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Do clutch players win the game? Testing the validity of the clutch player's reputation in basketball

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ABSTRACT

Objectives: The sport psychology literature recognizes the existence of clutch behavior among elite athletes. The present study questions the validity of the clutch reputation in basketball. The performance of clutch players was compared to that of their teammates, using a broad approach that included different performance measures.
Design: Eight basketball experts ranked NBA players according to their perceived reputation of being clutch shooters. The selection procedure resulted in a sample of 16 clutch players who had successfully made a game-deciding shot, or had made a successful shot in the final few minutes to tie the game, during the 2003–2006 seasons.
Method: Data were collected from play-by-play reports of 222 tied NBA games during the 2005–2006 season and playoffs. Data were reduced to the final five minutes of the second and fourth quarters in each close/tied game. A MANOVA and several ANOVAs were conducted in order to compare the performance measures of the clutch players and the average of their teammates, in game phases of low and high pressure.
Results: The reported main effects of clutch versus non-clutch players suggest a superior performance of the clutch players. The results also show that the clutch players improved their performance in the final, most decisive phase of the game, which could be interpreted as evidence for clutch ability. However, the clutch players did not improve their general shooting skills, as might have been expected.
Conclusions: Top NBA players, like most other people, do not perform better under pressure situations, at least not while considering their chances of making a shot, but clutch players do influence the end-result of the game in other aspects.

The sport psychology literature recognizes the existence of clutch behavior among elite athletes. At least five theoretical frameworks have been suggested to explain it (Wilson, 2012). The term "clutch" is commonly used to describe any performance–increment or superior performance, relatively better than usual standards, that occurs under pressure circumstances (Albert, 2007; Otten, 2009). It often refers to high levels of performance in a critical situation, typically that of a game-deciding shot or the final few minutes in a close/tied match. Baumeister (1984, p. 610) defined pressure as "any factor or combination of factors that increase the importance of performing well on a particular occasion". This includes many occasions where an outstanding performance means the difference between winning and losing.

When reviewing the names of athletes who have been labeled as clutch players during their careers, one will find the best and most exceptional players, for example Mariano Rivera and David Ortiz in baseball, Michael Jordan and Dirk Nowitzki in basketball, Romario and Zidane in soccer, and Tiger Woods in golf, along with the average ones who apparently were able to dramatically raise the level of their performance in the clutch (such as basketball players Robert Horry, Steve Kerr, and Derek Fisher, and golfer Andy North). An athlete's reputation for being a clutch player often reflects a certain innate ability that some players possess while others do not. For example, former NBA player Jerry West had such a notable reputation as a clutch player in the 1960s and 1970s that he was given the nickname "Mr. Clutch". He was considered to "have what it takes" to make the winning point at a critical time in the game. Other examples are baseball players Reggie Jackson (who

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was famous as "Mr. October" due to his alleged ability to elevate his performance in the postseason), Jack Morris (who had a reputation as a "money pitcher"), and the perceived clutch hitter Derek Jeter.

Believing in clutch ability might have some strategic consequences related to how players and coaches conduct the game. For example, managers may decide during critical, pressure-packed situations to put in their clutch players, or to deliberately direct the game towards a player who is considered to excel in a clutch situation. A clutch player holds a position of high honor and responsibility, as this player is supposed to improve his or her team's chances of winning the game. Both players and fans have a high regard for the clutch player's role in pressure situations. The reputation of being a clutch player might also provide tangible and valuable rewards within and outside the competitive arena. Therefore, the incentive to acquire this superior athletic reputation is likely to be strong, and the incentive to maintain it might be even stronger.

Clutch ability research

The issue of whether clutch ability actually exists has been investigated and discussed mostly in the game of baseball (e.g., Albert, 2001, 2005; Bronstein, 2001; Conlon, 1990; Cramer, 1977; Neyer, 1999; Otten, 2009; Otten & Barrett, 2013; Palmer, 1985, 1990; Wood, 1989; Zaidlin, 1999). For example, in a more recent study Otten and Barrett (2013) reviewed players' data from 109 years of Major League Baseball (MLB) statistics. However, the results from all these studies did not reflect any meaningful ability of players to perform better in clutch relative to non-clutch situations. In his 1984 *Baseball Abstract*, baseball expert Bill James skeptically questions if it is even worth searching for clutch ability without a clear understanding of the mechanisms underlying this phenomenon: "If there is such a thing as 'clutch ability', then exactly what is it? We know what its signs would be, but what is it? How is it that a player who possesses the reflexes and the batting stroke and the knowledge and the experience to be a .260 hitter in other circumstances magically becomes a .300 hitter when the game is on the line? How does that happen? What is the process? What are the effects? Until we can answer those questions, I see little point in talking about clutch ability" (quoted in Albert, 2001, p. 15).

If clutch ability is to be attributed to an individual skill in addition to various situational influences (such as a reliance on implicit knowledge when pressured), as psychologists often assume, then one would expect that clutch players will exhibit such a tendency over multiple seasons. Based on such reasoning, most studies on this topic have applied a year-to-year comparison of players' performances in clutch and non-clutch situations. Cramer's (1977) classic study was the first to follow such a rationale. Cramer examined the performance records of 122 professional baseball players in the 1969 and 1970 seasons. He calculated the amount that these players contributed to their team's chances of winning over the season (PWA), and compared it to their raw batting win average (BWA). The difference between these two measurers reflected the players' observed "clutchness". Comparing clutchness over seasons, Cramer found that the best clutch hitters in 1969 reverted to their normal level in 1970 (r-square of .038 for National League players, and .055 for American League players). Given the lack of consistency in the data (which is reflected in the small correlation values), Cramer concluded that players' performances over seasons could simply be due to chance, and that clutch hitting as an ability does not exist and must be just a matter of luck.

The majority of follow-up studies challenging Cramer's findings were also unable to detect clutch ability. Palmer (1985) showed that clutch pitchers do not exist either. He found that a baseball pitcher's probability of winning a game was not higher than that which could be expected by chance. A follow-up study (Palmer, 1990), which tested for clutch talent over a 10-year period using players' batting averages, confirmed Palmer's preliminary conclusion. The latter study was not concerned with the question of whether results were consistent from one year to the next, but rather whether they could be explained solely by random forces. However, the results showed that the actual distribution of players' hits in the clutch was perfectly consistent with a normal distribution – that is, nothing over and above the random effect.

Ruane (2005) conducted a very similar analysis to Palmer's (1990) study, but with a much larger numbers of at-bats, extending over a period from 1960 to 2004. Comparing players' ability in both clutch and non-clutch situations over the course of their careers, Ruane arrived at the same conclusions as Palmer. Even when using a more sensitive procedure to detect the consistency in clutch ability, as suggested by Conlon (1990) and James (2005a, 2005b), support was not provided for the existence of the clutch phenomenon (Birnbaum, 2005). Palmer and Cramer (2008) extended their analysis to include 50 years of play-by-play data, using win probabilities as a measure of clutchness. The overall results of several sub-studies within this research suggested that clutchness is a random effect.

Still, a number of scholars (e.g., Albert, 2007; Dolphin, 2004; Silver, 2006; Tango, Lichtman, & Dolphin, 2007) believe that there is some evidence for clutch ability, and several top clutch baseball players were clearly identified in these studies. So the debate on this issue is far from being settled. In any case, it is already quite accepted that the clutch effect is much smaller (if it really does exist) than players and fans believe it to be. Even if a few clutch hitters do exist, the clutch performance effect is probably too small to make a practical difference on the outcome of a pennant race (Cramer, 1977). However, despite the evidence to the contrary, many people still consistently believe in the idea of the clutch hitter.

The belief in clutch ability is commonly attributed to a general tendency to retain the occurrence of the more dramatic events embedded in a normal course of experiences (which relates to the *availability* heuristic: a mental shortcut that relies on immediate examples, such as related events or situations, that come to mind; as a result, one might judge that those events are more frequent and possible than others). Thus, it is possible that players who had several memorable hits in critical games, especially in the early stages of their careers, would be considered by both themselves and others as being clutch hitters. Players and fans would then expect similar performances in the future from those players, erroneously reinforcing their belief over time. Alternately, this belief could be attributed to a general tendency to detect clumps in random sequences, even when none exist (which relates to the *representativeness* heuristic), as previously demonstrated in the framework of "hot hand" studies (e.g., Gilovich, Vallone, & Tversky, 1985). These cognitive biases were first recognized and documented by the psychologists Amos Tversky and Daniel Kahneman (see Tversky & Kahneman, 1974).

Clutch reputation versus hot hand belief

The term "hot hand" refers to the common belief that a player's chances of success during a particular period within a game are significantly higher than his or her overall base rate (Gilovich et al., 1985). For example, after a few consecutive successful shots, the basketball player is assumed to be in a psychological state that enhances his or her chances of scoring the next shot(s) as well. However, the majority of hot hand studies conducted over the last three decades have concluded that unusual streaks are exceptionally singular events, most likely associated with great athletic skill

combined with pure luck (e.g., Avugos, Köppen, Czienskowski, Raab, & Bar-Eli, 2012; Bar-Eli, Avugos, & Raab, 2006; Reifman, 2012).

Clutch ability appears to be related to the hot hand belief, however the causal attributions for the elevated performance in both cases are entirely different. The hot hand is typically attributed to a recent success or flow from a hot player – assuming that success in previous attempts is self-promoting (Tversky & Gilovich, 1989). This intuitive conviction that "success-breeds-success" is not exclusive to sports activities, but rather is quite common in many daily occurrences in which people are involved. As for the case of clutch reputation, a high sense of confidence and perceived control under stressful situations is expected to positively affect performance. Thus, we often expect that those highly skilled players will perform to a higher degree under stress, unlike most of us under stressful circumstances.

A clear conclusion emerging from hot hand research suggests that success in previous attempts does not promote success in the future, either through the enhancement of self-confidence or through any other motivational mechanism, particularly not for basketball shooting. However, the difficulty in detecting streak shooting in basketball does not exclude the possibility that other aspects of a player's performance, such as defense, rebounding, shots attempted, or points scored, could be subject to hot and cold periods (Tversky & Gilovich, 1989). For example, the number of points that a player scores in different periods within a game might not necessarily be the same, however the shooting percentages for this player will likely not change across the game. This line of reasoning guided our current work, as it is also might be a potential explanation for the origin of the clutch ability belief.

Clutch performance versus choking

Another closely related phenomenon that deserves consideration in the framework of this study is "choking under pressure". This term is used to describe suboptimal performance – far below what should be achieved despite situational demands for superior behavior (i.e., performing below your best; Beilock & Gray, 2007). Thus, similar circumstances (i.e., high pressure, high gains/losses) are expected to result in contrasting effects: superior clutch performance versus choking (Markman, Maddox, & Worthy, 2006; Otten, 2009; Worthy, Markman, & Maddox, 2009a, 2009b).

The most acknowledged competing clusters of theories, which attempt to explain the mechanisms underlying choking, are *distraction theories* (see Beilock, Kulp, Holt, & Carr, 2004; Oudejans, Kuijpers, Kooijman, & Bakker, 2011) and *explicit monitoring theories* (EMH; also known as *self-focus theories*; see Beilock & Gray, 2012; Castaneda & Gray, 2007; DeCaro, Thomas, Albert, & Beilock, 2011). Both accounts essentially make opposite predictions regarding how pressure exerts its impact (Wilson, 2012). While distraction theories propose that cognitive anxiety in the form of worry shifts required attention away from task execution, EMH states that performance is disrupted by the athlete monitoring the step-by-step execution of the skill. In other words, according to the EMH, anxiety shifts too much attention to skill execution processes, which eventually disrupts performance (Beilock & Carr, 2001; Gray, 2004; Masters, 1992).

Baumeister and Showers (1986) illustrated this process as follows: "Whereas a skilled basketball player will automatically move his hands so as best to catch the ball, if he tries consciously to control his hand movements he will find that he does not know how to move them, with the result being that he may misalign his hands and drop the pass" (p. 366). Both self-focus and distraction theories of choking have received considerable support in the sport psychology literature.

Implicit learning (i.e., a relatively passive accumulation of task-relevant knowledge that is normally processed at an unconscious level; Lam, Maxwell, & Masters, 2009a, 2009b), as opposed to explicit learning, is expected to overcome the effects of pressure (Masters, 1992). Lam et al. (2009a) demonstrated that the performance of individuals following learning by the metaphorical experiences of movements (i.e., analogy learning) is not affected by pressure manipulation, as opposed to the experience of explicit learners. These findings have the potential to explain the occurrence of both the clutch and choking phenomena under pressure-packed situations.

As for sport, research on choking among highly skilled athletes is controversial, and has had mixed results. Reliable support for declining performance under pressure was found under laboratory conditions, where individuals were placed under excessive stress concerning failure (e.g., Baumeister, 1984; Schlenker, Weigold, & Doherty, 1991); however, the participants were low- or moderately-skilled for the task at hand. The literature on choking in professional athletes in natural competitive settings has been less consistent (see Baumeister & Steinhilber, 1984; Fuld, 2005; Gayton, Matthews, & Nickless, 1987; Schlenker, Phillips, Boniecki, & Schlenker, 1995; Wright, Voyer, Wright, & Roney, 1995). Most of these studies investigated choking not at the individual athlete level, but rather at a team performance level (for an exception see Clark, 2002). Overall, the data provided ambiguous support for the choking hypothesis. Therefore, it can be concluded that in general, professional athletes do not inevitably choke under competitive pressure conditions. In the present work we show that they do not improve their performance under pressure conditions either, at least when basketball shooting performance is considered.

To summarize, the cumulative evidence provided in the literature suggests that there are no such general phenomena as clutch ability or an inherent clutch talent. For baseball players, the clutch-hitting effect either does not exist at all, or is so rare and small in magnitude that it is hardly worth consideration. Various baseball analysts, including Cramer (1977), Palmer (1985), and Ruane (2005), have found the so-called "clutch hitting" ability to be a myth. However, it should not be definitively concluded that clutch hits do not occur every now and then, but rather that any ability of certain players to regularly perform better than usual under high-pressure situations is apparently an illusion. Still, the belief in clutchness has its own power, even among specialized baseball statisticians who consider the existence of clutch hitting as an "open question" to be further debated (e.g., James, 2005a, 2005b). So, the disputable issue of clutch ability is in need of more exploration (for additional reading on the clutch debate see Cyril Morong's sabermetric research website, which keeps an updated list of clutch publications. www.cyrilmorong.com).

Research objectives

Clutch players are expected not only to overcome the predicted negative influence of anxiety on sporting performance (i.e., choking), but also to actually perform better than usual under pressure (Otten, 2009). Although more than a few studies have already suggested that clutch talent does not exist, these were all focused mainly on the game of baseball. The present study expands the evidence on the clutch reputation, which stems primarily from baseball, to a new arena that has not been previously explored – the game of basketball.

The purpose of the current study was twofold. The first goal, concerned with the validity of the clutch reputation, was to address the question of whether clutch shooting actually exists in basketball (i.e., the tendency of a player to shoot significantly better than expected on the basis of his or her overall record under extremely

demanding conditions). Do some "special" basketball players have the tendency to hit the right shot at the right time above and beyond what their regular shooting statistics would indicate? This was explored through an analysis of players' field goal and free throw shooting records in the clutch. The results of this analysis provide an additional view on decisions related to how players and coaches conduct the game.

The second goal, and in our view the more important one, was to assess whether players with a clutch reputation differ from their teammates in performance. We used a broad approach that includes different performance measures (field goal and free throw attempts, assists, foul drawing, and points scored), which may have the potential to explain the origin of the belief. We argue that a clutch player may exert greater effort at the critical moments of the game, which might lead to an increase in the "*doing more*" (quantitative) performance measures, even if such an effort would not produce a real change in this player's "*doing better*" (qualitative) performance measures (i.e., his or her shooting base rate). This dynamic is likely to guide players' actions as well as the allocation decisions of coaches during the game.

Method

Measures used for detecting clutch performance

In order to determine whether clutch shooters actually exist, a measure of shooting quantity and a measure of shooting timeliness (i.e., "close and late" clutch situations) were required. To address the first variable, eleven male basketball experts were asked to give their opinion as to which performance measures best reflect basketball clutch ability. The group of experts included ten basketball coaches from the two highest national divisions and one NBA commentator. The coaches had coached (or were coaching at the time) at the highest national level or for a national team. One of the coaches also had experience coaching a European national team.

The list of performance factors that was presented to the experts included field goal attempts (FGA), field goal percentage (FG%), assists (AST), foul drawings (FD), free throw attempts (FTA), free throw percentage (FT%), turnovers (TO), steals (ST), rebounds (RE), and points scored (PTS). In addition, the experts were encouraged to add any other performance measures that they felt were missing from the list.

The coaches agreed unanimously on two performance measures: field goal attempts (FGA) and the number of points scored by the player (PTS). Less agreement occurred on two other performance measures, namely foul drawings (FD) and assists (AST) (an agreement of 9 and 10 out of 11 experts, respectively). Nevertheless, we extended our analysis to include the qualitative performance measures, field goal percentage (FG%) and free throw percentage (FT%), in order to attain a better view of the clutch players' performances in the sense of the "*doing more*" versus "*doing better*" measures. Overall, these six factors were the potential clutch ability measures that were to guide our analysis.

For comparison purposes, data were also collected for each of the clutch player's teammates in all games. We used the term "non-clutch player" (as opposed to "clutch player") to identify the clutch player's teammates. Our final dataset included the performance records of more than 180 non-clutch players (according to NBA regulations, each team may have up to 13 players on its active roster in each game).

In line with Bar-Eli and Tractinsky (2000), pressure situations were defined in terms of time interval within a game; in this case we used the final five minutes of the fourth quarter in a close/tied game. For comparison purposes, data were also collected from the final five minutes of the second quarter in the same close/tied game, when pressure was relatively low.

Participants

Eight out of the eleven basketball experts who were involved in the first phase of the study were asked to rank the NBA players according to their perceived reputation of being clutch players. The other three experts were excluded because they were not fully familiar with NBA teams and players (i.e. they were not actively involved in continuously evaluating NBA players for drafting purposes). The experts were presented with the classical clutch performance definition, the one that is most accepted in the literature (see Albert, 2007; Otten, 2009), as outlined in the first paragraph of this paper. A list of 50 candidates (downloaded from www.82games.com) was presented to the coaches. The list included players who successfully hit a game-deciding shot, or who made a successful shot in the final few minutes to tie the game, in the seasons from 2003 to 2006. The experts were then asked to select the "clutch reputation" players who, in their opinion, best represented clutch behavior. The experts were also encouraged to add any other player's name that they felt was missing from the list.

A player was included in the analysis if he had earned the vote of at least five out of the eight basketball experts. Only 21 out of the 50 players met this criterion. In order to strengthen the reliability of our selection process, we excluded five players who did not compete in the 2005–2006 season's All-Star Games. During that particular season, two out of the considered five non-All Star players in our list (Sam Cassell and Stephan Marbury) were injured, and thus were not able to play in the season's final games, while the other three players (Carmelo Anthony, Derek Fisher, and Mike Bibby) missed few games and/or had a low average of minutes played per game (this might have been due to poor performance of these players during that particular season). Therefore, in practical terms, we did not have enough quality data for these players on which to base our analysis. Thus, the question of whether these five players are really clutch players could not be examined on the basis of their performance data in the 2005–2006 season.

Overall, the final sample in our study included 16 candidate clutch basketball shooters from 14 different NBA teams (the vote count is presented in parentheses): Kobe Bryant (8), Steve Nash (8), Paul Pierce (8), Dwyane Wade (8), Allen Iverson (7), LeBron James (7), Chauncey Billups (6), Tim Duncan (6), Richard Hamilton (6), Tony Parker (6), Ray Allen (5), Gilbert Arenas (5), Vince Carter (5), Kevin Garnett (5), Tracy McGrady (5), and Dirk Nowitzki (5).

Procedure

Our sample included 16 candidate clutch basketball players from 14 different NBA teams. Each team played 82 regular season games during the 2005–2006 season. A few of the selected teams also participated in the playoff games. As a season progresses, the games are assumed to become more demanding and crucial for each team. Therefore, in the course of this study we selected and analyzed the season's last 20 close/tied games for each team. A "close" game should not exceed a 6-point gap between the total score of each team at the final legal time of the game. The averaged gap between the teams' scores for the selected sample of games was 3.5 points. In cases where clutch players were identified in both teams in the same game, calculations were made for each player and his teammates for both teams in the same game. In total, our sample included 222 NBA tied games for the considered season.

Performance measures were collected for each player and his teammates from play-by-play reports published on the web (downloaded from: www.Espn.com, and www.NBA.com). Data

were reduced to the final five minutes of the second and fourth quarters in each close/tied game. In total, the primary dataset included 640 performance records for each selected clutch ability measure. For two out of the 14 teams that involved more than one potential clutch player, a single averaged non-clutch player measure was computed and used for comparison for all the considered clutch players. In total, an additional 560 performance records were added to the original dataset.

Free throw shooting data were also collected for the same potential clutch players and their teammates. This included the number of free throw shots attempted (FTA), the number of free throws made (FTM), and the percentage of successful free throw shots made (FT%) in both the second and fourth quarters of the games. In total, 2494 shots were analyzed, of which 951 were attempted in the second quarter of the considered games, while the other 1543 were attempted in the fourth quarter of all games.

Computation

For each performance measure, an averaged team performance value (ATP) was computed for all other non-clutch team members who were present with the clutch player on the court. The averaged team record was calculated based on data collected from the final 5 min of the second and fourth quarters in each close/tied game. For example, to compute the averaged team points scored (PTS), we counted the number of points made by all players on the court (except for the clutch player) in each game, and divided it by three or four.

Results

Analysis of raw performance measures data

Table 1 presents the averaged scores for each of the performance measures in the second and fourth quarters of all the considered games, for both clutch and non-clutch players. A multivariate analysis of variance (MANOVA) was conducted (FG% was excluded from the analysis, since it is directly and linearly related to the other dependent variables), which indicated a significant main effect related to the level of clutch ability (Wilks' Lambda = 0.364, $F_{[4,57]} = 24.89$, $p < .001$). In general, and beyond the game's phase, the clutch players' averaged performance scores were considerably higher compared to the non-clutch players. It appears that the clutch players were simply better players than their teammates.

A comparison of players' performance in the second and fourth quarters of the games revealed a statistically significant main effect related to the game phase (Wilks' Lambda = 0.65, $F_{[4,57]} = 7.77$, $p < .001$). In general, and beyond the level of clutch ability, the averaged performance scores for all players (clutch and non-clutch players alike) were higher during the final 5 min of the game compared to the final 5 min of the second quarter of the game. Our analysis also showed a significant interaction effect between the level of clutch ability and the game's phase (Wilks' Lambda = 0.808, $F_{[4,57]} = 2.66$, $p < .032$), suggesting that the clutch players' performance level was higher in the fourth quarter of the game compared to the second quarter, while the performance level of the non-clutch players between the two phases was more or less the same in the two quarters. It appears that the clutch players improved their performance in the final stage of the game, while the non-clutch players maintained their normal base level of performance.

An analysis of variance (ANOVA) for each of the performance measures separately indicated that the clutch players performed significantly better than the non-clutch players in all of the considered measures: field goal attempts (FGA; $F_{[1,60]} = 68.712$, $p < .001$), points scored (PTS; $F_{[1,60]} = 81.67$, $p < .001$), foul drawings (FD; $F_{[1,60]} = 44.85$, $p < .001$), and assists (AST; $F_{[1,60]} = 34.165$, $p < .001$).

As for the game's phase, a significant main effect was detected for only two out of the four performance measures, namely points scored (PTS; $F_{[1,60]} = 10.799$, $p = .002$) and foul drawings (FD; $F_{[1,60]} = 21.76$, $p < .001$). The scores of both measures were significantly higher in the final 5 min of the fourth quarter compared to the second quarter of the game. The effect of game phases for the other two measures, namely field goal attempts (FGA; $F_{[1,60]} = 1.72$) and assists (AST; $F_{[1,60]} = 1.58$), was not significant.

An additional analysis revealed a significant interaction effect between the level of clutch ability and the game's phase for field goal attempts (FGA; $F_{[1,60]} = 8.99$, $p = .004$), points scored (PTS; $F_{[1,60]} = 13.83$, $p < .001$), and foul drawing (FD; $F_{[1,60]} = 9.07$, $p = .004$). Yet no significant effect was found for assists (AST; $F_{[1,60]} = 0.37$).

Analysis of performance measures per minutes played

Up to this point, the analysis of players' records seemingly supports the clutch player reputation hypothesis; i.e., that the clutch players will improve their performance in the final critical phase of the game, while the non-clutch average team players will perform more or less at the same level. Even so, a skeptical observer might reasonably attribute the elevated performance of the clutch players to external factors, rather than to any fundamental enhancement of the effort or ability of specific players. Accordingly, the clutch reputation might have affected the allocation and replacement decisions made by the coaches in the course of the game. As a result, the perceived clutch players were intentionally allocated in the final critical phase of the game, and for a longer duration than their teammates.

To examine this possibility, the cumulative amount of time that clutch players were engaged in the second and fourth quarters of all the considered games was computed. Our analysis showed that on average, clutch players were engaged in 87.58 (SD = 9.08) out of 100 min in the second quarter (5 min multiplied by 20 games) compared to 99.15 (SD = 1.85) in the fourth quarter of the game, and this difference was significant (paired $t_{(15)} = 5.72$, $p < .001$). Thus, it is evident that the clutch players were not constantly on the court, and played less time in the second quarter as opposed to the fourth quarter of the game. This makes most of the selected performance measures incomparable between clutch and non-clutch players, because they were computed over different times on court.

Table 1
Averaged scores for each of the raw performance measures in the second and fourth quarters for both clutch players and non-clutch players.

Group	Phase	FG%	FGA	AST	FD	PTS
Clutch players	Fourth phase	0.46 (0.08)	56.06 (17.65)	12.25 (6.79)	26.31 (11.34)	89.81 (28.96)
	Second phase	0.49 (0.1)	43.75 (13.72)	13 (5.85)	14.25 (4.89)	60.44 (15.17)
Non-clutch players	Fourth phase	0.46 (0.07)	23.82 (3.46)	4.8 (1.69)	11.06 (2.07)	36.44 (6)
	Second phase	0.49 (0.05)	28.64 (3.21)	6.95 (1.51)	8.46 (1.17)	38.25 (4.51)

Note. FG% = field goal percentage; FGA = field goal attempts; AST = assists; FD = foul drawing; PTS = points scored. The standard deviation for each value is given in parentheses.

To account for this variable, a value-per-minute played was computed for each of the performance measures (except for FG%, which is not directly affected by the amount of time that players are actually engaged in the game), through dividing each raw value by the actual amount of time each player engaged in all games. As for the non-clutch players, each raw value was divided by 100 (min). These values were calculated for each game's phases separately. Table 2 summarizes the averaged scores per minute played in the second and fourth quarters of all the considered games, for both clutch and non-clutch players.

A multivariate analysis of variance (MANOVA) indicated that in general, and beyond the game's phase, the clutch players' averaged performance was significantly higher compared to that of the non-clutch players (Wilks' Lambda = 0.304, $F_{[4,57]} = 32.61$, $p < .001$). It was also found that in general, and beyond the level of clutch ability, the averaged performance scores of all players (clutch and non-clutch players alike) was significantly higher during the final 5 min of the game, compared to the final 5 min of the second quarter of the game (Wilks' Lambda = 0.678, $F_{[4,57]} = 6.771$, $p < .001$). However, no significant overall interaction effect was found between the level of clutch ability and the game's phase (Wilks' Lambda = 0.874, $F_{[4,57]} = 2.06$), suggesting that the main effect for the game's phase should not necessarily be related to a higher ability of the clutch players in the final stage of the game.

An analysis of variance (ANOVA) for each of the performance measures separately indicated that the clutch players performed significantly better than the non-clutch players in all the considered measures per minute: field goal attempts per minute (FGA/min; $F_{[1,60]} = 88.14$, $p < .001$), points scored per minute (PTS/min; $F_{[1,60]} = 103.3$, $p < .001$), foul drawing per minute (FD/min; $F_{[1,60]} = 52.5$, $p < .001$), and assists per minute (AST/min; $F_{[1,60]} = 38.8$, $p < .001$).

As for the game's phase, a significant effect was detected for only two out of the four performance measures, namely points scored per minute (PTS/min; $F_{[1,60]} = 5.65$, $p = .021$) and foul drawing per minute (FD/min; $F_{[1,60]} = 16.11$, $p < .001$). The scores of both measures were significantly higher in the final 5 min of the fourth quarter compared to the second quarter of the game. The effect of the game's phase for the other two measures, namely field goal attempts per minute (FGA/min; $F_{[1,60]} = 0.14$) and assists per minute (AST/min; $F_{[1,60]} = 3.48$), was not significant.

Further analysis indicated that the overall interaction between the level of clutch ability and the game's phase was marginal (Wilks' Lambda = 0.874, $F_{[4,57]} = 2.06$), yet a significant effect was found for three out of the four considered performance measures: field goal attempts per minute (FGA/min; $F_{[1,60]} = 4.26$, $p = .043$), points scored per minute (PTS/min; $F_{[1,60]} = 7.93$, $p = .007$), and foul drawing per minute (FD/min; $F_{[1,60]} = 5.78$, $p = .019$). No significant effect was found for assists per minute (AST/min; $F_{[1,60]} = 3.47$).

To summarize, the averaged scores for each of the performance measures per minute played were actually similar to the results obtained by simply analyzing the raw performance measures data. Still, the previously detected interaction effect between the level of clutch ability and the game's phase has been weakened (this could be explained partly by the large difference between the game phases for these players in the raw data), which seemingly undermines the clutch player phenomenon.

Analysis of field goal and free throw shooting data

Field goal and free throw shooting percentages are both associated with the "doing better" performance measures. Recall that the analysis of variance (ANOVA) for each of the performance measures separately indicated that the clutch players performed significantly better than the non-clutch players in most of the considered measures (i.e., FGA, PTS, FD, and AST). However, applying this test for field goal shooting percentage revealed no significant difference between the clutch and non-clutch players in either the second or fourth quarters of the game (FG%; $F_{[1,60]} < 0.001$). No significant effect was detected for field goal percentage (FG%; $F_{[1,60]} = 1.98$) when also considering the game's phase. Furthermore, no significant interaction effect was found between the level of clutch ability and the game's phase for field goal percentage (FG%; $F_{[1,60]} = 0.04$).

Up to this point, the analysis of field goal data provided only partial support for the clutch players' reputation – as reflected by the basketball experts' ratings in the primary stage of this study. However, the failure to detect clear-cut support for pure clutch ability might be attributed to external factors. These include the decisions made by the non-clutch players regarding the allocation of the ball between members of the team, shot selection made by the clutch players themselves (i.e., attempting difficult shots from a long distance), and the defensive strategy of the opposing team. To control for these confounding factors, we examined all free throw shots attempted by the clutch and non-clutch players during the considered games. Our dataset included a total of 2494 free throw shots for analysis, of which more than 1000 were attempted by the clutch players. Table 3 presents the averaged scores for each of the free throw performance measures: free throw shots attempted (FTA), free throws made (FTM), and the percentage of successful free throw shots made (FT%), in the second and fourth quarters of all games. The data show that the clutch players were fouled more than their teammates, and thus had to shoot from the line more frequently, mostly in the final stages of the game.

An analysis of variance (ANOVA) for each of the free throw performance measures indicated that in general, the clutch players were better free throw shooters than their non-clutch teammates; they attempted (FTA; $F_{[1,60]} = 42.54$, $p < .001$) and made (FTM; $F_{[1,60]} = 50.69$, $p < .001$) significantly more shots, and their hit rate from the line was significantly higher than their teammates (FT%; $F_{[1,60]} = 19.5$, $p < .001$).

As for the game's phase, a significant effect was detected for two out of the three free throw performance measures, namely free throw attempts (FTA; $F_{[1,60]} = 25.58$, $p < .001$) and free throws made (FTM; $F_{[1,60]} = 22.53$, $p < .001$). The scores of both measures were significantly higher in the final 5 min of the fourth quarter

Table 2
Averaged scores for each of the performance measures per minute played in the second and fourth quarters for both clutch players and non-clutch players.

Group	Phase	FGA/min	AST/min	FD/min	PTS/min
Clutch players	Fourth phase	0.56 (0.17)	0.12 (0.07)	0.26 (0.11)	0.90 (0.29)
	Second phase	0.50 (13.82)	0.15 (0.07)	0.16 (0.06)	0.69 (0.15)
Non-clutch players	Fourth phase	0.24 (0.03)	0.05 (0.17)	0.11 (0.02)	0.36 (0.06)
	Second phase	0.29 (0.03)	0.07 (0.15)	0.08 (0.01)	0.39 (0.05)

Note. FGA/min = field goal attempts per minute; AST/min = assists per minute; FD/min = foul drawings per minute; PTS/min = points scored per minute. The standard deviation for each value is given in parentheses.

Table 3
Averaged scores for each of the free throw performance measures in the second and fourth quarters for both clutch players and non-clutch players.

Group	Phase	FTA	FTM	FT%
Clutch players	Fourth phase	42.25 (19.87)	34.31 (16.39)	0.81 (0.1)
	Second phase	20.50 (5.69)	17.06 (5.35)	0.83 (0.13)
Non-clutch players	Fourth phase	16.69 (3.81)	11.83 (3.45)	0.71 (0.1)
	Second phase	11.63 (2.04)	8.17 (1.25)	0.71 (0.08)

Note. FTA = free throw attempts; FTM = free throws made; FT% = free throw percentage. The standard deviation for each value is given in parentheses.

compared to the second quarter of the game. However, the effect of the game's phase on the free throw percentages was not significant (FT%; $F_{[1,60]} = 0.205$). The results suggest that despite a general increase in free throws attempted, and consequently in the number of points scored, no change in shooting accuracy (i.e., hit rate) was detected for the clutch players.

Our analysis also showed a significant interaction effect between the level of clutch ability and the game's phase for free throw attempts (FTA; $F_{[1,60]} = 9.99$, $p < .003$) and for free throws made (FTM; $F_{[1,60]} = 9.51$, $p < .004$), suggesting that the clutch players substantially improved their performance during the game compared to their teammates. However, unexpectedly, no change in players' success rate was detected in the final stage of the game (FT%; $F_{[1,60]} = 0.189$) for either the clutch or the non-clutch players.

Discussion

The clutch ability reputation reflects the belief that certain "special" players tend to significantly improve their performance level under high-pressure conditions during a game. It also anticipates that a clutch player will exceed the averaged teammates' performance during these critical moments. Previous research on the game of baseball has provided no substantial evidence to support these convictions. The current work investigated the validity of the clutch player reputation in a new, untested arena – the game of basketball.

The idea that some exceptionally brilliant players can overcome choking under pressure situations and actually raise their performance level is inspiring. Taking into account that the professional sport industry, most of all the NBA, is highly selective in hiring their athletes, we would then expect that those who are chosen in this selection process are truly highly specialized players. Indeed, our findings demonstrated that, in relation to several quantitative measures (i.e., FGA, PTS, FD, and AST), the clutch players' performance was actually better than the averaged performance of their non-clutch teammates. Furthermore, the clutch players improved their performance (for FGA, PTS, and FD – which reflect individual effort) in the final, most important part of the game, while their teammates performed more or less at the same level during both the low-stress and the high-stress moments of the game. Even controlling for the amount of time that players actually played in the game did not distort our results. Yet, no change was detected in the clutch players' performance for the qualitative measure (i.e., FG % – which reflects individual skill), which runs counter to the clutch player hypothesis. The same pattern was found for the analysis of shooting data on the free throw, when players were not heavily guarded.

The results of the current work provided only limited support for the clutch ability reputation. Looking at the main effects of game phase, as one would expect, foul drawing (FD), free throw attempts (FTA) and free throws made (FTM, and consequently PTS) were by far higher for the clutch players in the final phase compared to the second quarter of the game (and in comparison with their averaged teammates). Based on the common strategy in practice, this reflects the efforts that players make in the critical moments of such tied-game situations to intentionally commit fouls, in order to get ball possession and to have more opportunities for attacking within the time remaining. Indeed, the clutch players' performance generally improves in the sense that they exert more effort in the final, critical moments of the game. They may also attain more points because they shoot more often. This could provide the rationale behind paying these players higher salaries and bonuses (Berri, Schmidt, & Brook, 2004). However, our results show that clutch players are not likely to shoot better than their overall base rate under extreme pressure situations.

An obvious question to be asked is: Why do perceived clutch players exert more effort in the final stages of the game? One plausible explanation could be related to the possibility that clutch players (who are usually paid much more than other players) are strongly motivated to justify and maintain their reputation, due to the high rewards they receive for having such a reputation (Semmann, Krambeck, & Milinski, 2005; Weigelt & Camerer, 1988). In this case, our intuitive association between incentive and behavior is accurate. It is also possible that reputation operates as a self-fulfilling prophecy (Roth & Schoumaker, 1983): higher expectations placed upon the clutch players (which are probably derived from singular unusual performances of those players in the past, especially at the beginning of their careers) induce higher levels of performance by the players, generally known as the "Pygmalion Effect" (Rosenthal & Jacobson, 1968). The clutch player's reputation might well trigger a set of beliefs and expectations leading to a sequential equilibrium, in which the player, coach, and teammates operate to support and enhance this reputation.

Unlike the quantitative performance measures, our results provided no evidence for any enhancement in clutch players' shooting accuracy. In other words, the clutch players did not improve their shooting skills in the final five minutes of the game. These findings are in accordance with the cumulative empirical evidence on the clutch reputation in baseball, and also with results reported in the related hot hand research.

Clutch reputation and game strategy

Having a high-level reputation is an intangible, tradable asset that provides benefits to its owners (Tadelis, 1999; Weigelt & Camerer, 1988). Research among Italian soccer players provided evidence for the effect of reputation: Superstar talents attract more audiences to the match, and thus are evaluated and paid markedly more than their teammates (Lucifora & Simmons, 2003). Moreover, a correlation was found between players' earnings and their attacking skills (i.e., goals and assists). Superstar players are more valuable not just to their own teams, but also to the entire league. Hausman and Leonard (1997) estimated Michael Jordan's worth to other teams in the NBA as more than 50 million dollars. This estimate has been reinforced by Berri and Schmidt (2006).

Weigelt and Camerer (1988) considered reputation as information, which relies on past behavior and helps to predict future behavior. Hence, a player's clutch reputation is expected to influence decisions made by all who are involved in the game. In view of our results, some practical questions arise: Should the ball be allocated to the clutch player in the final, critical moments of the game? Would such allocation behavior enhance the teams' chances of scoring? Should the coach necessarily involve the clutch player late in a close game? Should the clutch player be heavily guarded by his or her teammates in order not to be fouled early in the game? Should the opposing team guard the clutch player more closely?

Relating these questions back to the hot hand, Tversky and Gilovich (1989) argued that the misconception of chance events related to the hot hand reputation might have direct consequences for the conduct of the game. Passing the ball to the hot player, who is being closely guarded by the opposing team, would be a non-optimal strategy if other players who do not appear to be hot have a better chance of scoring. Thus, they concluded that like other cognitive illusions, the hot hand belief could be costly.

Based on simulated data, Burns (2004) provided an entirely different insight. Burns found that allocating the ball to the hot player could result in one extra point per seven or eight games, and might make the difference between a win and a loss. Similarly, Raab, Gula, and Gigerenzer (2012) emphasized the adaptive value of the hot hand belief using real game data in volleyball. Raab and

his colleagues found that coaches are able to detect the hot players, and that they use these cues of hotness to make strategic decisions. Playmakers are also sensitive to streaks and adjust their allocation behavior accordingly, which results in more hits for a team.

Silver (2006) addressed quite similar questions in relation to David Ortiz, who has the reputation as being the greatest clutch hitter in the history of the Boston Red Sox. Silver argued that clutch hitting may exist in the classic sense of the term, but much of what we think of as "clutch hitting" may really be *situational* hitting. The best clutch hitters are most often merely the best hitters in a particular period. Indeed, analysis of play-by-play data revealed that David Ortiz's clutch reputation was limited to just two seasons, 2000 and 2005. Take out these two seasons, and his lifetime clutch rating is essentially zero.

A review of the ranking list of baseball clutch hitters in the past three decades suggests that clutch ability actually reflects the effect of smart situational hitting. A smart hitter who has the ability to adjust his hitting approach to different situations as the situation requires, will provide some small but discernible benefit to his club. This advantage provides another incentive for teams to acquire plate-disciplined hitters, who may also be better at taking advantage of clutch situations. Silver (2006) argued that producing wins at the plate is about 70 percent a matter of overall hitting ability, 28 percent pure luck, and perhaps two percent clutch – or situational-hitting skill.

In line with Silver's line of reasoning, our sample of basketball players exhibited clutch performance in the sense that they exerted more effort during the final, most important part of the game: they attempted more field goal shots, scored more points, and drew more fouls than their teammates during the high-stress moments of the game. Sometimes a smart situational basketball (clutch) player can make the difference between a win and a loss. Therefore, there are players who are more valuable than their base rate statistics of shooting would suggest, because of their tendency to (smartly) exploit small advantages in the clutch.

Methodological considerations

The results of the present study were based on the analysis of performance records of 16 NBA players during the 2005–2006 season. Future research should consider the examination of archival data across more than one season, and from a larger sample of players, to verify the consistency of the results. Players' performance could also be considered in relation to other aspects of the game, such as turnovers, steals, and rebounds. Clutch ability in the final few minutes of the game could be compared not only to the last 5 min of the second quarter of the game, but also to performance in other intervals of the game. Other forms of comparisons are of interest, such as a comparison between the performance of clutch players in the final phase of close/tied games and the same players' performance in not-tied games, or comparing clutch players to other highly skilled players who are not considered clutch players. Further research should also consider using a comparison objective for the clutch players other than the average of their teammates, as the distribution of skill across game periods might differ according to the mixture of players on the floor at the time. Studies on other team sports would be of great value, if our understanding of highly skilled athletes' performance is to be advanced.

Conclusions

The present work was aimed at exploring the belief that a number of exceptional people are able to demonstrate unusual behavior under extreme pressure situations. The assumed clutch ability effect, which has been explained by several theoretical frameworks within the sport psychology literature, was challenged. The results of our study extend the body of evidence against the weakly-supported statistical effect of the clutch player's superior performance.

The qualitative measures related to the performance of the clutch players (i.e., FG% and FT%) are likely to represent the upper limits of their ability, and thus are less affected by external environmental factors, such as the opponent team defense strategy or the assistance of the clutch player's teammates. From a human learning mechanism point of view, it is possible that while considering the case of top skilled athletes, it should not be expected that players will become markedly better at shooting over the course of the final few minutes of the game. The "ceiling effect" alone might explain the relative stability in the players' hit rate.

Still, a few quantitative aspects of players' performance quite reasonably enhance the clutch ability reputation. This reputation shapes the beliefs and expectations of playmakers (including the clutch player's own expectations), coaches, opponents, and fans. In line with reinforcement reputation models (e.g., Adler, 1985; Posner, 1990), we suggest that the clutch player's reputation is likely to feed into itself in a cyclical manner: in the first stage of the process (stage 1), the coach and teammates are affected by the clutch player's reputation as being able to win games, most likely due to singular unusual performances of this skillful player in the early stages of his or her career. As a result, the coach and teammates adjust their strategic allocation decisions to support the clutch player on the court (stage 2). The fact that these decisions are made in the critical moments of the game enables the clutch player to be more involved in the game, to score more points, to draw more fouls, and eventually to be instrumental in winning the game. At the same time, clutch players who are aware of the responsibility that their reputation has imposed upon them avoid early fouls, and save their efforts for the critical moments of the game (stage 3). Finally, the decisive role of the clutch player is reinforced, bringing us back to stage 1. This "snowball" dynamics disposition may support, maintain, and enhance the clutch reputation and its implications.

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