

Choking and Excelling at the Free Throw Line

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Psychological research suggests that trying to avoid a negative outcome and trying to attain a positive outcome have different effects on performance (Higgins, 1997). We explored this prospect by examining free throw performance among NBA basketball players at the ends of games when the player's team was ahead or behind in a clutch situation. Players tended to shoot worse than their career average when their team was behind or when their team was ahead by one point. In contrast, players tended to shoot better than their career average when the game was tied. Thus, the point margin affected a player's likelihood of choking or excelling under pressure. This research provides a novel real-world analysis of the phenomenon of choking under pressure that could guide and motivate future research.

INTRODUCTION

Many professional basketball games are decided by players' ability to complete their free throws in the final moments of the contest. Free throws are an interesting case, because the player gets an unobstructed shot at the basket from a distance of 15 feet, and so the on-court conditions for taking this shot are always the same. There is anecdotal evidence for the phenomenon of "choking" under pressure in which a player is more likely to miss a crucial free throw late in a close game. In this paper we present an innovative approach to examining the effects of pressure on the free-throw performance of professional athletes in clutch situations. This approach offers a unique empirical investigation of choking phenomena in a real-world setting.

Choking under pressure has also been the subject of laboratory research (e.g., Beilock & Carr, 2005; Markman, Maddox, & Worthy, 2006; Beilock, Kulp, Holt, & Carr, 2004; Masters, 1992; Hardy and Mullen, 1996; Lewis and Linder, 1997). Choking occurs when someone underperforms on a task relative to their normal performance because of an acute stressor. Laboratory research has focused on two different explanations for choking. The *Distraction* hypothesis proposes that pressure leads to a decrease in available working memory resources, which in turn has a negative impact on the performance of cognitively demanding tasks (Wine, 1971). Alternatively, the *Explicit Monitoring* hypothesis proposes that pressure causes increased attention to skill-focused processes which disrupts the performance of proceduralized tasks (Baumeister, 1984).

There is evidence supporting both the Distraction and Monitoring theories of chok-

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ing under pressure. Studies supporting the Distraction hypothesis often come from working-memory intensive tasks. For example, Markman et al. (2006) studied category-learning tasks. Participants performed either a *rule-based* task which has been shown to recruit working memory resources (Ashby, Alfonso-Reese, Turken, & Waldron, 1998; Maddox & Ashby, 2004; Zeithamova and Maddox, 2006), or an *information-integration* task which has been shown to recruit a procedural-learning based system which is not working-memory demanding (Maddox & Ashby, 2004; Ashby et al., 1998; Decaro, Thomas, & Beilock, 2008). In accordance with the Distraction hypothesis, novice participants choked while performing the rule-based task under pressure, but excelled while performing the information-integration task under pressure.

Further support for the Distraction hypothesis comes from Beilock and Carr (2005), who showed that performance of participants with high working-memory capacity declined more under pressure than did performance of those low in working-memory capacity. Additional studies using cognitively demanding tasks such as math problems also support the Distraction hypothesis (e.g. Ashcraft and Kirk, 2001; Beilock et al. 2004), and there is some evidence that skill-focused training can reduce choking under pressure in motor tasks such as golf-putting (Lewis and Linder, 1997; Beilock and Carr, 2001 Experiment 3).

Support for the Monitoring hypothesis has been demonstrated primarily in motor tasks such as golf-putting (Masters, 1992; Hardy and Mullen and Jones, 1996; Beilock and Carr, 2001 Experiment 4), simulated baseball batting (Gray, 2004), and free throw shooting (Liao and Masters, 2002). Gray (2004) induced a pressure situation in a laboratory setting and had Division 1A collegiate baseball players ('experts') perform a simulated batting task before and after receiving the pressure manipulation. He found that pressure caused a disruption in performance by increasing the level of skill-focused attention to the task. Liao and Masters (2002) observed that the type of training novice basketball players received influenced their subsequent free throw shooting performance while under pressure. Those who had received specific instructions regarding the mechanics of shooting the ball performed worse in a stressful situation than those who had simply been told to do their best during training. The skill-focused information could be used to explicitly monitor performance while under pressure, and this led to performance decrements. Due to the nature of the current task we hypothesized that NBA players may choke under pressure due to explicit monitoring of their performance.

Recently we have proposed a more elaborate view of choking under pressure that relates pressure to regulatory focus theory (see Higgins, 1997). Regulatory focus theory suggests that there should be a difference between the case in which a player's team is behind by one point and the case in which the teams are tied. When the player's team is behind by one point, the player must avoid a global negative outcome (e.g., losing the game) by making the free throw. In contrast, when the teams are tied, the shooter is trying to achieve a global positive outcome (e.g., winning the game). Work in our laboratory suggests that pressure induces a situational *prevention focus* (Worthy, Markman, & Maddox, 2008; Markman et al., 2006). Regulatory fit theory proposes that the interaction between the situational and global regulatory foci influences performance.

In the current case when the player is attempting to make a free throw when the game is tied to put his team ahead there is a mismatch between his global promotion

focus (i.e. trying to win the game) and his situational prevention focus (i.e. trying to prevent succumbing to the pressure). Previous research suggests that a regulatory mismatch actually *improves* performance on proceduralized tasks (Maddox, Baldwin, & Markman, 2006; Worthy et al., 2008; Markman et al., 2006) because it leads to a decrease in executive resources needed to monitor the skilled processes involved. In contrast, when the player's team is behind by one point there is a regulatory fit between his global prevention focus (i.e. trying to avoid losing the game) and his situational prevention focus induced by the pressure of the situation. This regulatory fit actually causes decrements because it leads to increased executive resources which may be used to monitor, and thus harm, performance. From this we reasoned that professional basketball players might shoot worse than they would otherwise when their team is behind by one, and they might shoot just as well, or perhaps better when their team is tied.

METHOD

Our goal was to examine patterns of choking observed in real world settings. To this end, we obtained game transcripts for every regular-season and playoff game in the National Basketball Association in the 2003-4, 2004-5, and 2005-6 seasons. We examined every free throw shot by players in the final minute of games when the differential between the teams was within 5 points.

We classified each free throw into a bin based on the differential in score between teams. We could not analyze the proportion of successful free throws directly, because it is possible that a different caliber of player shoots free throws in these situations. Thus, we gathered the career free throw statistics for the player who shot each free throw in each bin. To obtain the *expected* free throw percentage for each bin we averaged each player's career free throw percentage one time for every free throw they attempted in each bin. To obtain the *observed* free throw percentage for each bin we simply took the percentage of free throws made by each player in each bin. We then subtracted the expected free throw percentage from the observed free throw percentage for each point differential to develop a statistic that would indicate how well players shot free throws relative to their career averages in clutch situations across a range of point differentials.

RESULTS

Figure 1 shows the mean difference between the observed proportion of free throws made at each score differential and the expected proportion made based on the career free throw percentage of the players who shot those free throws. Binomial tests were conducted to determine whether the value in each bin differed significantly from 0. We found significant decrements in performance from the baseline levels, (i.e., 'choking'), for point margins of -2, $p < .05$, -1, $p < .05$, and 1, $p < .01$ (the slight decrement at 3 was also significant but this is likely due to a very large sample size). Interestingly, free-throw shooters appear to excel under pressure when the game is tied, although the difference was not significant ($p > .05$).

Figure 2 plots the observed and expected proportions of free throws made by players at each point differential. Although performance in the 0 point margin is not significantly greater than its baseline, $p > .05$, a pairwise comparison between the proportion of free-throws made in the -1 and 0 point margins shows that a significantly

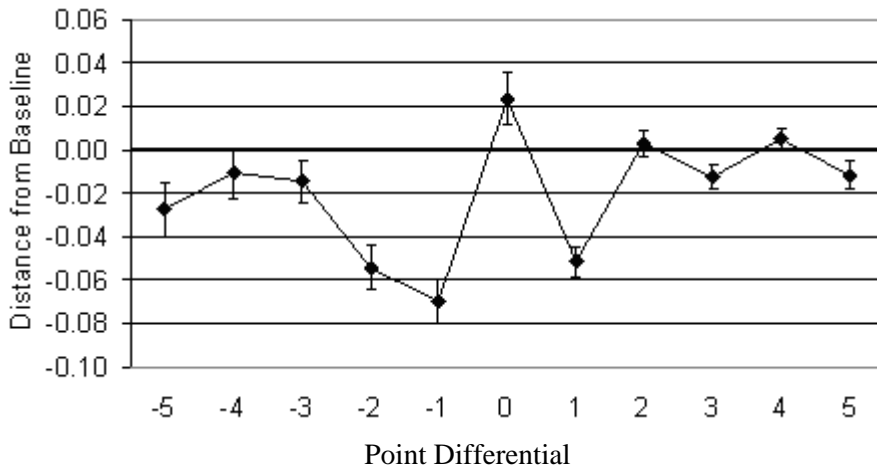


Figure 1. Mean Difference between the Proportion of Free Throws Made by Players in the Final Minute of NBA Games And the Career Free Throw Percentage of the Players Who Took Those Shots as a Function of the Score Differential between Teams.

greater proportion of free throws were made when the score is tied ($M=.782$) than when the shooter’s team is behind by one point ($M=.690$, $F(1,536)=5.68$, $p<.05$, $\eta^2=.01$). Furthermore, there was no difference between the expected proportions for the -1 ($M=.759$) and 0 ($M=.758$) point margins, $F<.5$.

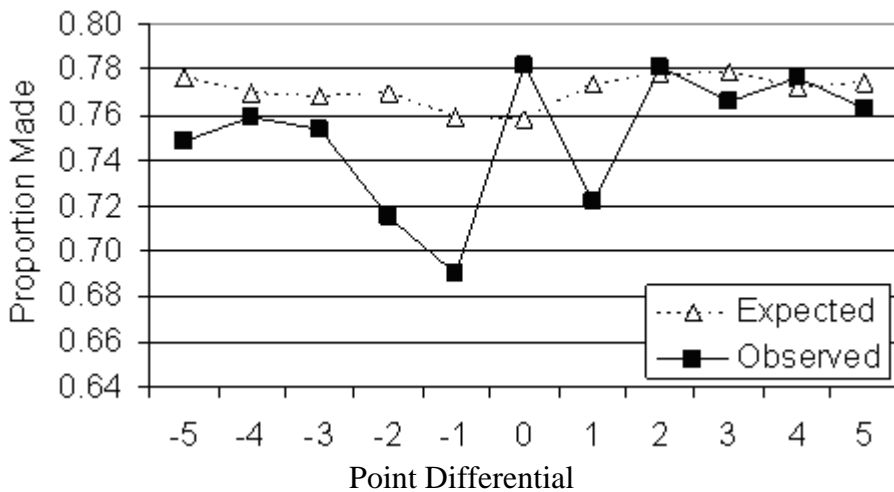


Figure 2. Observed And Expected Proportions of Free Throws Made by NBA Players in the Final Minute of Games for Each Point Differential.

DISCUSSION

These results indicate that pressure may induce a situational prevention focus that interacts with the global focus of either attempting to win or avoid losing the game. As predicted, when there was a regulatory mismatch between the global promotion focus of seeking to win the game when tied and the situational prevention focus of trying to avoid choking under pressure players were more likely to excel. In contrast, when there was a regulatory fit between the global focus of trying to avoid losing when the player's team is behind by one point, and the situational prevention focus induced by the performance pressure players tended to choke.

These results extend the Distraction and Monitoring theories of choking under pressure. While, it is likely that performance decrements were caused by explicit monitoring of performance, Monitoring theory cannot easily account for the huge difference in performance at different point differentials. These results, combined with results from our laboratory (Worthy et al., 2008; Maddox et al., 2006; Markman et al., 2006), suggest that choking under pressure is a phenomena caused by an interplay between different motivational variables. A more complex theory is needed to account for the wide variety of choking phenomena observed.

One interesting and unexpected finding is that choking is also observed when the shooter's team is ahead by 1 point, but no choking is observed when the player's team is ahead by 2 or more points. It is possible that players view the ahead by 1 point situation as trying to avoid the negative outcome that one shot could still permit the opposing team to win. Alternatively, it is also possible that players do not feel *enough* performance pressure when their team is ahead by one point and their performance suffers from a lack of focus on the task at hand. At a minimum, it suggests that players are in a different psychological state when their team is tied as opposed to when their team is ahead by one.

The identical on-court conditions for all free throw attempts provide a unique opportunity to study the choking phenomenon in a real-world setting. Our method of analyzing free throws attempted by some of the best players in the world in clutch situations would be difficult or impossible to replicate in a laboratory setting. These results should inform theories and future laboratory research on choking under pressure (Beilock and Carr, 2005; Markman, et al., 2006), and could also serve as useful knowledge to professional coaches and athletes.

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