An inch away from being mentally tough: Performance bias in ratings of mental toughness

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The manuscript was accepted for publication in *Sport, Exercise, and Performance Psychology*.

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<http://dx.doi.org/10.1037/spy0000210>

Acknowledgements

Research funding was provided by the Faculty of Kinesiology and Recreation Management at the University of Manitoba. We thank the members of the Laboratory for Research on Achievement, Motivation, and the Regulation of Action (LAMRA) at the University of Ottawa for their valuable feedback throughout the initial stages of this research.

Abstract

Are assessments of an athlete's mental toughness influenced by how that athlete performs in a single moment in a game? We conducted three experimental studies to address this question and conclude that the answer is yes. In each study, sports fans (total $N = 1,097$) read vignettes that depicted a mentally tough basketball player, either by describing the player as having many mentally tough attributes (Study 1), or by stating that the player had been identified as being mentally tough by an expert sport psychologist (Studies 2 and 3). Participants then read that the player was about to take a championship-winning shot and were randomly assigned to learn that the shot had been either successful or unsuccessful. Moreover, in Studies 1 and 2 participants learned that the outcome had been either decisive (i.e., a "perfect swish" or an "air ball") or indecisive (i.e., the ball hitting the backboard, then the rim and, eventually, either going or not going into the basket). In each study, despite learning that the athlete was very mentally tough, participants' mental toughness ratings depended on whether or not the shot was successful. Ratings were also sensitive to the way in which an outcome was attained: ratings decreased in a linear pattern with the highest ratings after a decisive success, followed by an indecisive success, an indecisive failure, and the lowest ratings after a decisive failure. This research supports the criticism that evaluations of mental toughness are distorted by how an athlete performs in a single moment.

Keywords: experimental design; mental toughness; outcome bias; performance

“When Chris Bosh raises up to shoot that shot at the end of the game, and the ball is in the air, stop it right there. Stop it, write your stories. Write your stories right now.” – Stan Van Gundy, coach of the 2008 Orlando Magic, addressing the media (as quoted by Arthur, 2008).

A single moment in a game often influences how people perceive and evaluate an athlete; whether or not an athlete is viewed as a clutch performer or a choker, a star or a dud, or a winner or a loser can depend on whether or not an athlete makes a basket, sinks a putt, scores a goal, catches a ball, or reaches an end zone. Stan Van Gundy was frustrated that the media allows these single instances to shape their narratives, but the power that specific game events have on broad athlete perceptions can be felt by others in sport including coaches, scouts, players, and fans. Our aim in this research was to focus on evaluations of one specific athletic characteristic that is often identified as being critical for success in sport: *mental toughness* (e.g., Gould, Hodge, Peterson, & Petlichkoff, 1987). Mentally tough athletes can be described in various ways, including being confident, in control, focused, consistent, determined, flexible, and calm under pressure (see Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015). But are assessments of an athlete’s mental toughness distorted by a single moment in a game, or do people discount these moments and instead base their assessments of mental toughness on characteristics that are already known about an athlete – that is, do they form their impressions while “the ball is in the air”? We conducted three studies that addressed this question and conclude that perceptions of mental toughness are indeed biased by single performance outcomes.

Mental Toughness: Empirical Challenges and Philosophical Criticisms

Mental toughness is a concept in sport that is undoubtedly important but that has also been the source of much confusion (Gucciardi & Hanton, 2016; Jones, Hanton, & Connaughton, 2002). It is important because it is often identified as a psychological characteristic that is critical

for athletic success (e.g., Gould et al., 1987), which has resulted in mental toughness receiving a great deal of attention in the media and popular press (e.g., Siebold, 2005). But the empirical study of mental toughness has faced some challenges, including questions surrounding its definition, associated attributes, dimensionality, measurement, context-/sport-specificity, and “traitness” (Gucciardi et al., 2015, p. 30). We do not delve into these important topics here – in fact, in conducting this research we tried our best to avoid them entirely – but refer the reader to many excellent sources that address them and discuss recent progress (e.g., Crust, 2007; Gucciardi, 2017; Gucciardi, Gordon, & Dimmock, 2009; Gucciardi & Hanton, 2016; Gucciardi et al., 2015; Lin, Mutz, Clough, & Papageorgiou, 2017).

In addition to these empirical challenges, there have been some more pointed philosophical and perhaps moral criticisms directed toward mental toughness. Andersen (2011), for example, criticized the concept of mental toughness for reinforcing a “macho” culture in sport in which athletes who struggle with mentally “weak” characteristics – such as performance anxiety, self-doubt, or low self-confidence – are marginalized, underrated, or silenced. Andersen also argued that descriptions of mental toughness were vague, other-dependent, and relied on absolutist language that portrayed mental toughness as a fantasy that is impossible to attain. This criticism was echoed by Caddick and Ryall (2012) who argued that, as conceptualized in the academic literature, mental toughness is an elitist ideal that is unattainable and represents “an almost super-human quality” (p. 139). They went further to argue that mental toughness has become a “pseudoscientific rhetorical construction” (p. 139), and that labelling athletes as “mentally tough” could be consistent with a fascitoid ideology (Tännsjö, 2000) in which winners are celebrated as heroes and losers are criticized and devalued. Given that mental toughness is

such an important concept that is firmly embedded in sport (Gucciardi, 2017), it is critical for research to address these potential concerns and criticisms.

Evaluating Mental Toughness

The current research was inspired by one additional criticism that was mentioned by both Andersen (2011) and Caddick and Ryall (2012) that centers on the entanglement between an athlete's mental toughness and an athlete's performance. After highlighting the fictional boxer Rocky Balboa and the former cyclist Lance Armstrong (before it was known that he had been using performance-enhancing drugs) as exemplars of mentally tough "heroes", Caddick and Ryall explained that "...the application of the term 'mentally tough' is applied in both examples *after* adversity overcome and success attained. They are ascribed with 'mental toughness' only in hindsight..." (p. 141). Similarly, Andersen (2011) argued that mental toughness "...has been associated with overcoming adversity or being better than opponents or having long successful careers (e.g., Jones et al., 2002) – post hoc judgements that have all the problems of making judgements about people after the fact" (p. 70). Therefore, when evaluating the mental toughness of an athlete, they argue that people conflate mental toughness attributes (e.g., feeling confident, in control, determined, etc.) and outcomes (e.g., successful performances, victories, overcoming adversity); whether or not an athlete is deemed to be mentally tough depends on whether or not an athlete succeeds, wins, or overcomes adversity. In this research, we treated this philosophical argument as an empirical research question: Are evaluations of an athlete's mental toughness distorted by how an athlete performs?

People are notoriously susceptible to biases in their cognitive functioning (e.g., Kahneman, 2011). Two notable biases have been documented that occur after learning the outcome of an event. In *hindsight bias* (or the "knew-it-all-along" effect), people believe that an

event was more predictable after it occurs compared to before it occurs (see Roese & Vohs, 2012). For example, it has been shown that sports fans report being more certain of the outcome of a game if they are asked after the game is played compared to before it was played (Roese & Maniar, 1997). In *outcome bias*, decisions are rated as being higher quality if they happen to lead to good outcomes compared to bad outcomes (Baron & Hershey, 1988). For example, an American football coach who decides to attempt a fourth-down conversion will often be judged as having made a savvy decision if the conversion is successful, but a reckless one if it is not. But the argument presented against mental toughness suggests that learning the outcome of an event does not affect beliefs about the predictability of an outcome (as in hindsight bias) or judgements of a decision that led to the outcome (as in outcome bias). Instead, the argument holds that people place too much weight on performance outcomes when evaluating one's mental toughness, even allowing their evaluations to be distorted by single performance instances.

Of course, knowing whether or not an athlete is a good performer can be very valuable information when assessing an athlete's mental toughness; mental toughness, after all, is universally treated as a construct that should facilitate success. However, we reason that knowing performance outcomes can be rendered much less informative – and perhaps completely useless – in two circumstances. First, knowing the outcome of a single performance (e.g., one shot, kick, or throw) should say very little about an athlete's mental toughness compared to knowing an athlete's performance history. Single performance instances can be affected by a multitude of factors that are outside an athlete's control (officiating, opponents, random variation in technique and playing conditions, etc.), which explains why players and coaches (such as Stan Van Gundy) feel frustrated when broad athlete assessments are influenced by these single moments. Second,

knowing the outcome of an event should have little impact on ratings of mental toughness if the athlete is known to be mentally tough beforehand. For instance, if an athlete had been identified by an expert as having high levels of mental toughness, or if one was somehow able to glimpse into an athlete's mind and see that the athlete showed all the hallmarks of mental toughness (e.g., confident, determined, etc., depending, of course, on how one defines mental toughness), then this would show directly that the athlete was very mentally tough and would reduce the value of knowing how the athlete performs in a single moment. Therefore, we reason that in circumstances in which both (a) knowledge about an athlete's performance is limited to a single moment, and (b) there is pre-existing knowledge about an athlete's mental toughness, support for the argument made by both Andersen (2011) and Caddick and Ryall (2012) would be obtained if ratings of mental toughness were still affected by how an athlete performs.

Furthermore, if the outcome of a single performance affects ratings of an athlete's mental toughness, then those ratings might also be influenced by *how* the performance was attained. Some performance outcomes, both good and bad, are quite decisive – this occurs when a skill is executed perfectly or terribly. But other performance outcomes are less decisive – this occurs when an athlete performs a skill that nearly results in the opposite outcome. For example, a basketball player attempting a jump shot could decisively and unambiguously be successful (e.g., a perfect swish) or unsuccessful (e.g., a complete miss) in the shot attempt. But the outcome of the shot attempt could be less decisive; the ball could hit the rim, the backboard, and either barely go in the basket or barely miss the basket. If performance outcomes (i.e., success vs. failure) are important when evaluating an athlete's mental toughness, then the decisiveness of a performance outcome (i.e., decisive vs. indecisive) might also matter. This possibility would

provide strong support for the hypothesis that ratings of mental toughness are affected by athlete performance.

The Current Research

The purpose of this research was to test the hypothesis that evaluations of an athlete's mental toughness are biased by performance outcomes. To test this hypothesis, we adopted experimental vignette methodology (Aguinis & Bradley, 2014) in order to experimentally manipulate portrayals of an athlete's mental toughness and performance. We followed Aguinis and Bradley's (2014) recommendations for using experimental vignette methodology, including the use of "paper people" designs, which are best suited for assessing explicit processes; presenting vignettes that are familiar to the participants; and creating vignettes that were immersive and provided sufficient contextual background to allow for the use of between-subjects designs (for an example of experimental vignette methodology in sport, see Slater, Coffee, Barker, Haslam, and Steffens, 2019).

Each study of this research followed the same a general design: Participants were presented with a vignette describing a very mentally tough basketball player who either makes or misses a championship-winning shot. The vignettes therefore satisfied the two features of (a) being related to a single performance moment, and (b) involving pre-existing knowledge about an athlete's mental toughness. Basketball was the focus of the vignettes because it is a popular sport in which a single performance moment can decide whether a team wins or loses. Each study varied the vignette in different ways. In Study 1, the player was described as having many mentally tough attributes prior to taking the final shot (confidence, determination, etc.), whereas in Studies 2 and 3 the athlete was described as having been identified as being very mentally tough by a sport psychologist who was an expert in mental toughness. To test the extent to which

mental toughness evaluations were sensitive to performance outcomes, in Studies 1 and 2 we manipulated the decisiveness of a performance outcome whereby participants learned that the athlete had been either successful or unsuccessful in a decisive or indecisive way. In Study 3, we included a manipulation of mental toughness in order to test the effect of knowledge about both performance outcomes and prior mental toughness on evaluations of mental toughness. Our primary dependent variable in each study was ratings of the player's mental toughness.

Although the hypothesis of this research can be tested with many types of people involved in sport (e.g., coaches, athletes), we focused exclusively on sports fans because they are a group that often relies on performance outcomes to form impressions of athletes (e.g., Tormala, Jia, & Norton, 2012; Wann & James, 2019). We used G*Power software (Version 3.1.9.2; Fraul, Erdfelder, Lang, & Buchner, 2007) to determine sufficient samples sizes to detect small-to-medium effect sizes in each study with a minimum power of .90 (Studies 1 and 2 targeted $N = 305$; Study 3 targeted $N = 441$). We recruited additional participants (approximately an additional 5% of participants) because we anticipated that some would need to be excluded due to missing data or dishonest responding. With each study, ethics approval was obtained from our institutional research ethics board before data collection, and all participants provided informed consent.¹

Study 1

Method

Participants. Undergraduate sport fans ($n = 305$) completed an online survey about their

¹ Anonymous data and syntax files for Studies 2 and 3 have been made publicly available via the Open Science Framework and can be accessed at <https://osf.io/bsu5k/>. Note that the data for Study 1 will not be posted online because Study 1 participants did not give their explicit consent to have their anonymous responses shared on an online repository. Study 1 data and syntax files are available by request from the first author.

experiences as a fan in exchange for course credit.² We excluded 20 additional fans who took part in this study because they either did not complete the survey ($n = 16$) or because they reported that they did not honestly answer the survey questions ($n = 4$). The final sample ranged from 17 to 43 years old ($M = 19.36$ years, $SD = 2.53$ years), most often identified having a White/European ethnic background (59.3%), and consisted of a similar number of males ($n = 157$) and females ($n = 146$). Two participants either did not report a gender or did not identify as either male or female.

Procedure and measures. All participants read the following vignette:

A college basketball team is playing in the championship game. There are only 12 seconds remaining in the game and the team is losing by 1 point. The coach has taken a timeout to draw up a play that will hopefully allow one of the players to have an open shot and potentially win the game.

The team executes the play perfectly and, now with only 2 seconds remaining in the game, a player has a wide-open shot about 15 feet away from the basket. If the player makes the basket, the team will win the game. But if the player misses, they will lose.

At the moment that the player was preparing to take the shot, the player felt confident about making it. The player felt under control and, although it was clear that there was a lot of pressure at that moment, the player was up for the challenge. The player was focused, determined, and believed that the shot would go in.

This vignette was designed to describe the athlete as being mentally tough by relying on common mental toughness characteristics (i.e., confidence, in control, acknowledging pressure

² This data set was collected as part of a larger project on the experiences of sport fans. All other reports from this larger project focus on different variables and test different hypotheses (e.g., Schellenberg & Gaudreau, 2020).

situations, confronting challenges, focus, determination, self-belief; see Gucciardi et al., 2015). After reading this vignette, participants rated on a scale from 0% to 100% the likelihood that the player would make the shot ($M = 72.90\%$, $SD = 16.29\%$); this measure was included in all three studies of this research, and including it as a covariate did not change the results in any substantial way. We therefore did not include it in our analysis but present group differences as part of the supplementary file (see Tables S1 to S3).

Next, participants were shown a survey page that displayed the same vignette and were told that the vignette now included the outcome of the event. Participants were randomly assigned to see one of five vignette outcomes. Participants randomly assigned to the *success/decisive condition* read the following outcome: “The player takes the shot and the ball goes through the basket without touching the rim – a perfect swish. Because the player made the basket, the team wins the championship.” Participants randomly assigned to the *success/indecisive condition* read the following outcome: “The player takes the shot and the ball hits the backboard, then hits the rim and, eventually, goes in the basket. Because the player made the basket, the team wins the championship.” Participants randomly assigned to the *failure/indecisive condition* read the following outcome: “The player takes the shot and the ball hits the backboard, then hits the rim and, eventually, does not go in the basket. Because the player misses the basket, the team does not win the championship.” Participants randomly assigned to the *failure/decisive condition* read the following outcome: “The player takes the shot and the ball misses the basket completely – an air ball. Because the player misses the basket, the team does not win the championship.” Participants randomly assigned to the *control condition* saw the same vignette displayed on the previous survey page that did not include the event outcome. Random assignment in all three studies of this research was conducted automatically

using the online survey software.

Next, on a scale from 1 (*not agree at all*) to 7 (*completely agree*) participants rated their agreement with the statement “This player is mentally tough”. We chose to measure mental toughness with a single item because we considered it to be a brief, direct, and face-valid way to assess perceptions of mental toughness. Although responses derived from single-item scales may be more vulnerable to random measurement error, the use of single-item assessments can be a valid and reliable way to assess psychological constructs and often produces results that do not differ from those obtained from multiple-item scales (e.g., Hoepfner, Kelly, Urbanoski, & Slaymaker, 2011; Postmes, Haslam, & Jans, 2013). We should note that, in each study, participants also rated the player on several other attributes (e.g., arrogance, trustworthiness, ability to perform under pressure). These outcome variables were assessed for exploratory purposes and are presented in full in the supplementary file (see Tables S1 to S3).

Finally, again on a scale from 1 (*not agree at all*) to 7 (*completely agree*), participants rated their agreement with three statements to assess their understanding of the vignette and familiarity with basketball: “I understood what was happening in the basketball scenario”, “The event described in the basketball scenario was clear”, and “I am familiar with the rules of basketball”. These three questions were asked at the end of all three studies of this research, and responses indicated that the participants had a good understanding of what was happening in the basketball vignettes (see Tables S1 to S3).

Results and Brief Discussion

A one-way analysis of variance (ANOVA) revealed a significant omnibus effect of the vignette outcome condition on ratings of mental toughness, $F(4, 300) = 7.168, p < .001, \eta_p^2 =$

0.09.³ Group means are displayed in Table 1. We followed this significant omnibus effect with two pre-planned contrasts (e.g., Haans, 2018). The control group was not included in these follow-up analyses because it was not relevant to either contrast. First, to test if mental toughness ratings were affected by the vignette outcome (success or failure), we specified a contrast that compared the two success conditions (success/decisive and success/indecisive) with the two failure conditions (failure/decisive and failure/indecisive). This contrast revealed that participants in the success conditions reported significantly higher mental toughness ratings than those in the failure conditions, $F(1, 239) = 9.38, p = .002, \eta_p^2 = 0.04$.⁴ Second, to test if mental toughness ratings were sensitive to the decisiveness of the event outcome, we tested a linear contrast that specified decreasing mental toughness ratings with the success/decisiveness condition as having the highest mental toughness ratings, followed by the success/indecisive condition, failure/indecisive condition, and finally the failure/decisive condition. This planned contrast supported this decreasing linear trend, $F(1, 239) = 15.30, p < .001, \eta_p^2 = 0.06$. This supports a response pattern in which rating of mental toughness were highest with the success/decisive condition, and decreased in a linear pattern as the outcome became less successful and decisive. Overall, these results reveal that mental toughness ratings were sensitive not only to the vignette outcome, but also to the way in which the outcome was attained (i.e., decisive or indecisive).

Study 2

In Study 1, all participants read a vignette that described a basketball player as having many different mental toughness characteristics. Nevertheless, rating of mental toughness

³ The test of equality of error variances was significant for several of the omnibus effects reported in each study. However, in each case, the results were replicated using robust tests of group differences.

⁴ We report η_p^2 values as measures of effect size, which specify the ratio of the variance of an effect to the variance of both an effect and the error associated with an effect. Note that these values are equivalent to η^2 values in one-way ANOVA designs. Cohen (1988) suggests that η_p^2 values of .01, .06, and .14 correspond to small, medium, and large effects, respectively; however, these benchmarks should be treated as rough guidelines.

differed depending on (a) whether or not the basketball player made a single championship-winning shot, and (b) the extent to which the shot was executed perfectly (i.e., decisiveness), with mental toughness ratings decreasing as the performance went from successful and decisive (i.e., a “perfect swish”) to unsuccessful and decisive (i.e., an “air ball”). The purpose of Study 2 was to replicate these effects while addressing two potential limitations of Study 1. First, by relying on specific attributes to portray a mentally tough athlete, we may have inadvertently taken a stance on how mental toughness should be conceptualized and defined. Again, our aim was not to enter this debate, but instead to make it clear that the athlete portrayed in the vignette showed high levels of mental toughness. Therefore, in Study 2 we used a more overt strategy to portray a mentally tough athlete: each vignette explained that the athlete had been evaluated over the course of a season by a sport psychologist who was an expert in mental toughness, and was identified as being highly mentally tough. Second, although the participants in Study 1 were sports fans who were on average quite familiar with basketball (see Table S1), they were not all necessarily basketball fans. Therefore, there is the possibility that these participants were not able to appreciate the nuance and randomness involved in the critical event described in the vignette, namely, shooting a “wide open” shot that could win a championship. As all basketball fans know, even the best players in the world sometimes miss these types of shots. Therefore, in Study 2 we recruited participants who watched basketball on a regular basis.

Method

Participants. Basketball fans ($n = 329$) were recruited from Prolific Academic (www.prolific.co), an online platform oriented toward academic research (Peer, Brandimarte, Samat, & Acquisti, 2017). Users complete a screening questionnaire upon initial registration with Prolific Academic, and to be invited to participate in the current study they must have

reported on the screening questionnaire that they (a) were 18 years of age or older, (b) regularly watched basketball, and (c) lived in either the United States or Canada. This final restriction was in place because the vignettes described a situation that is uncommon outside of North America: a high school athlete being recruited to play for a college basketball team. All participants reported that they responded honestly to the survey questions. The sample ranged from 18 to 75 years old ($M = 33.95$ years, $SD = 11.00$ years), included participants who most often identified having a White/European ethnic background (63.2%), and consisted of more males ($n = 245$) than females ($n = 74$). Ten participants either did not report a gender or did not identify as either male or female. Participants were compensated with £0.45 (\$0.58 USD).

Procedure and measures. Participants were presented with a similar vignette as the one presented to participants in Study 1. However, rather than describe the athlete as having characteristics related to mental toughness (e.g., confidence, self-belief, etc.), the Study 2 vignette described the athlete as being categorized as being mentally tough by an expert sport psychologist. All participants read the following vignette:

The coach of a college basketball team wants to recruit local high school players to play on the team next year. But the coach only wants to recruit players who are mentally tough. To help identify players who are mentally tough, the coach hires a sport psychologist who is an expert in mental toughness. Over the course of the high school season, the sport psychologist observes local high school players during practices and games, interviews them, and administers validated questionnaires to assess their mental toughness. In the end, the sport psychologist identifies one athlete ("Player A") who is judged to be very mentally tough.

Player A's high school team had a good season and is now playing in the

championship game. There are only 12 seconds remaining in the game and the team is losing by 1 point. The team's coach has taken a timeout to draw up a play that will hopefully allow one of the players to have an open shot and potentially win the game.

The team executes the play perfectly and, now with only 2 seconds remaining in the game, Player A has a wide-open shot about 15 feet away from the basket. If Player A makes the basket, the team will win the game. But if Player A misses, they will lose.

The procedures that followed the presentation of this vignette were identical to those from Study 1: participants were randomly assigned to one of the same five event outcome conditions (success/decisive, success/indecisive, failure/decisive, failure/indecisive, control), and then made the same ratings of mental toughness. Participants also answered the same final questions assessing their understanding of the vignette and familiarity with basketball (see Table S2).

Results and Brief Discussion

A one-way ANOVA revealed a significant omnibus effect of the vignette outcome condition on ratings of mental toughness, $F(4, 324) = 10.931, p < .001, \eta_p^2 = 0.12$. Group means are displayed in Table 1. We followed this significant omnibus effect with the same two pre-planned contrasts used in Study 1. The first contrast, which compared the two success conditions to the two failure conditions, revealed that participants in the success conditions reported significantly higher mental toughness ratings than those in the failure conditions, $F(1, 258) = 35.50, p < .001, \eta_p^2 = 0.12$. The second contrast, which specified a decreasing linear pattern between all outcome conditions, supported this trend, $F(1, 258) = 33.66, p < .001, \eta_p^2 = 0.12$. Replicating Study 1, this result supports a response pattern in which rating of mental toughness were highest with the success/decisive condition, and decreased in a linear pattern as the

outcome became less successful and decisive. Overall, these effects replicate those obtained in Study 1: mental toughness ratings were sensitive to both the event outcome and also to the way in which an outcome was attained. But these results build on the Study 1 results by relying on a more explicit portrayal of an athlete's mental toughness (i.e., an expert evaluation) and by showing the same effects with a sample of basketball fans.

Study 3

Studies 1 and 2 showed that ratings of an athlete's mental toughness were influenced by how that athlete performed in a single performance instance, even after learning that the athlete possessed many attributes that are characteristic of mental toughness (Study 1) or that the athlete had been identified by an expert as being very mentally tough (Study 2). These findings raise the question of the extent to which descriptions of mentally tough athletes matter when making ratings of mental toughness. Do people completely discount information about an athlete's mental toughness and instead rely solely on performance outcomes when making assessments of mental toughness? In Study 3, we addressed this question by adopting the same design as Study 2 but with some participants randomly assigned to read vignettes that did not include any information about an athlete's mental toughness. Also, given the consistent results from Studies 1 and 2 and to maximize statistical power, the manipulation of vignette outcomes did not include differences in decisiveness and focused only on successes and failures. This study therefore adopted a 2 (mental toughness and no information conditions) $\times$ 3 (success, failure, and control conditions) between-subjects design.

Method

Participants. Basketball fans ($n = 463$) were once again recruited from Prolific Academic. The same inclusion criteria used in Study 2 (over 18, watched basketball regularly,

resided in North America) were used in the current study. One additional participant completed the survey but reported that the responses were not honest; this participant was excluded from all analyses. The sample ranged from 18 to 76 years old ($M = 34.34$ years, $SD = 11.47$ years), included participants who most often identified having a White/European ethnic background (63.1%), and consisted of more males ($n = 339$) than females ($n = 118$). Six participants did not report a gender. Participants were compensated with £0.45 (\$0.58 USD).

Procedure and measures. First, participants were randomly assigned to read one of two athlete vignettes. Those randomly assigned to the *mental toughness condition* read a vignette that was quite close to the one presented to participants in Study 2:

The coach of a college basketball team is scouting local high school teams to recruit players to play on the team next year. [But the coach only wants to recruit players who are mentally tough. To help identify players who are mentally tough, the coach hires a sport psychologist who is an expert in mental toughness. Over the course of the high school season, the sport psychologist observes local high school players during practices and games, interviews them, and administers validated questionnaires to assess their mental toughness. In the end, the sport psychologist identifies one athlete (Player A) who is judged to be very mentally tough.] One of the teams that the coach is scouting includes Player A.

Player A's high school team had a good season and is now playing in the championship game. There are only 12 seconds remaining in the game and the team is losing by 1 point. The team's coach has taken a timeout to draw up a play that will hopefully allow one of the players to have an open shot and potentially win the game.

The team executes the play perfectly and, now with only 2 seconds remaining in

the game, Player A has a wide-open shot about 15 feet away from the basket. If Player A makes the basket, the team will win the game. But if Player A misses, they will lose.

Participants randomly assigned to the *no information condition* read the same vignette but without the information describing the athlete as being mentally tough (i.e., excluding the information enclosed in brackets).

Next, participants were randomly assigned to one of three outcome conditions.

Participants randomly assigned to the *success condition* read the following outcome: “Player A takes the shot and the ball goes in the basket. Because Player A makes the basket, the team wins the championship.”. Participants randomly assigned to the *failure condition* read the following outcome: “Player A takes the shot and the ball does not go in the basket. Because Player A misses the basket, the team does not win the championship.” As in the previous two studies, participants randomly assigned to the *control condition* did not see an event outcome.

Participants then answered the same questions as those assessed in Studies 1 and 2.

Results and Brief Discussion

A 2 (mental toughness and no information conditions) $\times$ 3 (success, failure, and control conditions) between-subjects ANOVA was used to test the main and interactive effects of both factors. Group means are displayed in Table 3. There was a significant main effect of the mental toughness condition on ratings of mental toughness, $F(1, 457) = 34.37, p < .001, \eta_p^2 = 0.07$.

Participants who read the mental toughness description of the athlete rated the athlete as having higher levels of mental toughness (marginal $M = 5.28, SD = 1.20$) than those who did not (marginal $M = 4.65, SD = 1.27$). This finding means that participants did indeed take the mental toughness description into account when making their evaluations. There was also a significant main effect of the outcome condition on ratings of mental toughness, $F(2, 457) = 30.98, p <$

.001, $\eta_p^2 = 0.12$. Those in the success group (marginal $M = 5.44$, $SD = 1.09$) reported the highest levels of mental toughness, followed by the control group (marginal $M = 5.05$, $SD = 1.17$), and the failure group (marginal $M = 4.41$, $SD = 1.34$). All marginal pairwise comparisons were significant at the $p < .01$ level. This finding again replicates the effects obtained in Studies 1 and 2 and shows that participants' mental toughness assessments were affected by a single performance instance. We did not anticipate and did not find a statistical interaction between both factors, meaning that the effect of one factor did not depend on levels of the other.

General Discussion

The purpose of this research was to empirically test a criticism of mental toughness that was succinctly summed up by Caddick and Ryall (2012): "The problem with mental toughness is that it is only applied to an individual in hindsight and depending on outcome" (pp. 146-147). Do people allow their assessments of an athlete's mental toughness to be influenced by how that athlete performs in a single instance? To address this question, we conducted three experimental studies in which we presented participants with vignettes that described an athlete as being very mentally tough, and then varied the outcome of a single performance (i.e., a championship-winning shot). Despite learning that the athlete was very mentally tough, participants' ratings of the athlete's mental toughness were found to depend on whether or not the shot went in the basket. Moreover, in Studies 1 and 2 we varied whether the performance outcome was decisive or indecisive, and found that mental toughness ratings were sensitive to the way in which an outcome was attained. Overall, this research supports the notion that people's evaluations of an athlete's mental toughness are biased by how the athlete performs in a single moment.

Mental toughness is often recognized as an attribute that is the key for success in athletics and in other performance domains (e.g., Jones et al., 2002; Siebold, 2005). Depending on one's

definition, athletes are mentally tough if they are confident, in control, driven, calm, determined, consistent, focused, competitive, good at coping with adversity, and possess other capabilities and attributes that facilitate success (Gucciardi et al., 2015). But even athletes with extremely high levels of mental toughness are not guaranteed to succeed in all competitive situations – sometimes the ball just does not go in. When evaluating the extent to which an athlete is mentally tough, this research showed that performance outcomes affect perception of mental toughness, even when there is prior knowledge about an athlete's mental toughness and the performance outcome is limited to a single moment in a game. The impact of performance outcomes was further demonstrated by showing that mental toughness evaluations were affected by the way in which an outcome was attained: mental toughness ratings were highest when an athlete was described as having a perfect success (decisive success), lower when described as having a less-than-perfect success (indecisive success), lower still when described as having a failure that was close to being a success (indecisive failure), and lowest when described as suffering an extreme failure (decisive failure). These effects were replicated in all three studies, but effect sizes tended to be larger in Studies 2 and 3 compared to Study 1; this could be explained by the fact that Studies 2 and 3 involved participants who were specifically fans of basketball and included a more overt mental toughness description. Overall, the findings of this research have implications for those who regularly evaluate the internal attributes of athletes, including coaches, fans, scouts, and the media: evaluations of an athlete's mental toughness can be distorted by a single performance outcome and by how that outcome was attained.

This research supports the criticism that mental toughness is assessed only in hindsight after the outcome of an event is known (e.g., Andersen, 2011; Caddick & Ryall, 2012). This criticism is one of many that have been raised about the concept of mental toughness that can be

translated into empirical research questions. For example, another such criticism is that the language used to describe mental toughness, "... reek[s] of the macho, masculine, and pathogenic culture of sport. If one is not mentally tough, then one is weak, soft and a sissy." (Andersen, 2011, p. 69). Does this mean that environments that promote mental toughness also foster negative attitudes and low levels of empathy toward athletes who struggle or fail? Do efforts to promote mental toughness also promote behaviors consistent with a "macho, masculine culture", such as suppressing emotions and playing through injuries? Another criticism is that being mentally tough is an almost unattainable hero-like ideal (Caddick & Ryall, 2012). Does this mean that athletes with a reputation for being mentally tough are believed to be more hero-like and possess other positive qualities unrelated to mental toughness (much like the *halo effect*; see Nisbett & Wilson, 1977)? Do people believe mentally tough athletes are also funnier, nicer, smarter, or more attractive? Social scientists can help inform many of the concerns that have been raised about mental toughness by treating them as empirically-testable questions.

The findings of this research should be interpreted with several caveats in mind. First, although participants' assessments of mental toughness were influenced by vignette outcomes, they did not completely discount the descriptions of mental toughness. As shown in Study 3, variance in participants' ratings of mental toughness was predicted by both the vignette outcome (success vs. failure vs. control), and the athlete description (mental toughness vs. control). This means that evaluations of mental toughness are distorted by but do not exclusively rely on the outcomes of single performances. Also, although the use of vignettes allowed us to maintain experimental control over different aspects of an athlete's portrayal, this could have come at the expense of external validity. Additional research relying on different methods, such as assessments of mental toughness among actual amateur/professional athletes or laboratory

experiments conducted in person (e.g., Slater et al., 2019), would be particularly useful. This research also focused exclusively on vignettes related to basketball that were evaluated by fans. Research going forward can test these effects in other sports in which a single moment can decide the outcome of a game (e.g., American football, rugby) and with other populations that often form impressions of athletes such as coaches and scouts.

Conclusion

The difference between an athlete making or missing a basket, pass, save, putt, or catch is often a matter of inches. This research showed that these inches also matter for the evaluations that are made about an athlete's mental toughness. Even after making it explicit that an athlete was extremely mentally tough, we found that mental toughness ratings depended not only on the athlete's performance in a single moment (i.e., success vs. failure), but also on how that performance was attained (i.e., decisive vs. indecisive). This finding supports a common criticism of mental toughness (Andersen, 2011; Caddick & Ryall, 2012) and a viewpoint held by coaches such as Stan Van Gundy (Arthur, 2008): assessments of an athlete, including of the athlete's mental toughness, are often distorted by how the athlete performs in a single moment.

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Table 1

Studies 1 and 2: Mean (standard deviation) mental toughness ratings within each outcome group.

	Control	Success/ Decisive	Success/ Indecisive	Failure/ Indecisive	Failure/ Decisive	Omnibus		Contrast 1		Contrast 2	
						<i>F</i> (df)	<i>p</i>	<i>F</i> (df)	<i>p</i>	<i>F</i> (df)	<i>p</i>
Study 1	5.81 (0.90)	5.66 (1.23)	5.49 (1.22)	5.40 (1.42)	4.66 (1.64)	7.168 (4, 300)	< .001	9.38 (1, 239)	.002	15.30 (1, 239)	<.001
Study 2	5.18 (1.14)	5.35 (1.32)	5.44 (1.26)	4.62 (1.41)	4.20 (1.35)	10.931 (4, 324)	<.001	35.50 (1, 258)	< .001	33.66 (1, 258)	< .001

Note. The control group was excluded from both Contrast 1 and Contrast 2. Contrast 1 compared the two success conditions to the two failure conditions, and Contrast 2 tested a linear decrease in mental toughness ratings between outcome groups.

Table 2

Study 3: Mean (standard deviation) mental toughness ratings within each group.

Mental Toughness Condition	Outcome Condition		
	Success	Control	Failure
No Information	5.21 (1.12)	4.71 (1.13)	4.03 (1.28)
Mental Toughness	5.68 (1.01)	5.38 (1.12)	4.79 (1.30)

Supplementary File

Table S1
Study 1: Means (standard deviations) of additional measures.

Items	Scale Range	Outcome Condition					Omnibus	
		Control	Success/ Decisive	Success/ Indecisive	Failure/ Indecisive	Failure/ Decisive	<i>F</i> (df)	<i>p</i>
<u>Exploratory Outcome Variables</u>								
“What are the chances that the player will make the shot?” ¹	0% to 100%	71.82 (17.41)	68.13 (16.05)	76.10 (16.17)	74.02 (16.43)	74.61 (14.63)	2.245 (4, 300)	.064
“To what extent would you trust the same player to take the same shot again?”	-3 to +3	1.79 (1.04)	1.95 (1.21)	1.49 (1.28)	1.53 (1.27)	0.55 (1.60)	11.044 (4, 300)	<.001
“This player is arrogant”	1 to 7	2.11 (1.13)	2.37 (1.59)	2.36 (1.32)	2.32 (1.42)	2.55 (1.51)	0.759 (4, 300)	.553
“This player performs very well under pressure”	1 to 7	5.73 (1.07)	6.13 (1.11)	5.76 (1.32)	4.47 (1.51)	3.15 (1.81)	48.548 (4, 300)	<.001
<u>Integrity-check Items</u>								
“I understood what was happening in the basketball scenario”	1 to 7	6.08 (1.25)	6.37 (1.24)	6.32 (1.07)	6.37 (1.13)	6.11 (1.48)	0.793 (4, 299)	.530
“The event described in the basketball scenario was clear”	1 to 7	6.00 (1.38)	6.37 (1.12)	6.29 (1.00)	6.30 (1.23)	6.02 (1.59)	1.128 (4, 299)	.343
“I am familiar with the rules of basketball”	1 to 7	6.05 (1.53)	5.79 (1.80)	5.61 (1.69)	5.53 (1.71)	6.00 (1.62)	1.129 (4, 299)	.343

Note. Response options for the item rated on a -3 to +3 scale ranged from -3 (*definitively would not trust to take the same shot*) to +3 (*definitively would trust to take the same shot*). Response options for items rated on 1 to 7 scales ranged from 1 (*not agree at all*) to 7 (*totally agree*).

¹ This item was assessed before random assignment to outcome conditions.

Table S2
Study 2: Means (standard deviations) of additional measures.

Items	Scale Range	Outcome Condition					Omnibus	
		Control	Success/ Decisive	Success/ Indecisive	Failure/ Indecisive	Failure/ Decisive	<i>F</i> (df)	<i>p</i>
<u>Exploratory Outcome Variables</u>								
“What are the chances that the player will make the shot?” ¹	0% to 100%	64.01 (14.18)	67.52 (13.93)	64.62 (16.68)	65.08 (15.27)	64.52 (15.38)	0.548 (4, 324)	.701
“The sport psychologist accurately judged Player A to be mentally tough”	1 to 7	4.94 (1.32)	5.29 (1.30)	5.23 (1.24)	4.47 (1.52)	4.38 (1.59)	5.956 (4, 324)	<.001
“The coach should recruit Player A and try to get Player A to join the college team next year”	1 to 7	5.06 (1.17)	5.65 (1.32)	5.45 (1.18)	4.42 (1.47)	4.27 (1.38)	14.315 (4, 324)	<.001
“Player A knows how to handle competitive pressure”	1 to 7	5.19 (1.20)	5.89 (1.13)	5.80 (1.06)	4.32 (1.57)	3.94 (1.54)	28.960 (4, 324)	<.001
“Player A will have a great college basketball career”	1 to 7	4.46 (1.31)	4.53 (1.32)	4.73 (1.44)	3.79 (1.54)	3.95 (1.16)	5.764 (4, 324)	<.001
<u>Integrity-check Items</u>								
“I understood what was happening in the basketball scenario”	1 to 7	6.52 (0.88)	6.59 (1.04)	6.52 (0.89)	6.47 (0.98)	6.56 (0.75)	0.169 (4, 324)	.954
“The event described in the basketball scenario was clear”	1 to 7	6.61 (0.76)	6.61 (0.91)	6.52 (0.85)	6.48 (0.95)	6.56 (0.84)	0.272 (4, 324)	.896
“I am familiar with the rules of basketball”	1 to 7	6.18 (1.53)	6.44 (1.19)	6.27 (1.28)	6.45 (1.07)	6.35 (1.20)	0.567 (4, 324)	.687

Note. Response options for items rated on 1 to 7 scales ranged from 1 (*not agree at all*) to 7 (*totally agree*).

¹ This item was assessed before random assignment to outcome conditions.

Table S3
Study 3: Means (standard deviations) of additional measures.

Items	Scale Range	No Information Condition			MT Condition			MT Main Effect		Outcome Main Effect	
		Control	Success	Failure	Control	Success	Failure	<i>F</i> (df)*	<i>p</i>	<i>F</i> (df)	<i>p</i>
<u>Exploratory Outcome Variables</u>											
“What are the chances that the player will make the shot?” ¹	0% to 100%	63.92 (14.42)	60.29 (13.71)	59.47 (14.79)	63.59 (15.82)	66.31 (16.02)	60.12 (13.19)	2.394 (1, 457)	.122	3.378 (2, 457)	.035
“The coach should recruit Player A and try to get Player A to join the college team next year”	1 to 7	4.51 (1.17)	5.18 (1.20)	3.86 (1.44)	5.13 (1.22)	5.71 (1.12)	4.83 (1.29)	37.761 (1, 457)	<.001	30.578 (2, 457)	<.001
“Player A knows how to handle competitive pressure”	1 to 7	4.82 (1.20)	5.77 (1.04)	3.63 (1.48)	5.12 (1.17)	5.95 (0.94)	4.44 (1.36)	14.540 (1, 457)	<.001	87.757 (2, 457)	<.001
“Player A will have a great college basketball career”	1 to 7	4.00 (1.31)	4.16 (1.35)	3.46 (1.30)	4.30 (1.32)	4.64 (1.31)	4.09 (1.23)	15.130 (1, 457)	<.001	8.948 (2, 457)	<.001
<u>Integrity-check Items</u>											
“I understood what was happening in the basketball scenario”	1 to 7	6.58 (0.82)	6.65 (0.76)	6.71 (0.63)	6.37 (0.89)	6.68 (0.73)	6.50 (0.91)	3.181 (1, 457)	.075	2.190 (2, 457)	.113
“The event described in the basketball scenario was clear”	1 to 7	6.51 (0.88)	6.61 (0.80)	6.69 (0.65)	6.38 (0.85)	6.57 (0.98)	6.46 (0.86)	2.822 (1, 457)	.094	1.422 (2, 457)	.242
“I am familiar with the rules of basketball”	1 to 7	6.51 (0.91)	6.39 (1.26)	6.56 (0.99)	6.20 (1.13)	6.27 (1.17)	6.23 (1.37)	5.630 (1, 457)	.018	0.135 (2, 457)	.873

Note. Response options for items rated on 1 to 7 scales ranged from 1 (*not agree at all*) to 7 (*totally agree*).

¹ This item was assessed after random assignment to mental toughness conditions but before random assignment to outcome conditions.

MT = Mental Toughness. No statistical interactions were observed between the MT and Outcome factors.