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Technical Fouls Predict Performance Outcomes in the NBA

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Abstract

A dataset including all players from five consecutive National Basketball Association (NBA) seasons was analyzed to determine the relationship between displays of hostile aggression—as measured by the number of technical fouls a player received—and markers of successful performance. Analyses revealed that a greater number of technical fouls predicted success in aspects of the game that require power and energy, such as making field goals, grabbing rebounds, and blocking shots. However, a greater number of technical fouls was also associated with performance decrements in aspects of the game that require precision and carefulness, such as making three-pointers.

Technical Fouls Predict Performance Outcomes in the NBA

Sport psychologists have long been interested in whether aggression helps or hinders successful sport performance (e.g., Andrews, 1974; Hanegby & Tenenbaum, 2001; Loughhead & Leith, 2001; McCarthy & Kelly, 1978a, 1978b; Sheldon & Aimar, 2001; Wankel, 1973). Aggressive behavior has been defined as any physical or verbal action that is committed with the intention to physically or psychologically harm a target person (Silva, 1980), while successful performance refers to performance outcomes that are consensually considered indicative of good play within a sport (e.g., a greater number of goals in soccer, a smaller number of turnovers in basketball). Because many sports involve legitimate physical contact between players (and sometimes resultant injuries), measuring aggression within the context of sports can be a complex endeavor (Grange & Kerr, 2010; Kerr, 2005; Russell, 2008). It is important not to confound true aggression, including the intention to harm another person, with mere assertiveness (Cox, 2007) or *play aggression* (Apter, 2001; Kerr, 2005), in which athletes' legitimate actions within a sport might cause accidental or incidental harm to opponents.

Conveniently for sport psychology researchers, some sports include penalties or fouls that are specifically assigned for unsanctioned aggression that is judged illegitimate in its intentions (Vokey & Russell, 1992). Several studies have therefore examined whether aggressive behavior within the context of competition, as measured by penalties or fouls, is associated with better or worse performance outcomes. For example, in an investigation of college ice hockey, McCarthy and Kelly (1978a, 1978b) found that players who received more aggressive penalties attempted a greater number of goal shots, made a greater number of goals, had a higher percentage of successful goal shots, and had more assists, while Sheldon and Aimar (2001) observed that aggression often precedes success in hockey. Other studies have shown a positive relationship

between a hockey team's number of wins and number of penalties received (Andrews, 1974; Wankel, 1973). Furthermore, Loughead and Leith (2001) found that as youth league hockey players advanced to a higher level in the system, they became more accepting of aggression and received more aggressive penalties, providing some evidence that aggression is associated with being a better, more experienced player. In general, the evidence indicates that aggressive penalties are associated with success in hockey, although some studies suggest that this may be true only under certain conditions (Cullen & Cullen, 1975; Gee & Leith, 2006; Jones, Bray, & Oliver, 2005; McGuire, Courneya, Widmeyer, & Carron, 1992; Widmeyer & Birch, 1984; but see also Gee & Sullivan, 2006). Similar results have been found for handball, with one study showing that winning teams committed more fouls than losing teams did (Albrecht, 1979).

Past research in this vein, while highly suggestive that aggression may have an impact on sport performance outcomes, suffers from a failure to distinguish between instrumental and hostile aggression. When an athlete intentionally harms another athlete but the ultimate *goal* of the action is not the harm itself, but rather the achievement of some other end such as victory in the competition, it is called instrumental aggression (Cox, 2007; Russell, 2008; Silva, 1980). Since instrumental aggression in the context of sports often has winning the competition as its ultimate goal, it would not be especially enlightening to discover that such aggression may be linked to positive performance outcomes such as victory. Unfortunately, the hockey penalties used as the measure of aggression in most past studies (e.g., Widmeyer & Birch, 1984) are sometimes assigned for actions that further the goal of the athlete—in other words, instrumental aggression (e.g., hitting an opposing player with the stick to steal the puck may result in a slashing penalty). A more substantively interesting question is whether aggressive behavior that is not aimed at any further goal—aggression that serves only the goal of psychologically or

physically harming a target person—is associated with positive or negative performance outcomes in sports. Such behavior has been called hostile aggression (Cox, 2007; Russell, 2008; Silva, 1980) or anger aggression (Apter, 2001; Kerr, 2005), and some authors have suggested that it typically stems from an angry emotional state (e.g., Cox, 2007). If an association were found between displays of hostile aggression and sport performance outcomes, it would suggest that such displays, or the psychological states that dispose athletes toward such aggression (e.g., anger), may be adaptive (or maladaptive) for sport purposes, and would not merely show that “doing whatever it takes to win” (i.e., instrumental aggression) facilitates winning.

We conceived the present study with the goal of utilizing a purer operationalization of hostile aggression than has been used in prior studies. For this purpose, we selected technical fouls in the context of professional basketball. Technical fouls are an especially strong indicator of hostile aggression because they are given out only for behaviors that do not directly contribute to the goal of the athlete.¹ For example, a technical foul can be given out for physical contact only when the ball is not alive (NBA.com Rule No. 12 – Fouls and Penalties, 2009). The prototypical technical foul in basketball—yelling at or insulting an official over a call—fits with the conventional assumption that aggression occurs “as a result of a perceived threat or the belief that one has been intentionally mistreated or even because of some frustration” (Berkowitz, 1990, p. 494), and indeed, in a study of aggression in hockey and basketball, “negative verbalizations to officials” were the most common form of aggressive behavior observed in both sports, and were judged by an expert player, an official, and the experimenter to have highly aggressive intent (Kirker, Tenenbaum, & Mattson, 2000). For these reasons, we believe that our selection of technical fouls as an indicator of aggression was appropriate and represents an

advance over the operationalizations of aggression used in past archival research on the relationship between aggression and sport performance outcomes.

A second advantage of our study design is that by using a very large and comprehensive dataset—five full seasons of National Basketball Association (NBA) player statistics—we had greater power than past, smaller scope studies to detect subtle variations in the performance effects of aggression. Aggression may help athletes in some aspects of sport performance while hurting in others. Although research on ice hockey has generally suggested a positive relationship between aggression and successful performance (e.g., McCarthy & Kelly, 1978a, 1978b), aggressive behavior among tennis players (e.g., insulting an opponent) has been associated with worse performance (Hanegby & Tenenbaum, 2001), and a recent meta-analysis suggested that anger—which may dispose athletes to aggression—hurts sport performance outcomes overall (Beedie, Terry & Lane, 2000), although the effect size was small and some of the reviewed studies showed effects in the opposite direction (e.g., Terry & Slade, 1995; Terry & Youngs, 1996).

Why might, as the research literature suggests, aggression help in some cases, but hurt in others? We propose that because hostile aggression is a high-arousal state (Apter, 2001; Grange & Kerr, 2010; Kerr, 2005), an aggressive mindset may help athletes to maintain high levels of energy and drive (Hanin, 2000; Robazza & Bortoli, 2007), critical for a forceful sport such as hockey or handball. On the other hand, consistent with the classic Yerkes and Dodson (1908) finding that high arousal impairs rather than facilitates performance on tasks that demand an organism's attention, aggression may produce distraction and impair performance when precision and concentration are paramount (Kauss; 1978; Silva, 1980; Striegel, 1994), as in tennis (see Cox, 2007, for more on how optimal arousal levels vary by sport activity). Based on

this idea, we hypothesized that among NBA players, a greater number of technical fouls across a season would be associated with successful performance on tasks requiring forceful energy, such as points scored, rebounds, and blocks, whereas for tasks requiring precise concentration, such as three-point shots, a greater number of technical fouls would be associated with negative outcomes.

Method

We analyzed player statistics for the five most recent NBA seasons at the time of our analysis (2003–2004, 2004–2005, 2005–2006, 2006–2007, and 2007–2008). These statistics were obtained from dougstats.com, a repository of NBA statistics that are cross-checked against various sources. The dataset for each season contained season totals for each individual's technical fouls and minutes played, in addition to all the major statistics that are considered by players, coaches, and fans to be important markers of successful (or unsuccessful) performance in basketball: points scored, shots attempted and made (broken down into field goals, free throws, and three-pointers), rebounds, assists, turnovers, blocks, and steals. The primary position the player played in that particular season (point guard, shooting guard, small forward, power forward, or center) was also indicated. Each dataset contained performance information for all of the players who appeared in a game that season. Each season's dataset had data for between 442 and 464 players. We combined the five datasets into one large dataset (indicating which year the data were from), and the full dataset had 2272 observations. The descriptive statistics for the full dataset appear in Table 1; some of the mean values are low because many players played relatively few minutes in a total season.

As an operationalization of hostile aggression, we used the season total of technical fouls that a player accumulated. The technical fouls recorded in our dataset did not include non-

aggressive violations such as an illegal defense or an illegal substitution. Instead, our dataset's technical foul totals included only those fouls that counted toward the ejection of a player, and these were given out exclusively for unsportsmanlike conduct—that is, aggressive behavior. As defined in the NBA rulebook, these fouls are assigned for actions such as “fighting,” “a deliberately-thrown elbow or any attempted physical act with no contact involved,” “taunting,” “use of profanity,” “overt actions indicating resentment to a call,” and “physically contacting an official” (NBA.com Rule No. 12 – Fouls and Penalties, 2009). Contact with other players within the context of the game (e.g., elbowing or pushing to create separation from a defender), which may reasonably be interpreted in some cases as instrumental aggression or even mere assertiveness, results in a personal or flagrant foul instead of a technical foul.

To assess the relationship between displays of hostile aggression and performance outcomes, we analyzed how technical fouls (controlling for minutes played, position played, and season year) predicted all available performance statistics: points scored, field goals attempted, field goals made, field goal percentage, free throws attempted, free throws made, free throw percentage, three-point shots attempted, three-point shots made, three-point shooting percentage, rebounds, assists, steals, blocks, and turnovers. To do this, we ran linear mixed-models analyses in SAS (version 9.1) with PROC MIXED, which allowed us to account for the repeated observations of some players. Specifically, for each of the 15 measures of performance we were interested in, we built a model that predicted that measure of performance from technical fouls, season year, minutes played, and position. All of our models included random effects for the intercept and year. The square root of all response variables except for the shooting percentages was taken to correct for any non-normality of error terms and heterogeneity of variance. Finally, for our three shooting percentage models, we included only those players who had at least 50

shot attempts of the particular shot (e.g., for the field goal percentage model, we included only players with at least 50 field goals attempted). We did this to ensure that our analyses were not contaminated by players who did not shoot very often and thus could have misleading percentages (e.g., 1 for 1 = 100%).²

Results

We were interested in the effect of technical fouls on performance outcomes, controlling for other factors that might affect the various performance outcomes—specifically, season year, the player’s position, and minutes played. Unsurprisingly, minutes played predicted every outcome variable in our dataset. In addition, there was a linear trend over the season years for many measures of performance. All measures of performance also had at least some kind of positional differences, most of which were unsurprising (e.g., centers shot fewer three-pointers but collected more rebounds and blocks than all other positions). Coefficients for technical fouls—our predictor of interest in the mixed-model analyses—are shown in Table 2.

As the number of technical fouls increased, the number of points scored increased significantly ($b = .1455, p < .0001$). Points scored can be broken down into field goals and free throws. Players with more technical fouls both attempted ($b = .0809, p < .001$) and made ($b = .0745, p < .0001$) significantly more field goals than did players with fewer technical fouls, and the field goal percentage of players with more technical fouls was marginally higher than that of players with fewer technical fouls ($b = .0008, p < .1$). In addition, players with more technical fouls both attempted ($b = .1764, p < .0001$) and made ($b = .1516, p < .0001$) significantly more free throws than did players with fewer technical fouls, although the total number of technical fouls per season was not related to a player’s free throw percentage ($b = .0004, p > .5$).

Three-point shots are a particular type of field goal, constituting about 20% of total field goal attempts in our dataset. Players with more technical fouls attempted ($b = -.1092, p < .0001$) and made ($b = -.0792, p < .0001$) significantly fewer three-pointers, and had a lower three-point shooting percentage ($b = -.0014, p < .05$), than did players with fewer technical fouls. Thus, although players with more technical fouls shot and made more field goals overall, their shots appear to have been from shorter distances, compared to players with fewer technical fouls.

Beyond shots taken and points scored, a greater number of technical fouls also predicted a significantly greater number of rebounds ($b = .0700, p < .001$), blocks ($b = .0524, p < .001$), and turnovers ($b = .0793, p < .0001$). A greater number of technical fouls predicted a marginally greater number of assists ($b = .0296, p < .1$). However, technical fouls were not significantly related to steals in our dataset ($b = .0093, p > .3$).³

Discussion

In the first study, to our knowledge, that has examined the relationship between displays of hostile aggression and performance outcomes in basketball, we found that aggressive behavior in the NBA—as measured by the number of technical fouls a player received—was generally positively associated with markers of successful performance. Controlling for the season year, the number of minutes they played, and their position, NBA players who received more technical fouls scored more points and had a greater number of rebounds and blocks than did players with fewer technical fouls. Players with more technical fouls also had marginally more assists per season than did players with fewer technical fouls. A greater number of technical fouls was also associated with a greater number of field goals attempted and made and a (marginally) higher field goal shooting percentage. Furthermore, players with more technical fouls were better at getting to the free throw line, and therefore made more free throws, than did players with fewer

technical fouls (even though there was no relationship between technical fouls and free throw shooting percentage). On the flip side, a greater number of technical fouls was associated with more turnovers and fewer attempts at and less success with three-point shooting.

These findings suggest that displays of hostile aggression, or possibly a disposition toward hostile aggression (e.g., anger), may help basketball players in aspects of their game that require power and energy, such as grabbing rebounds, blocking shots, and making field goals (many of which, including lay-ups and dunks, depend more upon the power to get close to the rim than on precision). This makes sense given that hostile aggression is a high-arousal state (Apter, 2001; Grange & Kerr, 2010; Kerr, 2005), and is consistent with McCarthy and Kelly's (1978a, 1978b) findings that hockey players who received more aggressive penalties scored more goals than players with fewer aggressive penalties. Furthermore, by using technical fouls as the operationalization of aggression, our study strengthens the claim that aggression itself or an aggressive disposition can improve sport performance outcomes in a non-obvious way, since, unlike hockey's aggressive penalties, basketball's technical fouls do not include instrumental acts of aggression that directly contribute to successful performance outcomes.

Our study's results complicate the simple aggression–success link, however, by showing that technical fouls are associated with performance decrements in aspects of the game that require precision and carefulness (e.g., three-pointers). The greater number of turnovers experienced by players with more technical fouls, compared to players with fewer technical fouls, suggests that the aggressive players may be prone to recklessness, which is consistent with research showing that angry people tend to engage in risky decision-making (Gabetti & Giusberti, 2008). And although the number of technical fouls was related to getting to the free throw line, displays of aggression were not related to better free throw shooting, another task

involving carefulness (a negative correlation between number of technical fouls and free throw shooting percentage, of course, would have provided even stronger support for our hypothesis). One could extrapolate from our results that aggression may actually hurt performance in sports that require more carefulness and less explosive energy than basketball and hockey. Future research should test this hypothesis and examine whether it accounts for why displays of aggression were related to worse performance in tennis (Hanegby & Tenenbaum, 2001) but better performance in basketball and hockey (e.g., McCarthy & Kelly, 1978a, 1978b; Widmeyer & Birch, 1984).

Like any correlational research, the present study is open to alternative interpretations. It is possible that the direction of causation is opposite our interpretation: players who are accustomed to playing successfully, that is, may simply show more aggression when things do not go their way. However, if this were the case, we would expect technical fouls to be uniformly associated with measures of player success; what we found, instead, as discussed above, was systematic variation in the relationship between aggression and success depending on whether the measure of success was something that could sensibly be expected to be facilitated by the increased energy associated with a player's aggression. Still, it is possible that some third variable such as players' motivation or testosterone levels influenced both aggression and successful performance in the same direction. For example, players who are dispositionally high-arousal might show a tendency both to react aggressively against perceived slights (resulting in technical fouls) and to perform well in those aspects of the game requiring high energy or arousal. Although we cannot rule out this particular possibility, we think it is unlikely, as research has shown that aggressive adolescents actually have lower levels of baseline autonomic

arousal than non-aggressive adolescents; only when provoked by stressful events do aggressive individuals show higher levels of arousal (Patrick, 2008).

One major question for future research is whether aggression by individual basketball players helps or hinders the performance of the whole team. Aggressive players may score more points and do better overall than less aggressive players, but it is possible that their aggression harms their teams. For example, whenever a player receives a technical foul, the opposing team is given one free throw. Our statistical analyses did not take into account any team-level deleterious consequences of aggression. On the other hand, displays of aggression could improve team performance by increasing spectators' enjoyment of and excitement about the game (DeNeui & Sachau, 1996), which in turn tends to boost athletes' motivation and improve their performance, as in the home-field advantage (see Schwartz & Barsky, 1977). As previously noted, studies of team-level effects in ice hockey have suggested that teams showing more aggression may perform better (Andrews, 1974; Wankel, 1973; Widmeyer & Birch, 1984).

The present study makes a significant contribution to the literature on aggression and athletic performance by examining aggression in basketball for the first time and by using a dataset more robust and reliable than the small samples used in most previous studies of in-game aggression. Moreover, our operationalization of aggression, technical fouls, enabled us to determine with more certainty than prior studies whether players who frequently display hostile aggression—as opposed to instrumental aggression or an aggressive playing style—show more successful performance outcomes than players who less often display hostile aggression. Consistent with past research (e.g., McCarthy & Kelly, 1978a, 1978b), we found that in-game aggression was positively associated with individual athletes' success—at least in those domains that require energy and drive more than concentration and carefulness. We hope that this

research will inspire renewed interest in the relationship between aggression and sport performance outcomes, and will spur more researchers to attend to the important distinction between hostile and instrumental aggression in the context of sports. Although more research will be needed before definitive conclusions can be established, this study suggests that coaches may want to think twice before unequivocally condemning displays of hostile aggression by their players, such as those that result in technical fouls in basketball. While yelling at a referee clearly does not lead directly to any positive outcomes, our data suggest that the energy that this display creates in a player, or the angry disposition that leads to the display, may facilitate successful performance in some aspects of the game.

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Footnote

¹ Flagrant fouls in basketball are more similar to the hockey penalties that have usually been studied in that they are often instrumental, or the result of an action that furthers the performance goal of the athlete (e.g., a player might receive a flagrant foul for trying to prevent another player from dunking). These fouls are so rare during the regular season in basketball that we did not examine their relationship to performance.

² We chose the number 50 as an arbitrary cutoff value, and analyses using slightly different values yielded the same pattern of results.

³ Mixed-models analyses do not allow us to determine whether we have between-subjects effects (i.e., players with more technical fouls scored more points than players with fewer technical fouls) or within-subjects effects (i.e., in years when players had more technical fouls they scored more points than in years when they had fewer technical fouls). Follow-up analyses to the mixed-models results suggested that for most of our performance measures there was a combination of between- and within-subjects effects.

Table 1

Means and standard deviations per season (aggregated over the five seasons)

Variable	Mean	Standard deviation
Technical fouls	1.989	3.052
Minutes played	1301.026	947.999
Points	523.121	487.279
Field goals attempted	430.581	382.229
Field goals made	194.267	177.074
Field goal percentage	0.434	0.091
Free throws attempted	137.265	146.086
Free throws made	103.236	114.705
Free throw percentage	0.720	0.144
Three-pointers attempted	87.920	122.078
Three-pointers made	31.352	46.240
Three-pointers percentage	0.269	0.162
Rebounds	223.733	201.215
Assists	114.254	135.158
Steals	39.914	35.146
Blocks	25.751	36.763
Turnovers	75.185	64.111

Table 2

Predicting per-season performance outcomes from technical fouls (controlling for season year, minutes played, and player position)

Per-season performance outcome	Coefficient estimate for technical fouls as a predictor	Standard error	Df	<i>t</i> value	<i>p</i> value
Points (sq rt)	0.1455	0.0239	926	6.08	<.0001
Field goals attempted (sq rt)	0.0809	0.0214	929	3.78	0.0002
Field goals made (sq rt)	0.0745	0.0149	929	5.00	<.0001
Field goal percentage	0.00076	0.00042	813	1.81	0.0711
Free throws attempted (sq rt)	0.1764	0.0189	929	9.32	<.0001
Free throws made (sq rt)	0.1516	0.0171	929	8.88	<.0001
Free throw percentage	0.00040	0.00066	600	0.60	0.5517
Three-pointers attempted (sq rt)	-0.1092	0.0255	929	-4.29	<.0001
Three-pointers made (sq rt)	-0.0792	0.0172	929	-4.60	<.0001
Three-pointers percentage	-0.00144	0.00065	386	-2.23	0.0264
Rebounds (sq rt)	0.0700	0.0206	929	3.40	0.0007
Blocks (sq rt)	0.0524	0.0136	929	3.85	0.0001
Turnovers (sq rt)	0.0793	0.0114	929	6.95	<.0001
Assists (sq rt)	0.0296	0.0171	929	1.73	0.0834
Steals (sq rt)	0.0093	0.0100	929	0.93	0.3526

Note: The coefficients for the shooting percentages are based on models in which only players who attempted the shot of interest at least 50 times were included (e.g., the field goal percentage results are based on players with at least 50 field goals attempted).