA	USC	Washington	Washington State
Arizona		8.75	5.50	4.75	1.75	8.75	7.25	3.75	7.75	2.00
Arizona State	10.00		2.00	1.67	1.33	5.00	5.00	3.00	2.67	1.33
California	5.50	2.25		5.25	3.00	9.75	9.00	6.75	4.50	2.50
Oregon	7.00	4.00	4.50		10.00	7.00	6.25	3.75	10.00	5.50
Oregon State	8.00	1.50	4.00	10.00		4.00	4.50	1.50	9.50	6.50
Stanford	8.75	3.00	7.25	3.50	2.25		6.50	5.25	5.75	3.50
UCLA	8.00	1.75	6.75	4.75	1.25	8.25		9.25	5.75	1.25
USC	6.00	3.00	5.67	4.33	2.17	6.33	9.83		4.50	2.00
Washington	8.00	2.33	2.33	9.00	4.00	6.33	6.67	1.33		8.67
Washington State	6.00	5.00	5.33	4.00	4.67	6.33	6.67	6.67	9.67	

<sup>a</sup> Rivalry ratings represent the averaged ratings (0–10 scale) of all qualified respondents at a given university.

Using the sportswriters' ratings of rivalry, we created a matrix for each of the six conferences that contained the level of rivalry felt by each team toward every other team in the conference, calculated as the average level of rivalry reported by respondents. Table 1 contains an example of one such rivalry matrix, for the Pac-10 conference. Across the 778 unique perceiver-target pairs in our sample, the average level of rivalry was 5.02 (s.d. = 2.53).

### Data Analyses

To test Hypothesis 1a and assess the extent to which rivalry varied at the relationship level versus the actor level, we employed the social relations model (SRM; Kenny, 1994; Kenny & La Voie, 1984). Our data set consisted of six conferences ranging in size from 10 to 14 members and had a round-robin design in which every member of each conference rated every other member of the conference. Given such ratings, SRM can be used to estimate the extent to which variance in ratings results from perceiver effects, target effects, relationship effects, and measurement error.<sup>4</sup> Perceiver effects capture rater attributes and rating tendencies—that is, the extent to which the focal actor drives variance. In

this setting, significant perceiver effects would indicate that certain teams, as compared to others, felt greater rivalry toward opponent teams in general—that is, regardless of whom they were competing with. Target effects capture the effect of ratee attributes on ratings. Significant target effects would indicate that certain teams tended to *elicit* higher versus lower levels of rivalry *from* opponents in general. Finally, relationship effects capture the role of unique relationships between raters. A relationship effect would exist if team A felt a level of rivalry toward team B that was greater than the rivalry that team A generally felt toward others, and greater than the rivalry that team B tended to elicit from others. Relationship effects should capture the roles of relational factors, such as proximity, relative attributes, and prior interactions—in our example, perhaps team A and team B are very similar to one another or have been particularly evenly matched over the previous few seasons.

### Results

We used the software program SOREMO (Kenny, 1995) to implement the SRM analyses of rivalry ratings. Of primary interest was the partitioning of variance into the components of perceiver, target, relationship, and error. Perceiver effects accounted for 4.6 percent ( $p < .10$ ) of the variance in rivalry ratings, which, although marginally significant, indicated relatively little variation in the average amount of rivalry felt by teams. Target effects accounted for 26.2 percent ( $p < .001$ ) of the variance in rivalry ratings, indicating that certain teams elicited higher levels of rivalry from opponents, on average, than others. In support of Hypothesis 1a, a

<sup>4</sup> Methodologically, to separate relationship effects from measurement error, the social relations model requires multiple sets of ratings and uses the equivalent of split-half reliability to distinguish the extent to which dyadic ratings are systematic. Thus, estimation of variance due to relationship effects requires repeated measurements for each rater-ratee pair, which we have in this data set because there were at least two respondents from every university.

full 50.4 percent ( $p < .001$ ) of the variance in rivalry ratings was attributed to relationship effects.

This finding indicates that the strength of rivalry between teams is to a large extent driven by their unique relationships. As an example, Oregon State rated its rivalry toward the University of Oregon at the maximum level of 10.0; however, Oregon State did not feel abnormally high levels of rivalry in general (mean = 5.50), nor did the University of Oregon elicit unusually high levels of rivalry from opponents (mean = 5.25). This intense rivalry, therefore, is particular to Oregon State's relationship with the University of Oregon. Finally, SOREMO indicated that 18.7 percent of the variance in rivalry ratings was due to error, resulting from the lack of perfect agreement among raters at each university.

Next, we tested whether the magnitudes of variances explained by perceiver and target effects were statistically different from the magnitude of variance explained by relationship effects, as follows: First, we used SOREMO to run the variance-partitioning analyses separately for each conference. Then, we used these data to run a series of repeated-measures analyses of variance (ANOVA) in which each conference was treated as a single participant ( $N = 6$ ), and the values for perceiver, target, and relationship variance were treated as the repeated measures. Relationship variance was found to be significantly greater than perceiver variance ( $F[1, 5] = 120.77$ ,  $p < .001$ ), target variance ( $F[1, 5] = 32.86$ ,  $p < .01$ ), and even the sum of both perceiver and target variance ( $F[1, 5] = 13.37$ ,  $p < .05$ ). Additionally, these results were consistent across conferences: relationship variance was larger than the sum of perceiver and target variance in every case. Therefore, we have strong support for Hypothesis 1b. That is, relationships between teams had a stronger influence on rivalry in NCAA basketball than the teams' individual attributes.

We were also able to use the rivalry ratings data to assess the extent to which rivalry between NCAA basketball teams was symmetric, with feelings of rivalry reciprocated between pairs of teams. In our sample of 389 dyads, the correlation between the strengths of rivalries among pairs of teams was substantial ( $r = .64$ ,  $p < .001$ ). Furthermore, SOREMO provided an estimate of this correlation that partialled out actor and target effects. This estimate was equal to .85, indicating that once average team-level tendencies toward feeling and eliciting rivalry were controlled for, rivalry between NCAA basketball teams was largely symmetric.

## Discussion

Our analyses of the rivalry networks in college basketball indicated that, at least in this setting, rivalry is largely a dyadic, relational phenomenon. Teams reliably see certain opponents as stronger rivals than others, and the attributes of individual teams explain only a fraction of this variance. This finding speaks to the importance of relationships in determining competitive perceptions and suggests that conceptions of competition that do not take into account its relational context may be incomplete. Further, the high level of agreement among our respondents (sportswriters and team members alike) indicates that rivalry is very real in the minds of these competitors. Finally, we also found evidence for lesser, yet statistically significant, target effects, indicating that some schools are generally perceived as greater rivals than others.

## EMPIRICAL ANALYSES, PART II: ANTECEDENTS OF RIVALRY

We next turned our attention to the antecedents of rivalry, with a primary focus on predicting dyad-level variance in rivalry. Our independent measures included archival data on the 71 teams and 389 team-dyads in our sample, drawn from websites maintained by the teams and athletic conferences. With regard to our dependent measure, we were primarily interested in dyad-level variance in rivalry, and so we had SOREMO output rivalry relationship effects for each of the dyads in our sample. Specifically, these represented the rivalry felt by team A toward team B, with the average rivalry felt by team A, the average rivalry elicited by team B, and any conference-level differences controlled for. Rivalry relationship effects within dyads were clearly not independent ( $r = .85$ , as noted above), which meant that we could not analyze them at the team level (Kenny, Kashy, & Cook, 2006). Instead, we followed the advice of Kenny et al. (2006: 69) and conducted separate dyad-level regression analyses of the *average* rivalry relationship effect for each dyad and the *difference* in the rivalry relationship effects of the two teams. We end by reporting a brief analysis of target variance in rivalry.

### Average Rivalry: Independent Measures

Appendix A describes all of the independent measures we used to predict rivalry. Hypotheses 2–4, which relate to the aggregate level of rivalry felt between pairs of competitors, directed selection of these measures. Table 2 displays descriptive

TABLE 2  
Antecedents of Rivalry: Descriptive Statistics and Correlations<sup>a</sup>

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Average rivalry relationship effect	0.10	1.63													
2. Distance between stadiums, in hundreds of miles	4.64	2.96	-.48***												
3. Teams in same state	0.10	0.30	.53***	-.33***											
4. Absolute difference in conference winning percentage, all-time	13.96	11.15	-.13*	.02	.01										
5. Absolute difference in conference titles won, all-time	6.67	8.04	-.03	-.01	-.04	.35***									
6. Absolute difference in conference winning percentage, prior three seasons	21.44	14.72	-.13*	-.01	.04	.48***	.29***								
7. Absolute difference in projected conference rank	4.42	2.84	-.16**	-.11 <sup>†</sup>	-.02	.38***	.18***	.43***							
8. Absolute difference in academic quality	0.94	0.79	-.15**	.11 <sup>†</sup>	-.02	-.10 <sup>†</sup>	.04	-.04	-.04						
9. Absolute difference in enrollment, in thousands of students	10.65	8.20	-.09	.13*	.03	-.01	-.05	-.01	.03	.26***					
10. Both universities public or private <sup>b</sup>	0.72	0.45	-.01	.14*	-.14*	.00	.02	-.09	-.09	-.27***	-.31***				
11. Number of games played <sup>c</sup>	7.70	63.93	.50***	-.64***	.43***	-.07	-.00	-.09 <sup>†</sup>	.03	-.11*	-.14**	-.01			
12. Competitiveness index, all-time	37.89	9.45	.19***	-.14*	.09	-.71***	-.45***	-.36***	-.25***	.02	-.03	-.00	.23***		
13. Competitiveness index, prior three seasons	25.90	16.31	.13*	.04	-.02	-.32***	-.20***	-.60***	-.20***	.04	.03	.06	.08	.22***	
14. Average margin of victory, prior three seasons	11.35	4.00	-.12*	.05	-.03	.24***	.03	.36***	.21***	-.07	-.02	-.01	-.08	-.24***	-.21***

<sup>a</sup>  $n = 318$  team dyads except for variable 7, for which  $n = 266$  team dyads.

<sup>b</sup> Dummy variable.

<sup>c</sup> Mean-centered by conference.

<sup>†</sup>  $p \leq .10$

\*  $p \leq .05$

\*\*  $p \leq .01$

\*\*\*  $p \leq .001$

Two-tailed tests.

statistics and zero-order correlations between these measures and average rivalry relationship effects.

It is worth noting that many of our measures were based on difference scores between the two teams. A number of methodological concerns have been raised in regard to using difference scores as predictor variables, most notably, the fact that they may confound the effects of their component measures (Edwards, 2002; Edwards & Parry, 1993)—in this case, the individual attributes of each team. To address this concern, we included fixed effects for individual teams in our models, to control for any differences between teams on the components that made up our independent measures, such as basketball status (see Appendix A), university characteristics, and so forth. Therefore, the characteristics of one team or the other could not have driven significant coefficients for difference scores in our models. In fact, only dyadic comparison measures made sense as predictor variables in these analyses; actor-level variables could not, by definition, predict relationship effects. It is also worth noting that the component measures of our difference score variables were uncorrelated, as they came from different sources (i.e., two different teams).

### Average Rivalry: Results

Table 3 summarizes the results of ordinary least squares regression analyses of the average rivalry relationship effect in each dyad.<sup>5</sup> To ensure meaningful values for the measure of absolute difference in conference winning percentages, we only included pairs of teams in which both teams had played at least five seasons in their current conference. This eliminated dyads involving the teams that joined the ACC and Big East conferences prior to the 2004–05 and 2005–06 seasons (Boston College, Cincinnati, Louisville, Marquette, Miami, and Virginia Tech; a total of 66 dyads). Further, to ensure meaningful values for the index of recent competitiveness, we only included pairs of teams that had played each other at least three times over the three seasons prior to 2005–06 (this eliminated an additional 5 dyads). All models were run on this subsample of 318 dyads, with the exception of those that included projected conference rank. As the Big Ten conference does not publish projected rankings, models including

this variable were run on a subsample of the 263 dyads from the other five conferences. Lastly, all models included team-level dummy variables, which also served to control for conference membership; conference dummies were dropped as redundant if included in addition to the team-level dummies.

**Similarity.** Hypothesis 2 proposes that similarity between competitors is positively related to rivalry. We tested this proposition in terms of geographic proximity, similarity in basketball-related status,<sup>6</sup> and similarity in broader university characteristics. Model 1 contains the two measures of geographic proximity. As predicted, geographic distance between teams is significantly, negatively related to dyad-level variance in rivalry ( $t = -8.80, p < .001$ ; all tests are two-tailed). In other words, the closer to each other two teams were located, the stronger their rivalry tended to be. In addition, we found that teams located in the same state had significantly stronger rivalries with one another, an effect going above and beyond the effect of geographic distance ( $t = 7.26, p < .001$ ).

We looked next at similarity in basketball-related status. Models 2 and 3 indicate that rivalry between teams is negatively predicted by the absolute difference in their all-time basketball status, measured in terms of all-time conference winning percentage ( $t = -3.47, p < .001$ ) or in terms of conference titles won ( $t = -2.48, p < .05$ ). In other words, the more similar the historic basketball statuses of two teams, the stronger the rivalry between them. A similar relationship exists between rivalry and recent status, as measured by conference winning percentage over the three seasons prior to 2005–06 (model 4;  $t = -2.11, p < .05$ ), as well as between rivalry and current status, as measured by projected conference rank in the upcoming season (model 5;  $t = -2.62, p = .01$ ).

Lastly, with respect to broader university characteristics, absolute difference in academic quality was significant (model 6;  $t = -3.20, p < .01$ ), and absolute difference in enrollment was marginally significant (model 7;  $t = -1.89, p < .10$ ); however, similarity on public or private university status was not related to average rivalry

<sup>5</sup> The results of these analyses were unchanged when raw average rivalry was used as the dependent measure, owing to the use of team-level fixed effects.

<sup>6</sup> We use the term “status” loosely and interchangeably with “success” or “reputation,” while recognizing that these concepts do not always go hand-in-hand. The actors in this setting do not exhibit deference toward, or influence over, one another, nor do they differ in network position (all teams in a conference play each other and, hence, are connected).

**TABLE 3**  
**Results of Multivariate Regression Analysis of Average Rivalry<sup>a</sup>**

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Distance between stadiums, in hundreds of miles	-0.38*** (0.04)							
Teams within the same state	2.42*** (0.33)							
Absolute difference in conference winning percentage, all-time		-0.05*** (0.01)						
Absolute difference in conference titles won			-0.08* (0.03)					
Absolute difference in conference winning percentage, prior three seasons				-0.02* (0.01)				
Absolute difference in projected conference rank					-0.12** (0.05)			
Absolute difference in academic status						-0.57** (0.18)		
Absolute difference in enrollment, in thousands of students							-0.04 <sup>†</sup> (0.02)	
Both universities public or private <sup>b</sup>								0.42 (0.43)
Number of games played, in tens <sup>c</sup>								
Competitiveness index, all-time								
Competitiveness index, prior three seasons								
Average margin of victory, prior three seasons								
$R^2$	.68	.40	.38	.37	.42	.39	.37	.36
Adjusted $R^2$	.50	.06	.04	.03	.09	.06	.03	.02
$\Delta R^2$ from fixed-effects model	.32	.04	.02	.01	.02	.03	.01	.00
$\Delta$ adjusted $R^2$ from fixed-effects model	.48	.05	.02	.02	.03	.04	.01	.00

<sup>a</sup>  $n = 318$  team dyads, except for models 5, 14, and 18, for which  $n = 263$ . All models include fixed effects for teams.

<sup>b</sup> Dummy variable.

<sup>c</sup> Mean-centered by conference.

<sup>†</sup>  $p \leq .10$

\*  $p \leq .05$

\*\*  $p \leq .01$

\*\*\*  $p \leq .001$

Two-tailed tests.

(model 8;  $t = 0.98$ , n.s.). Overall, we obtained strong support for Hypothesis 2: similarity in location, basketball-related status, and academic quality were all positively related to rivalry between teams.

**Repeated competition.** We next investigated the role of repeated competition, as measured by the number of games played between teams. Because closely located teams may play each other more frequently for logistical reasons, we controlled for geographic proximity in these models. Model 9 indicates that the more games teams have played against each other, the stronger the rivalry between them ( $t = 3.03$ ,  $p < .01$ ), thus supporting Hypothesis 3.<sup>7</sup>

**Competitiveness.** We next looked at the competitiveness of the match-up between teams.<sup>8</sup> As shown in model 10, historic competitiveness positively predicted the average rivalry relationship effect ( $t = 5.00$ ,  $p < .001$ ). In other words, the closer the historic match-up between teams was to a 50-50 split, the stronger the rivalry between them. Similarly, recent competitiveness, whether measured via head-to-head winning percentages (model 11;  $t = 2.06$ ,  $p < .05$ ), or via average margin of victory (model 12;  $t = -2.16$ ,  $p < .05$ ), also predicted the strength of rivalry between teams. Therefore, we obtained support for Hypothesis 4.

**Recent versus historic similarity and competitiveness.** In an additional set of analyses, we

<sup>7</sup> Model 6 contains conference-mean-centered number of games played. Untransformed number of games played was also a highly significant predictor of rivalry.

<sup>8</sup> The competitiveness indexes are perfectly correlated with the absolute difference in teams' head-to-head winning percentages.

TABLE 3  
Continued

Variables	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17
Distance between stadiums, in hundreds of miles	-0.25*** (0.06)								-0.19** (0.06)
Teams within the same state	1.79*** (0.38)								1.05* (0.42)
Absolute difference in conference winning percentage, all-time				-0.04** (0.01)	-0.03 <sup>†</sup> (0.02)		-0.01 (0.02)		0.00 (0.01)
Absolute difference in conference titles won									0.01 (0.03)
Absolute difference in conference winning percentage, prior three seasons					-0.01 (0.01)				0.01 (0.01)
Absolute difference in projected conference rank						-0.08 (0.05)			-0.11** (0.04)
Absolute difference in academic status									-0.15 (0.13)
Absolute difference in enrollment, in thousands of students									-0.02 <sup>†</sup> (0.01)
Both universities public or private <sup>b</sup>									-0.05 (0.29)
Number of games played, in tens <sup>c</sup>	0.09** (0.03)								0.12*** (0.03)
Competitiveness index, all-time		0.07*** (0.01)					0.07*** (0.01)	0.06*** (0.02)	0.01 (0.01)
Competitiveness index, prior three seasons			1.46* (0.71)				0.01 (0.01)		0.02* (0.01)
Average margin of victory, prior three seasons				-0.06* (0.03)					-0.03 (0.02)
$R^2$	.69	.43	.37	.37	.40	.43	.44	.43	.76
Adjusted $R^2$	.52	.12	.03	.03	.06	.10	.12	.12	.60
$\Delta R^2$ from fixed-effects model	.33	.07	.01	.01	.04	.07	.08	.07	.37
$\Delta$ adjusted $R^2$ from fixed-effects model	.50	.10	.02	.02	.05	.09	.11	.10	.54

looked at the relative predictive power of historic and recent status similarity and competitiveness. This analysis allowed us to assess the extent to which rivalry is a relationship shaped by recent trends rather than by stable, long-term factors. In models 13 and 14, absolute difference in all-time conference winning percentage remained a significant predictor of rivalry ( $t = -2.88$ ,  $p < .01$ ;  $t = -1.80$ ,  $p < .10$ ); however, neither absolute difference in recent conference winning percentage ( $t = -0.92$ , n.s.) nor absolute difference in projected conference rank ( $t = -1.44$ , n.s.) was significant. Similarly, in model 15, the all-time competitiveness of a match-up significantly predicted rivalry ( $t = 4.79$ ,  $p < .001$ ); however, recent competitiveness failed to achieve significance ( $t = 1.58$ , n.s.). Thus, rivalry seems to be driven by long-term status similarity and competitiveness, and is somewhat less responsive to recent changes in these factors.

**Status similarity versus competitiveness.** We also sought to parse out the relative contributions of status similarity and competitiveness in forming rivalry. As discussed, these two constructs may often be highly correlated. Indeed, in this data set, historic status similarity (in terms of all-time conference winning percentage) and historic competitiveness were highly correlated ( $r = .71$ ,  $p < .001$ ).

We entered both of these predictors in model 16 and found that absolute difference in historic status was not significant ( $t = -0.90$ , n.s.), whereas historic competitiveness remained highly significant ( $t = 3.60$ ,  $p < .001$ ). Although these results should be interpreted with caution, given the high level of intercorrelation, it appears that the extent to which competitors have been evenly matched in their prior contests may trump historic similarity in status or ability level.

**Full model.** Lastly, Model 17 is a full model that includes all predictor variables.

### Difference in Rivalry

Although the high level of reciprocity ( $r = .85$ ) severely restricted variation in the difference between teams' rivalry relationship effects within dyads, we attempted to see if we could predict it nonetheless. Given that we did not have any hypotheses relating to asymmetry in rivalry, these analyses were exploratory. We created a set of difference measures that were identical to those used above to assess teams' levels of similarity, except that these measures were untransformed rather than absolute. This procedure allowed us to test whether teams' relative characteristics predicted

asymmetry in rivalry in addition to the aggregate strength of rivalry. None of these measures approached significance, however.

### Target Effects

Finally, we decided to conduct exploratory analyses of the target effects of rivalry, examining which types of teams elicited stronger rivalry from opponents. SOREMO calculated a *target score* for each team in our sample, which was essentially the average level of rivalry felt toward that team, with any conference differences controlled for. Visual inspection of the list of teams eliciting the highest levels of rivalry (e.g., Duke, Kentucky, Arizona, and Kansas) suggested the presence of a “top dog” phenomenon, whereby the historically high-status teams elicited the highest levels of rivalry. Indeed, analyses of these target scores support this idea. Table 4 displays the correlations between rivalry target scores and all the team-level characteristics we collected. Correlations with all four measures of basketball status were highly significant, indicating that high-status teams elicit greater rivalry from opponents. Further, the academic quality of teams’ universities was positively correlated with rivalry target scores, and enrollment was marginally significant.

We then ran a full-model regression analysis that included all of these measures. All-time conference winning percentage ( $t = 2.10, p < .05$ ), recent conference winning percentage ( $t = 4.04, p < .001$ ), projected conference rank for the upcoming season ( $t = -1.83, p < .10$ ), and academic quality ( $t = 2.42, p < .05$ ) were all related to rivalry target scores, and the model captured the majority of the variance ( $R^2 = .77$ ). Therefore, it appears that team status largely drives team-level variance in rivalry:

higher-status teams attract greater rivalry. Furthermore, this finding suggests that asymmetric rivalry in NCAA basketball is largely the result of asymmetry in team status: teams with lower performance (such as Oregon State) tend to feel stronger rivalry toward those with higher performance (such as Arizona), but not vice versa.

### Discussion

The results from the above analyses reveal a great deal about the formation of rivalry and about competition more generally. First, we found strong support for the idea that similarity in geographic location, basketball-related status, and broader university status all foster rivalry. Second, we found that prior competitive interactions play a substantial role in rivalry formation. Both the number of two teams’ prior contests and the competitiveness of those contests predicted the strength of rivalry between the teams. Furthermore, historic competitiveness remained a significant predictor of rivalry even when historic similarity in status was controlled for. That is, the closer the historic match-up between teams was to a 50-50 split, the stronger the rivalry between them, even when we controlled for similarity in the teams’ all-time winning percentages. This result indicates that prior contests between teams went above and beyond their rivalry relationships in predicting the effects of those contests on their standings in the conference. Thus, it seems that prior competitive encounters can leave a mark that endures long after they have been decided, in support of the notion that competition is path-dependent, and contrary to predictions under rational models.

Third, we found that historic similarity and competitiveness appeared to trump recent similarity and competitiveness in predicting rivalry. This pattern is also consistent with the ideas that competitive perceptions are enduring and may not necessarily reflect current conditions and that contests are embedded in broader relational contexts. More broadly, the fact that we were able to reliably predict strength of rivalry via measures of teams’ relationships bolsters the argument that competition is relational.

Finally, at the team level, higher status was positively related to opponents’ feelings of rivalry. Although the precise mechanisms behind this finding are unclear, it may be the case that actors try to present themselves as rivals to high-status competitors to gain status by association, particularly if rivalry is generally perceived as symmetric. Alternatively, perhaps competing against the best is energizing, because of the reputational boost that can

**TABLE 4**  
Correlations with Target Scores on Rivalry<sup>a</sup>

Variables	Correlation
Conference winning percentage, all-time	.73***
Conference titles won, all-time	.54***
Conference winning percentage, prior three seasons	.82***
Projected conference rank	-.68***
Academic quality	.33**
Enrollment	.20 <sup>†</sup>
Private university	-.10

<sup>a</sup>  $n = 71$  teams.

<sup>†</sup>  $p \leq .10$

\*\*  $p \leq .01$

\*\*\*  $p \leq .001$

Two-tailed tests.



**TABLE 5**  
**Consequences of Rivalry: Descriptive Statistics and Correlations<sup>a</sup>**

Variables	Mean	s.d.	1	2	3	4	5	6	7
1. Average rivalry	5.31	2.33							
2. Attendance, in thousands	11.78	0.48	.23***						
3. Absolute betting line	6.58	4.61	-.04	.14***					
4. Points per 100 possessions	105.03	11.25	-.06	.08 <sup>†</sup>	-.02				
5. Field goal percentage	43.97	4.85	-.01	.03	-.01	.75***			
6. Steals	13.39	4.70	.08 <sup>†</sup>	-.00	.02	-.29***	.05		
7. Blocks	7.41	3.59	.06	.02	.15***	-.17***	-.32***	.08 <sup>†</sup>	
8. Free throw percentage	70.18	8.40	.04	-.02	.02	.23***	.04	-.03	.04

<sup>a</sup>  $n = 563$  games.

<sup>†</sup>  $p \leq .10$

\*\*\*  $p \leq .001$

Two-tailed tests.

be gained through victory, or because actors envy their high-status competitors and want to bring them down. Future work should delve further into this phenomenon.

### EMPIRICAL ANALYSES, PART III: CONSEQUENCES OF RIVALRY

#### Measures

To investigate the consequences of rivalry between NCAA basketball teams, we collected game statistics from all 563 regular season conference games played between teams in our sample during the 2005–06 season, using online box scores provided by Yahoo! (<http://www.yahoo.com>). Although this field setting did not allow direct measurement of motivation, it did provide a range of performance metrics. Hypothesis 5 posits that greater rivalry increases performance on effort-based tasks, for which the association between motivation and success is very clear. In basketball, it is not clear that greater effort, above a baseline level, results in more accurate offensive performance in shooting and passing; however, effort is generally believed to be associated with defensive performance. Indeed, coaches often note that although players can't control how well they shoot in a given game, they can make sure to give their all on defense (e.g., <http://www.howtodothings.com/sports-recreation/how-to-play-basketball-man-to-man-defense>). Given the relative requirements for accuracy and effort in offense and defense, respectively, we expected that rivalry between teams would be associated with increased defensive performance. Appendix B describes the statistics we examined, along with a pair of control variables, and Table 5 displays descriptive statistics and correlations.

#### Results

Table 6 contains results from regression analyses of game statistics. Given that we did not have data on rivalry between individual members, we looked at team performance; that is, statistics were aggregated for all team members. Further, because of the high reciprocity in rivalry ratings, in addition to the interdependent nature of teams' performance in basketball (i.e., the offensive performance of one team is confounded with the defensive performance of the other), we used the average level of rivalry in each game as the predictor variable and aggregate game-level statistics as dependent measures. We included team-level fixed effects for home and away teams in all analyses to control for teams' ability levels.

In model 1, rivalry is positively related to fan attendance ( $t = 3.75$ ,  $p < .001$ ), suggesting that it has a positive effect on the interest level or motivation of those who follow a competition. In model 2, rivalry is negatively related to the number of points scored per 100 possessions<sup>9</sup> ( $t = -2.14$ ,  $p < .05$ ), which reflects increased defensive efficiency (Pomeroy, 2005). Model 3 examined another measure of efficiency, field goal percentage, and revealed a similar, marginally negative, association with rivalry ( $t = -1.81$ ,  $p = .07$ ). Thus, defensive efficiency tends to be higher in games between fierce rivals than in games between mild rivals or nonrivals. These results, however, can also be viewed as reflecting decreased offensive efficiency,

<sup>9</sup> Number of possessions is not a statistic typically included in box scores; however, it can be accurately estimated from statistics that are included, using the following formula: possessions = field goals attempted – offensive rebounds + turnovers +  $.475 \times$  free throws attempted (Pomeroy, 2005).

**TABLE 6**  
**Results of Multivariate Regression Analysis of Game Statistics<sup>a, b</sup>**

Variables	Model 1: Attendance	Model 2: Points per 100 Possessions	Model 3: Field Goal Percentage	Model 4: Steals	Model 5: Blocked Shots	Model 6: Free Throw Percentage
Attendance, in thousands		0.31 (0.29)	0.08 (0.13)	-0.11 (0.11)	-0.16* (0.08)	0.01 (0.22)
Absolute value of the betting line	-4.21 (31.43)	-0.12 (0.19)	-0.01 (0.08)	-0.03 (0.07)	0.12* (0.05)	-0.15 (0.14)
Average rivalry	155.96*** (41.54)	-0.54* (0.25)	-0.20 <sup>+</sup> (0.11)	0.10 (0.10)	0.14* (0.07)	-0.11 (0.19)
$R^2$	0.90	0.35	0.32	0.47	0.49	0.32
Adjusted $R^2$	0.87	0.14	0.09	0.29	0.33	0.09
$\Delta R^2$ over fixed-effects model	0.00	0.01	0.01	0.00	0.00	0.00
$\Delta$ adjusted $R^2$ from fixed- effects model	0.00	0.01	0.01	0.00	0.01	0.00

<sup>a</sup>  $n = 562$  regular season conference games, except for model 1, for which  $n = 556$ .

<sup>b</sup> All models include fixed effects for home and away teams.

<sup>+</sup>  $p \leq .10$

\*  $p \leq .05$

\*\*\*  $p \leq .001$

Two-tailed tests.

as offensive and defensive efficiency are perfectly confounded at the game level. Therefore, we analyzed the frequency of steals and blocked shots, which provide more distinct indicators of defensive activity. As shown in model 4, the coefficient for steals, although in the expected direction, did not achieve significance ( $t = 1.05$ , n.s.). However, we did find a significant and positive association between rivalry and the number of blocked shots ( $t = 1.99$ ,  $p < .05$ ; model 5).<sup>10</sup>

To further investigate the significant findings for points per possession and blocked shots, we calculated the effect size of each. On the basis of the standard deviation of average rivalry and its coefficient in the points per 100 possessions model, a one standard deviation increase in the average rivalry between the teams in a game would result in 1.25 fewer points scored per 100 possessions, or a 1.19 percent decrease, on average. The same analysis for blocked shots indicates that a one standard deviation increase in average rivalry would predict 0.33 more blocked shots, or a 4.47 percent increase.

## Discussion

Overall, we found some support for Hypothesis 5, which states that rivalry is associated with in-

creased success on effort-based tasks—in this case, defense in basketball. Specifically, rivalry predicted higher defensive efficiency and greater numbers of blocked shots. The finding for blocked shots is in line with the idea that rivalry leads to increased motivation and effort. However, as mentioned, our findings for defensive efficiency conflate offensive and defensive performance and therefore deserve further scrutiny. An alternative explanation of these results is that rivalry led to decreased offensive performance instead of increased defensive prowess. Indeed, according to the Yerkes-Dodson theory (Yerkes & Dodson, 1908), high levels of arousal may be detrimental to performance.<sup>11</sup> Thus, perhaps teams in games with fierce rivals were so aroused that their performance suffered—or, in colloquial terms, they choked under pressure.

To sort out these two alternative interpretations, we analyzed free throw shooting accuracy. Because free throws cannot be defended, the defensive performance of teams should be unrelated to the free throw shooting success of their opponents. Thus, if the rivalry-effort explanation were correct, we would not expect to find a relationship between rivalry and free throw shooting accuracy. In contrast, if the choking-under-pressure explanation were correct, we would expect the negative effects

<sup>10</sup> Game-level analyses of rebounding—or the recovery of failed attempts at scoring—were not included because they were redundant with the analyses presented on field goal percentage (the number of rebounds in a game is determined by the number of missed shots).

<sup>11</sup> In an exploratory analysis, we tested for curvilinear effects of rivalry on performance but found no significant results.

of extreme arousal on performance to extend to free throw shooting. Indeed, we might expect excess arousal to be at its most harmful level when a player is standing alone at the free throw line with time to think about the upcoming shot. As can be seen by the results in Table 6 (model 6), there was no significant relationship between rivalry and free throw shooting accuracy ( $t = -0.59$ , *n.s.*). Although one must exercise caution when interpreting null findings, this reduces the plausibility of the choking explanation for the effects of rivalry on scoring and shooting efficiency.

The existence of a positive association between rivalry and effort has significant implications for both theory and practice. Motivation has been one of the most studied topics in organizational psychology, spawning a number of theories and research programs, including the job characteristics model (Hackman & Oldham, 1976), expectancy theory (Vroom, 1964), and goal-setting theory (Locke, 1968). Greater consideration of rivalries within and between organizations may add to understanding of this fundamental topic, and—to the extent that it can be harnessed as a motivational force—rivalry may have important managerial implications as well. Lastly, it is worth noting that the positive association between rivalry and fan attendance suggests that rivalry can spread to those indirectly involved in competitions.

## GENERAL DISCUSSION

Actors rarely compete in isolation; rather, they compete against other actors with whom they often have existing relationships. The present research was an attempt to systematically study these relationships with a focus on rivalries between competitors. Our results suggest that rivalry is largely a relational phenomenon and that it has implications for competitive behavior. Using a statistical technique designed to model interpersonal perception (Kenny, 1994), we found that rivalry between NCAA basketball teams was largely unexplained by teams' individual attributes—instead, these perceptions varied systematically at the dyad level. Rivalry was highest between teams that were similar, had a history of being evenly matched, and had repeatedly competed against each other. Further, rivalry was associated with increased performance on an effort-based task, that is, defensive performance.

We believe that this research makes several important theoretical contributions. First is the idea that competition is inherently relational—that to fully understand the behavior of competing individuals, groups, and organizations, one

must take into account competitors' dyadic relationships. This view represents a significant departure from much of the previous research on competition, which has tended to portray it as taking place among interchangeable foes and as void of relational content. Second, we provide the first detailed examination of rivalry as a psychological phenomenon. Although a wealth of anecdotal evidence speaks to the potential for rivalry to influence behavior, this study represents the first systematic research into the topic. Third, we conceive of competition as path-dependent, again extending prior models.

Our theoretical framework and empirical findings also have many practical implications. In firms, employees who are similar to one another (in demographic characteristics, tenure, expertise, position, etc.), who have repeatedly competed against each other (for promotions, performance rankings, etc.), and who have been evenly matched during prior contests (e.g., sales drives) will tend to see each other as rivals. In turn, they may be more motivated when competing against one another than they are when competing against other individuals. Therefore, managers wishing to increase employee motivation might consider designing incentive systems that foster interemployee rivalry, such as the competitive tournaments used by sales firms. Managers could also try to galvanize employees by playing up rivalries with competing firms, or between work groups.

Similarly, firms that resemble one another, that have a history of competing, and that have been historically evenly matched on key performance metrics will tend to be rivals. In turn, these rivalries may motivate executives, thereby influencing firm performance. Previous studies have linked managerial complacency to reduced competitive action (Ferrier, 2001), reduced strategic complexity (Miller & Chen, 1996), and greater competitive inertia (Miller & Chen, 1994), all of which generally lead to reduced firm performance (Ferrier, 2001; Ferrier, Smith, & Grimm, 1999). Managers who are motivated to outperform rival firms, however, may not fall prey to the pitfalls of complacency and may instead strive for increased performance even in times of prosperity. For instance, the rivalry between Intel and AMD has continually pushed executives at the rival chip makers to pursue technological innovations and seek out new markets ([http://www.eetindia.co.in/ART\\_8800422325\\_1800001\\_NT\\_627eeb79.HTM](http://www.eetindia.co.in/ART_8800422325_1800001_NT_627eeb79.HTM)).

In addition to its potential motivational benefits, however, rivalry may also have downsides. The idea that rivalry entails psychological payoffs and involvement separate from the objective character-

istics of competition opens up the possibility for economically irrational behavior. Examples of this could include sacrificing one's own gains in order to limit the gains of a rival, an unwillingness to cooperate with rivals even when it is instrumentally beneficial, and "win at all costs" attitudes leading to unethical behavior (such as the dirty tricks campaign launched by British Airways) or excessive risk taking. Although the current empirical setting provided little opportunity for exploration of this topic, this "dark side" of rivalry presents exciting possibilities for future research and suggests that managers may want to exercise caution when attempting to foster feelings of rivalry in employees.

### Limitations

The empirical analyses presented here were designed as a first test of our theoretical framework, and they are thus qualified by a number of limitations that should be addressed in future work. First, although we believe that rivalry is not simply a reflection of increased objective stakes for the parties involved, this is a potential alternative explanation for some of our findings. For example, geographic proximity may predict rivalry simply because greater instrumental outcomes—such as local fan support, prized recruits, and so forth—are at stake when nearby teams compete. Thus, future researchers should seek to empirically disentangle the relational and instrumental causes of rivalry, and more broadly, to cleanly distinguish rivalry from pure competition. That said, objective stakes cannot explain all of our findings. A salient example is the result that the historic competitiveness of a match-up predicts rivalry, even under controls for similarity in status and performance.

A second limitation relates to the fact that we did not provide our respondents with any definition of rivalry; rather, we relied on their own lay definitions. Although we felt that doing so was necessary to avoid influencing responses, and we found very high levels of agreement among respondents, the absence of a single definition does leave open the question of what exactly rivalry means to competitors. Therefore, future research should more fully validate the definition of rivalry. Third, given the archival design used here, we were unable to collect any measures of the mechanisms underlying the relationship between rivalry and performance. In the absence of direct measures of arousal and motivation, we instead relied on behavioral indicators in the form of the game statistics most likely to reflect these processes. Future research should

more carefully address the relationships between rivalry, motivation, and arousal.

Fourth, although the setting of NCAA basketball was ideal for studying the relational nature of rivalry and its antecedents, it was not as well suited for an exploration of rivalry's consequences, as evidenced by the relatively small magnitude of our results for defensive performance. The behavior of basketball players, and athletes more generally, is constrained within a narrow set of rules, which restricted the potential influence of rivalry on behavior and limited the types of behaviors we could examine. Further, there may be a ceiling effect for motivation in college basketball, given both the high stakes of the games, and the fact that players at the highest level of collegiate athletics are apt to be highly competitive and motivated by nature, regardless of their opponent. Given these factors, we believe that our results, although small, are still noteworthy. Additionally, the interdependent nature of performance in basketball, combined with the high level of reciprocity in rivalry, limited our ability to look at teams' relative outcomes, such as whether rivalry predicted winning and losing. Future work, therefore, should examine settings that offer greater behavioral freedom to competitors, host lower baseline levels of motivation, and show greater asymmetry in rivalry. A fifth limitation relates to our use of cross-sectional data. With these data, we could not authoritatively determine the causal direction of findings concerning the antecedents of rivalry. For example, although we found that repeated competition predicted greater rivalry, conferences may schedule more games between rival teams because of greater fan interest.

Lastly, it remains to be seen how our findings generalize to other empirical settings. Although anecdotal evidence suggests that rivalry is common in many competitive settings, we recognize that sports organizations may differ from nonsports organizations in important ways. For example, organizational loyalty has been shown to be unusually intense among athletic teams (Adler & Adler, 1988), which may make rivalry more common and strengthen its effects. Further, rivalry may be different in a context of continual as compared to episodic competition. That being said, given the greater behavioral leeway offered to actors in nonsports settings, in addition to the potentially greater significance of their decisions, rivalry may actually have greater implications outside of sports. Future work, therefore, should study rivalry in other contexts. In general, rivalry is apt to be more relevant to settings in which competitors are aware of one another and have longstanding relationships (such as oligopo-

lies) than in settings in which large numbers of anonymous actors compete.

### Future Directions

There are a number of worthwhile avenues for future research on rivalry beyond those already discussed. First, in tandem with exploring the potential downsides of rivalry, future work might identify the conditions under which rivalry tends to be more beneficial than harmful. Rivalry may be beneficial when tasks are largely effort-based, when cooperation with rivals is unnecessary, and when there is little room for unethical or risky behavior. By contrast, rivalry may be more dangerous when tasks require greater precision, when it exists between members of the same team or organization, and when the rules governing behavior are unclear or unenforced, allowing competitors to act upon their impulses.

Second, future work should investigate how rivalry can spread across levels of analysis. For instance, an interindividual rivalry between two members of separate groups or organizations may lead to broader rivalry between these two collectives, particularly if the individuals are high in influence and status in their groups. Similarly, intergroup or interorganizational rivalry may foster interindividual rivalries, particularly between members in comparable positions, such as CFOs at rival firms and analysts at rival investment banks. In other cases, rivalry may fail to spread across levels; rivalries between less influential members may not be adopted by their respective groups, and less committed or strongly identified organization members may fail to internalize macro-level rivalries.

Third, future research should also address level-specific moderators of rivalry. For instance, more homogeneous groups may be more likely to form rivalries and be influenced by them (Hamilton & Sherman, 1996; Klein et al., 1994), owing to conformity and polarization processes (Moscovici & Zavalloni, 1969). At the firm level, the extent to which executives have discretion over organizational decisions and strategy—as determined by factors such as government regulations, firm size, and available resources (Crossland & Hambrick, 2007; Hambrick & Finkelstein, 1987)—may moderate the effects of rivalry, as executives with low levels of discretion will be less able to act upon their competitive impulses. One could also examine how rivalry at one level of analysis affects outcomes at other levels. For instance, rivalry between two group members might affect group-level outcomes such as conflict and cohesion. Similarly, inter-

group or interorganizational rivalry might predict individual-level outcomes, such as job satisfaction and commitment.

Fourth, the subject of asymmetric rivalry presents an interesting avenue for research. Although rivalry was highly symmetric in NCAA basketball, symmetry may not always exist, and it would be interesting to explore how the effects of rivalry differ depending upon whether or not an opponent reciprocates it. Fifth, rivals may vary in the extent to which they feel animosity or respect for one another. For example, Larry Bird and Magic Johnson appeared to respect one another, whereas executives at Virgin Atlantic and British Airways likely did not. The extent to which these brands of rivalry have different antecedents and consequences presents another avenue for research.

Sixth, although we found strong support for similarity as an antecedent of rivalry, it is possible that key differences in identity may also sometimes foster rivalry. That is, competitors with distinct or conflicting identities (e.g., companies with different business models or corporate cultures) may feel a need to validate the superiority of their identities. Indeed, some recent research suggests that people may define themselves by the groups and organizations that they are *not* a part of, in addition to those to which they belong (Elsbach & Bhattacharya, 2001). Finally, it might be interesting to examine certain questions related to the sociology of rivalry, such as how feelings of rivalry are transmitted among or shared between organization members, and how the observers of a competition as well as the competitors themselves may feel and express rivalry.

### Conclusion

Although anecdotal examples of the power of rivalry abound, little research has been devoted to studying this psychological phenomenon. In this study, we provided an initial investigation of rivalry and some of its origins and consequences. In doing so, we presented a conception of competition as relational and path-dependent. We hope this will serve as a starting point for additional research, for rivalry is a topic rich in research possibilities and implications within and among organizations.

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**APPENDIX A**  
**Antecedents of Rivalry: Independent Measures**

Variable	Description
<i>Geographic similarity</i>	
Geographic distance	Driving distance between the teams' stadiums as reported by Google Maps ( <a href="http://maps.google.com">http://maps.google.com</a> ; in hundreds of miles)
Same state	Dummy variable set to 1 if teams were located in the same state (0 otherwise)
<i>Basketball status similarity</i>	
Absolute difference in all-time conference winning percentage	Absolute difference between teams' all-time winning percentages in intraconference play (from 0 to 100)
Absolute difference in all-time conference titles won	Absolute difference between teams' numbers of regular season conference titles (i.e., finishing in first place in their conference)
Absolute difference in recent conference winning percentage	Absolute difference between teams' winning percentages in intraconference play over the 2002–03, 2003–04, and 2004–05 seasons
Absolute difference in preseason projected conference rank	Absolute difference in projected conference rank for the 2005–06 season, as voted on by coaches and members of the news media
<i>University characteristics similarity</i>	
Absolute difference in academic quality	Absolute difference between universities' academic quality, as measured by an aggregate of three metrics used in the <i>U.S. News and World Report</i> 2005 undergraduate university rankings: admission acceptance rate (reverse-coded), percentage of freshmen in the top 10 percent of high school class, and a "peer rating" on a scale of 1 to 5 based upon ratings made by administrators at other universities ( $\alpha = .87$ ; measures were standardized and then averaged) ( <a href="http://colleges.usnews/rankingsandreviews/com/college">http://colleges.usnews/rankingsandreviews/com/college</a> )
Absolute difference in enrollment	Absolute difference between universities' total enrollments (in thousands of students)
Both universities private or public conference winning percentage	Dummy variable set to 1 if universities were both public or both private institutions in intraconference play over the 2002–03, 2003–04, and 2004–05 seasons
<i>Repeated interaction</i>	
Number of games played	Total number of games teams played against each other prior to the 2005–06 season, mean-centered by conference (in tens of games)
<i>Competitiveness</i>	
All-time competitiveness index	Head-to-head winning percentage of the inferior team (i.e., the team that won fewer games) over the history of games played between the teams (ranged from 0, indicating a completely lopsided match-up, to 50, indicating a perfectly even match-up)
Recent competitiveness index	The head-to-head winning percentage of the inferior team during the 2002–03, 2003–04, and 2004–05 seasons
Recent margin of victory	The average margin of victory in games played between the teams during the 2002–03, 2003–04, and 2004–05 seasons

**APPENDIX B**  
**Consequences of Rivalry: Control Variables and Dependent Measures**

Variables	Description
<i>Control variables</i>	
Attendance	The number of fans at the game. This variable was included to control for the influence of the crowd upon player motivation and arousal (Zajonc, 1965), as rivalry is likely to influence fan interest in addition to player involvement, and we were interested in the direct effects of players' feelings of rivalry on game performance, separate from any crowd effects. We also analyzed attendance as a dependent variable, to assess the effect of rivalry on fan interest.
Absolute betting line	An expert prediction about the final scoring margin. This captures how close the game is expected to be, which could influence player motivation and arousal independent of rivalry.
<i>Defensive performance</i>	
Points per 100 possessions	An indicator of defensive performance that is equal to the number of points scored divided by the number of possessions or scoring opportunities, multiplied by 100.
Field goal percentage	Shooting accuracy during normal play, calculated as the number of shots made divided by the number of shots attempted.
Steals	A defensive statistic in which a player intercepts a pass or otherwise takes possession of the ball from an opposing player.
Blocked shots	A defensive statistic in which a player prevents an opposing player's shot from reaching the basket.
<i>Miscellaneous</i>	
Free throw percentage	Shooting accuracy on free throws. Free throws are awarded after certain types of violations by the opponent. The game clock is paused and the player awarded the free throw(s) is allowed to shoot, undefended, from a designated spot.



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