

Goalkeepers' Reputations Bias Shot Placement in Soccer Penalties

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Research has demonstrated that in addition to minor changes in goalkeepers' position or height, goalkeeper reputation seems to influence penalty takers' shot placement. However, this evidence is based on correlative designs. Here, the authors experimentally manipulated both height and reputation to examine their causal impact on actual shot placement. Penalty takers performed kicks facing goalkeepers of different height (tall vs. short) and reputation (high vs. low) projected on a life-size screen. Results showed that tall goalkeepers were judged as taller than short goalkeepers. Likewise, high-reputation goalkeepers were judged as taller than low-reputation goalkeepers. An important finding was that reputation also influenced shot placement. When facing high-reputation goalkeepers, penalty takers aimed farther away from the goalkeeper and missed the goal more often. It follows that reputation affects both height estimates of goalkeepers and, most important, shot placement. Consequently, manipulating perceived reputation of goalkeepers provides an avenue for sport professionals to subtly influence shot placement of penalty takers.

Keywords: height judgment, judgment bias, penalty, size judgment

I did not volunteer to take the penalty. Nobody does. It is roulette, but you have to accept that before you step up to take the penalty.

—Clarence Seedorf, Former Dutch soccer player¹

Penalty shots and penalty shootouts are among the most nerve-racking moments in soccer matches for fans and players alike. As highlighted by the introductory quote, penalty takers often experience substantial anxiety when facing a penalty situation (Jordet & Elferink-Gemser, 2012), despite the relatively high likelihood for success (68–73%; Dalton, Guillon, & Naroo, 2015). Against popular beliefs, penalties often decide the winners and losers of a match. In fact, teams in the World Cup or European Finals encounter such anxiety-provoking shootouts during the tournament with a likelihood of approximately 50% (Dalton et al., 2015). To shift the odds in their favor, coaches and players attempt to get a competitive edge by predicting opponents' behaviors. For instance, goalkeepers are provided with probabilistic information about the penalty-taker's likely shooting direction (Cañal-Bruland & Mann, 2015). One famous example is the handwritten notes given to German goalkeeper Jens Lehmann during the 2006 World Cup quarterfinals, supposedly allowing him to successfully save two out of five penalties.

Not surprisingly, penalty shots have also become subject of extensive scientific investigation (e.g., Savelsbergh, Williams, van der Kamp, & Ward, 2002; for a comprehensive review, see Memmert, Hüttermann, Hagemann, Loffing, & Strauss, 2013). From the penalty-taker's perspective, it appears paramount to place the ball outside the goalkeeper's reach. To this end, penalty-takers pick up even very subtle changes in the goalkeeper's position or height in order to successfully adjust their kicking behavior and score. In an intriguing set of experiments, Masters, van der Kamp, and Jackson (2007) showed that penalty-takers are surprisingly accurate in detecting whether a goalkeeper's position deviates

slightly to the left or right from the goal center. As a consequence, participants directed their shots at the goal's larger half, thus making a save less likely. (Of course, goalkeepers may strategically use this effect to lure the penalty-taker into kicking to a specific side.) These findings seem to occur even in the absence of explicit awareness about the goalkeeper's positional offset and have recently been corroborated by data from real matches (see Noël, van der Kamp, & Memmert, 2015). In addition, Wood, Vine, Parr, and Wilson (2017, Exp. 3) demonstrated that goalkeepers' position affects kickers' performance even when using deceptive strategies.

Similarly, penalty-takers seem to adapt their shooting behavior to variations in goalkeepers' estimated height. Although it is less surprising that players direct their shots farther away from taller goalkeepers (with extended reach), van der Kamp and Masters (2008) showed the effect also if height is manipulated by visual illusions such as the "human Müller-Lyer illusion." In a first experiment, they found that goalkeepers with an arms-up posture were judged to be taller than goalkeepers with an arms-down posture (both postures resembling the fins-out vs. fins-in configurations of the classical Müller-Lyer illusion). In a second experiment, they confirmed that this height bias influenced throwing accuracy in a simulated handball penalty situation. More specifically, the arms-up posture led to wider and lower throws.

In addition to illusion-induced biases in size or height perception, social-cognitive research has revealed similar effects mediated by factors such as the desirability of objects (e.g., Balcetis & Dunning, 2010) and an individual's reputation (Dannenmaier & Thumin, 1964; Wilson, 1968). Dannenmaier and Thumin (1964) uncovered that students overestimated the actual height of high-status individuals (assistant director and instructor) in contrast to lower status individuals (fellow students). Wilson confirmed that this effect remains robust even if the status of an unknown individual is experimentally manipulated between groups. Specifically, the very same individual was introduced to different participant groups as either fellow student, demonstrator, lecturer, senior lecturer, or professor. Participants' height judgments revealed that the individual was judged taller the higher the ostensible status. In a similar vein, Marsh, Yu, Schechter, and Blair (2009) investigated

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the impact of nonverbal dominance cues on height judgments. Participants estimated the height of individuals displaying either dominant (i.e., lowered brows, direct gaze, open body posture, outward-directed gestures) or submissive (i.e., raised brows, averted gaze, closed posture, self-directed gestures) nonverbal behavior. Results indicated that compared with submissive cues, dominant cues yielded increased height judgments. Likewise, Fessler, Holbrook, and Snyder (2012) reported increased size and muscularity estimates for individuals with high (e.g., holding guns) versus low power (e.g., holding household items).²

Based on this social-psychological evidence, it seems reasonable to argue that reputation might influence height estimates of soccer goalkeepers as well. Indeed, this very idea was examined by Masters, Poolton, and van der Kamp (2010) by asking participants to rate the penalty-saving prowess of different goalkeepers and to subsequently estimate their actual height. In line with previous findings, the higher the goalkeeper's reputation, the more participants overestimated their height. In addition, manipulating goalkeepers' reputations on the fly by showing participants either a series of successful or unsuccessful saves resulted in identical findings: Viewing successful (unsuccessful) performances resulted in overestimations (underestimations) of goalkeepers' height. Finally, in order to examine the impact of these height estimation biases on actual shooting behavior, the authors analyzed archival data on actual penalty shootouts. Results revealed that penalty-takers showed an increased likelihood to aim farther away from the goalkeeper following a successful save. The authors interpreted their findings to indicate that these changes in kicking behavior were caused by goalkeepers appearing taller due to their increased reputation following successful saves. Note, however, that this interpretation is based on indirect evidence for a causal relationship between a goalkeeper's reputation and penalty-takers' actual shooting behavior because neither the goalkeepers' reputations nor actual and estimated goalkeeper height were assessed in the final study, let alone manipulated. Therefore, it remains to be addressed whether experimentally manipulating both goalkeepers' reputation and actual height would yield the hypothesized changes in kicking behavior.

Addressing this question has implications for at least two domains of research. First, data demonstrating that effects of reputation generalize from judgments to actual behavior would inform social-psychological theorizing (see also Baumeister, Vohs, & Funder, 2007, for a critical discussion of the lack of behavioral measures in social psychology). Second, insights into the effect of reputation on actual shooting behavior may help to understand the processes guiding soccer players' behavior in penalty situations and thereby spark the development of practically useful interventions. We therefore manipulated both goalkeepers' reputation and actual height in a within-subjects design and invited participants to perform a series of penalty kicks facing goalkeepers of different height (tall vs. short) and reputation (high vs. low) standing in a soccer goal projected on a large life-size screen. If height estimates indeed influence actual shooting behavior, then penalty-takers should aim further away from the goalkeeper for both actually taller goalkeepers as well as for goalkeepers with a higher reputation.

Method

Sample

A total of 24 male soccer players (all outfielders) voluntarily participated in the experiment. One participant did not follow

instructions; this participant's data were removed from any further analyses, resulting in a final sample size of $N = 23$ (age: $M = 23$, $SD = 2$, range = 20–26). Participants had an average of $M = 15$ ($SD = 4$, range = 6–22) years of playing experience at amateur levels and trained at least once a week ($M = 1.74$, $SD = 0.92$, range = 1–4). Participants provided informed consent and were free to withdraw from testing at any time. The experiment was approved by the ethics committee of the Faculty of Social and Behavioral Sciences of the Friedrich Schiller University of Jena.

Procedure

Upon arrival at the laboratory, participants provided informed consent and were invited to take a number of simulated penalty shots against different goalkeepers. After a generic warm-up session (in order to minimize risk of injury), participants took position facing a large screen showing an empty soccer goal. The image was projected with a standard digital projector (NEC Corp., Tokyo, Japan; Model M353WS, WXGA resolution) attached unobtrusively to the ceiling. In order to facilitate projection of the stimuli on the wall, all measures and distances were scaled to 41% of actual size, resulting in goal dimensions of 303 cm \times 100 cm. In order to preserve the proportions of the soccer penalty setting, participants were positioned 451 cm away from the screen. The goal line and position of the goalposts were marked with tape on the floor. To accurately determine shot placement, each shot was captured with a digital camera (1920 \times 1080, 50 fps; Sony Corp., Tokyo, Japan; Model RX100), positioned above and behind the participant, in line with both the goalkeeper and the participant's kick-off point. This setup allowed to accurately determine the frame that captured the ball hitting the wall. Using video analysis software (Kinovea; www.kinovea.org), we then measured the distance between the ball (i.e., the point of the ball closest to the goal center) and the goal's midpoint in pixels (for a similar approach to assessing ball position, see Kurz, Hegele, & Munzert, 2018). To ease interpretation, this value was converted to actual distance in centimeters.³ To record participants' error rate (i.e., hitting vs. missing the goal), a shot was classified as "miss" if the distance from the goal center to the closest point on the ball was larger than goal width/2 – ball diameter/2.

Using a polyurethane foam ball (Softball Volley 210, diameter 30 cm), participants familiarized themselves with the experimental procedures, first taking 10 low shots at the wall below the projection screen showing an empty goal. All shots were performed with the dominant leg and a lead in of one step. In each of the following four experimental blocks, participants again completed 10 low shots; however, a static image of a goalkeeper was now shown in the center of the goal.

To create the respective stimuli of the goalkeepers, first a photograph of one volunteering goalkeeper assuming an upright standing, legs slightly spread, and arms-out position was taken. This neutral posture (modeled after van der Kamp & Masters, 2008; Figure 1a) was chosen in order to prevent the impact of additional visual illusions from biasing height estimates. Subsequently, images of the two goalkeepers finally used in the study were prepared by matching the single goalkeeper's body with two different heads and two different jerseys using image manipulation software, resulting in four different (2 heads \times 2 jerseys) goalkeeper images as depicted in Figure 1. As discussed below, assignment of these images to conditions was counterbalanced across participants.

Participants were told to direct their shots within the goalposts and out of reach of the goalkeeper (similar to van der Kamp &

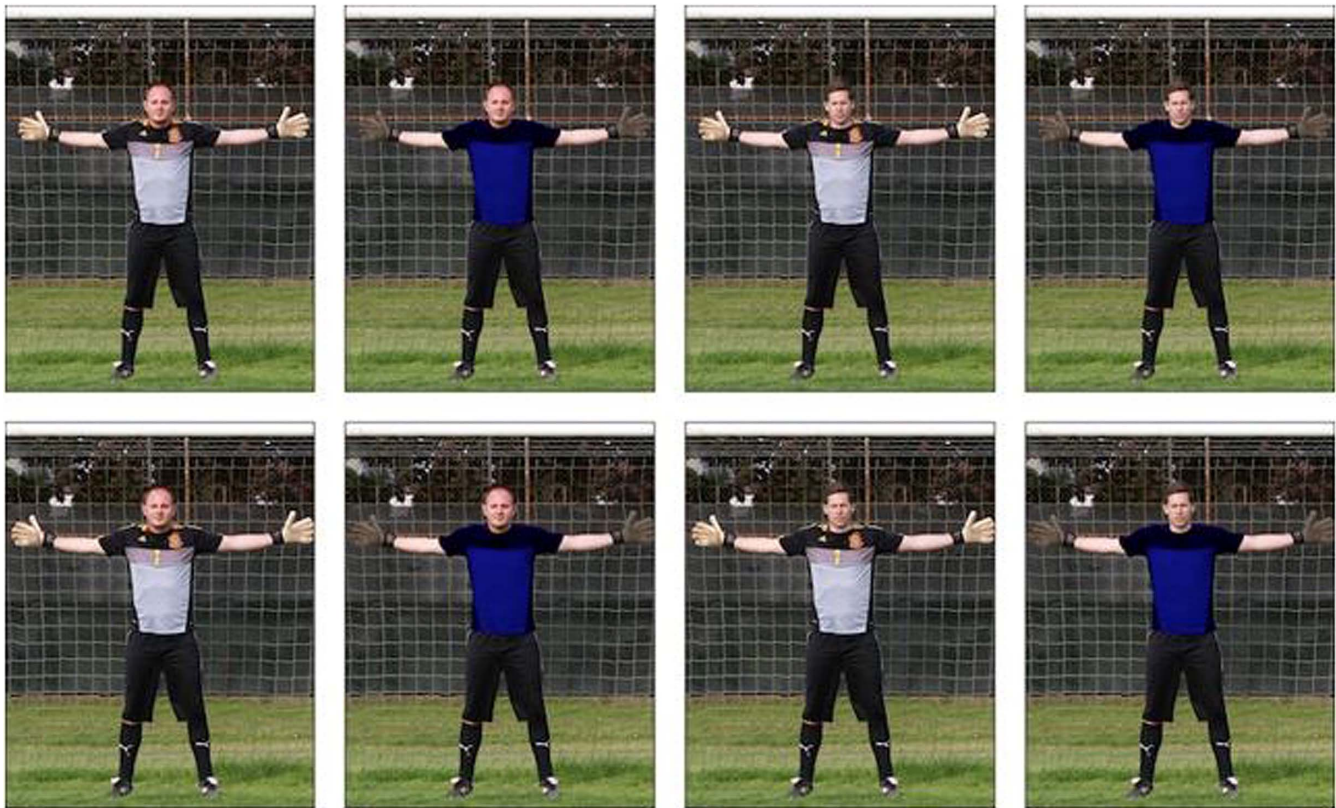


Figure 1 — Goalkeeper images at 100% (top row) and 105% (bottom row) height with orthogonally manipulated heads and attire (assignments to experimental conditions counterbalanced across participants).

Masters, 2008), and each shot was captured by the aforementioned camera. After each block, participants estimated the goalkeeper's height. Specifically, using a wireless mouse and standing in the very same spot from which they performed their shots, they adjusted the size of a bar to match the height of the goalkeeper they had just faced. This black bar was displayed on a white background covering exactly the area of the previously shown images (including the same borders of the life-size screen). In order to minimize block-to-block carryover effects, participants took a 2-min break after each block where they worked on four Sudoku puzzles given to them on a sheet of paper.

Manipulation of Height. Unknown to participants, the goalkeeper's actual height was manipulated within subjects. Participants faced two different goalkeepers who were introduced in the first and second block and encountered again in the third and fourth block. Counterbalanced across participants, goalkeepers were either shown at 100% size in the first two blocks and at 105% size in the last two blocks or vice versa (i.e., Blocks 1 and 2: 105%; Blocks 3 and 4: 100%), representing the within-subject factor *Height* (tall and short). The 5% height difference was chosen in accordance with previous research (van der Kamp & Masters, 2008) demonstrating that such changes reliably influence participants' shot placement.

Manipulation of Reputation. Orthogonal to the manipulation of height, the goalkeeper's reputation was manipulated by providing differing background information, displayed on the screen in the style of a trading card. Counterbalanced across participants, either the goalkeeper introduced in the first or second block was

ostensibly playing in the third league with a season history of only 43 conceded goals (i.e., high reputation), whereas the other goalkeeper was ostensibly playing in the 10th league with a season history of 109 conceded goals (i.e., low reputation). This constituted the within-subject factor *Reputation* (high and low). In addition, to prevent confounding of goalkeepers' identity or attire with the experimental conditions, goalkeepers' faces and jerseys were counterbalanced across participants (see Figure 1).

After finishing the experimental blocks, participants completed a questionnaire collecting demographic data such as age, gender, and playing experience. In order to ensure that participants did not suspect the specific hypotheses of the study, two open questions asked them to list (a) whether they noticed anything unusual about the study and (b) the current study's hypotheses. This assessment revealed that none of the participants noticed anything unusual or were aware of the specific hypotheses.⁴

Results

Impact of Height and Reputation on Height Estimates

In order to test whether goalkeepers' actual height as well as their reputation influenced participants' height estimates, a repeated measures analysis of variance (ANOVA) with the factors *Height* (tall and short) and *Reputation* (high and low) was conducted on participants' height estimates. In line with our predictions, both *Height*, $F(1, 22) = 6.43$, $p = .019$, $\eta_p^2 = .23$, and *Reputation*, $F(1, 22) = 7.12$, $p = .014$, $\eta_p^2 = .24$, influenced estimated height.

The interaction of *Height* × *Reputation* was not significant, $F(1, 22) = .02$, $p = .890$, $\eta_p^2 = .01$. As illustrated in Figure 1, taller goalkeepers were rated taller than shorter goalkeepers. More importantly, high reputation goalkeepers were rated as taller than low reputation goalkeepers.

Impact of Height and Reputation on Shooting Behavior

Distance From Goal Center. In order to test whether a goalkeeper's height as well as reputation influenced participants' shooting behavior, the ANOVA reported above was repeated with the placement of each shot (i.e., the ball's absolute distance from the goal's midpoint upon crossing the goal line, including both hits and misses) as dependent variable.⁵ Here, only *Reputation* influenced ball placement, $F(1, 22) = 36.21$, $p < .001$, $\eta_p^2 = .62$, whereas the effect of *Height*, $F(1, 22) = 3.01$, $p = .097$, $\eta_p^2 = .12$, as well as the interaction of *Height* × *Reputation*, $F(1, 22) = 2.38$, $p = .137$, $\eta_p^2 = .1$, fell short of conventional levels of significance. As illustrated in Figure 2 (left), high reputation goalkeepers resulted in participants kicking farther away from the goal center and, hence, the goalkeeper.

Error Rate. In addition, we analyzed participants' error rate (i.e., relative frequency of shots missing the goal) by repeating the previous ANOVA with accuracy as dependent variable.⁶ Both *Height*, $F(1, 22) = 5.17$, $p = .033$, $\eta_p^2 = .19$, and *Reputation*, $F(1, 22) = 4.96$, $p = .036$, $\eta_p^2 = .18$, influenced misses. As illustrated in Figure 2 (right), when facing taller goalkeepers, participants missed more often than with shorter goalkeepers. Similarly, when facing high reputation goalkeepers, participants missed more often than with low reputation goalkeepers. The interaction of *Height* × *Reputation* was not significant, $F(1, 22) = 1.17$, $p = .291$, $\eta_p^2 = .05$.

Discussion

There is evidence to suggest that penalty-takers in soccer adjust their kicking behavior in response to even slight changes in goalkeepers' position or height (Masters et al., 2007; van der Kamp & Masters, 2008). However, height estimates are subject to social-cognitive biases. For example, Dannenmaier and Thumin (1964), as well as Wilson (1968), showed that subjective judgments of

other people's height are influenced by their reputation. Similar effects have been reported in sports such as soccer, where goalkeepers with a high reputation have been shown to be estimated as taller than goalkeepers with a low reputation (Masters et al., 2010). To the best of our knowledge, this is the first study to test experimentally whether both height and reputation would not only lead to changed height estimates but also affect actual kicking behavior in soccer penalties.

To this end, we examined whether independently manipulating both a goalkeeper's actual height and reputation influenced penalty-takers' actual shot placement. We predicted that participants would kick farther away from the goalkeeper, when the goalkeeper was taller or had a high reputation. Results were in line with these hypotheses. First, high reputation goalkeepers were estimated as being taller than low reputation goalkeepers, thereby replicating and confirming earlier work by Masters et al. (2010). Second, and going beyond earlier work, our results also clearly show that reputation influenced shot placement. When facing a high reputation goalkeeper, penalty-takers aimed closer to the posts (i.e., further away from the goalkeeper) and also missed the goal more often (i.e., were less accurate)⁷. Therefore, facing a high reputation goalkeeper seems to be a double-edged sword: On the one hand, placing shots closer to the posts reduces the goalkeeper's chances for saving the penalty (Bar-Eli & Azar, 2009; Kerwin & Bray, 2006), and on the other hand, this comes with an increased risk of missing the goal altogether.

These findings have direct implications for both social and sport psychology as well as for practical applications. As concerns the former, our results add to classical (e.g., Dannenmaier & Thumin, 1964; Wilson, 1968) and recent social-cognitive research demonstrating that factors such as the desirability of objects (e.g., Balcetis & Dunning, 2010); displayed dominance (Marsh et al., 2009); expressed power (Fessler et al., 2012); or an individual's reputation (Masters et al., 2010) affect size judgments. These effects seem to be prevalent across domains and situations, and as shown in this study, they also apply to height estimates of opponents in sporting contexts. Most importantly, by assessing actual kicking behavior in participants (vs. measures of behavioral intentions), the current work highlights not only effects on participants' judgments but also on their actual behavior. This renders the findings especially valuable to inform social-psychological theorizing because there is first, a widespread lack of behavioral measures in social-psychological studies and second, evidence for profound differences between behavioral intentions and actual behavior (see Baumeister et al., 2007, for an in-depth discussion).

What is novel and likely of more importance to players, goalkeepers, and coaches striving to get a competitive edge by predicting opponents' behavior is that high versus low reputation systematically influenced penalty-takers' shot placement. In other words, social-cognitive factors such as the reputation of a goalkeeper allow to predict opponents' shooting strategies. Note though, that a number of factors might moderate the documented findings. First, one might ask whether the current findings might hold for expert samples also. Based on research by Shim et al. (2014, Exp. 3), indicating that visual illusions affected both novices' and experts' handball throwing behavior alike, we speculate that the effect of reputation should also generalize to an expert sample. However, whether this is indeed the case needs to be addressed in future studies.

Second, penalty-takers might use different strategies in performing a penalty (Kuhn, 1988). Whereas a goalkeeper-dependent strategy is characterized by an online adjustment of shot placement

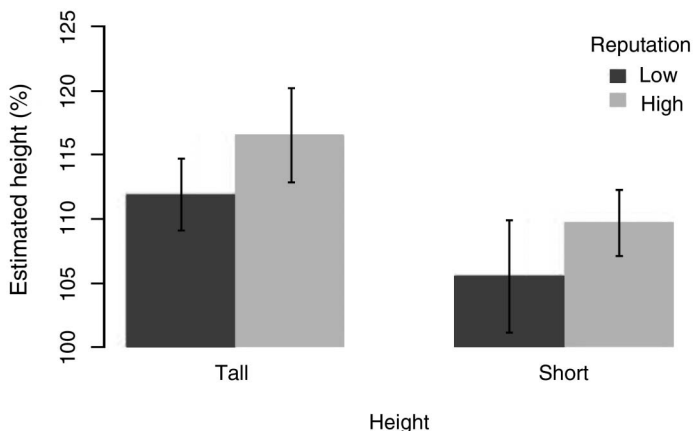


Figure 2 — Impact of size and reputation on goalkeepers' estimated height (mean with 95% confidence interval, values relative to the 100% goalkeeper).

in response to goalkeeper action, a goalkeeper-independent strategy is characterized by the penalty-taker performing the shot irrespective of the goalkeeper's actions. Even though the current study did not explicitly assess participants' shooting strategy, the use of a static goalkeeper image makes a goalkeeper-independent strategy most likely. However, goalkeeper reputation should exert its influence on shot placement also if players adopt a goalkeeper-dependent strategy because the crucial aspect in goalkeeper-dependent shooting is that selection of shot *direction* (i.e., left, right, and center) is based on an online and concurrent assessment of goalkeeper action during the run-up of the penalty-taker. However, in the event that the selected shot direction and goalkeeper action are congruent, similar effects of goalkeeper reputation on shot placement should be observed.

Third, it remains to be seen whether the same findings would be obtained in a real-life penalty setting (vs. the current laboratory setting) facing an actual (moving) goalkeeper. On the one hand, recent findings from Kurz et al. (2018) suggest that shooting performance is largely unaffected by the presence of a goalkeeper (vs. no goalkeeper). On the other hand, participants in Kurz et al. (2018) were told exactly where to place their shots (e.g., top left, bottom right), thus restricting participants' choice in selecting shot placement. Furthermore, real-life penalty settings are characterized by increased pressure to perform. Here previous work by Masters et al. (2010) discussed in the introduction provides initial evidence based on archival data. Using goalkeepers' previous performance as an indicator for reputation, they demonstrated that shots following successful saves missed the goal more often; that is, they were placed (too) close to the goalpost. Combined with the findings from the current experimental design, this adds further support to the notion that reputation impacts shot placement in real-life penalty scenarios also.

Finally, one may wonder how changes in situation variables might moderate processes that are important for the emergence of the reported effects. On the one hand, increases in pressure might render goalkeepers' reputation especially salient and thus increase its impact on shot placement. On the other hand, pressure might result in systematic shifts in penalty-takers allocation of attention that may counteract the effects of reputation. For instance, findings by Wilson, Wood, and Vine (2009) indicate that anxious penalty-takers exhibit increased fixation of the goalkeeper, in turn resulting in shots being placed closer to the penalty-taker. Theoretical explanations such as the explicit monitoring hypothesis (Beilock & Gray, 2007) or the reinvestment theory (Masters & Maxwell, 2008) further suggest that pressure may also lead to increased conscious attention to or control of the planning and/or execution of the penalty-taker's movement. Consequently, this may reduce the cognitive resources available to process information about goalkeepers' reputation and in turn reduce the impact of reputation on shot placement. Note, however, that this would also lead to performance decrements under pressure, especially in experts (Beilock & Gray, 2007). The very effect demonstrated in the current study (i.e., that high reputation goalkeepers are judged to be taller) might turn out to increase anxiety in penalty-takers. After all, facing a taller goalkeeper makes it more difficult to score. Again, this may trigger increased explicit monitoring and its detrimental effects on performance discussed above. Note though, that the relative behavioral impact of the numerous factors discussed here is an issue to be addressed in future research.

In our view, an important practical implication is to make players, goalkeepers, and coaches aware of this subtle bias that

may have tremendous impact on actual behavior and, hence, team success. At first sight, it may appear beneficial to downplay the reputation of an opponent's goalkeeper (to induce penalty-takers to take less risky shots), and at the same time boost the reputation of one's own goalkeeper in order to lure the opponent's penalty-takers into taking riskier shots. Note though that the success of this strategy hinges on the proportion of misses induced by high reputation goalkeepers and their ability to save penalties placed close to the goalposts. If misses are sufficiently rare (or the goalkeeper is highly capable), then the opposite strategy might be advisable: In these circumstances, one might benefit from boosting the reputation of the opponent's goalkeeper (to induce shots closer to the posts) and downplaying the reputation of one's own goalkeeper (to induce shots closer to the goalkeeper) instead.

Notes

1. Quoted from Miller (1999).
2. These findings are in line with numerous studies that have documented positive associations between actual height and various indicators of success; see Case and Paxson (2008) for career success; Judge and Cable (2004) for income; Stulp, Buunk, Verhulst, and Pollet (2012) for referees' authority; Young and French (1996) for perceived competence of U.S. presidents; and Stulp, Buunk, Verhulst, and Pollet (2013) for election chances of presidential candidates.
3. Note that some researchers have opted to exclude misses from the distance to goal center variable (e.g., Wood et al., 2017; Wood & Wilson, 2011). Although this strategy is useful in creating a variable representing *successful* performance, the focus of the current research was on shot placement—irrespective of success.
4. Note that concerning question (a) about half of the participants reported that the actual heights of the goalkeepers had changed across blocks. Yet, as judging goalkeepers' height was one of the main tasks and the manipulation not meant to be implicit, we expected this response. Note also, that although none of the participants identified the specific hypotheses of the experiment, four participants mentioned unspecific links between goalkeepers' performance levels and/or their heights and shooting performance.
5. To facilitate comparison with previous research (e.g., Wood et al., 2017; Wood & Wilson, 2011), we repeated the analysis on hits only (i.e., distance from goal center was computed for shots hitting the goal only). Again, *Reputation* influenced ball placement, $F(1, 22) = 68.35$, $p < .001$, $\eta_p^2 = .76$, whereas the effect of *Height* was not significant $F(1, 22) = 0.27$, $p = .61$, $\eta_p^2 = .01$. This was qualified by the interaction of *Height* \times *Reputation*, $F(1, 22) = 9.67$, $p = .005$, $\eta_p^2 = .31$. Follow-up tests revealed that for short goalkeepers, shots facing high (compared with low) reputation goalkeepers were placed farther out, $F(1, 22) = 42.27$, $p < .001$, $\eta_p^2 = .67$. Similarly, a marginal effect in the same direction was found for tall goalkeepers, $F(1, 22) = 2.95$, $p = .10$, $\eta_p^2 = .12$.
6. Note that in contrast to "distance from goal center," *error rate* was not normally distributed. However, in the absence of nonparametric alternatives to the current design and ANOVA's robustness concerning skew (Field, Miles, & Field, 2012, Ch. 10), ANOVA represents a viable alternative facilitating direct comparison with the previously reported results concerning "distance from goal center." Findings were corroborated by analyses of the ANOVA's main effects using the nonparametric Wilcoxon signed rank test (all $ps < .036$).
7. Note that in contrast to reputation, the effect of height on shot placement did not reach conventional levels of significance ($p = .097$).

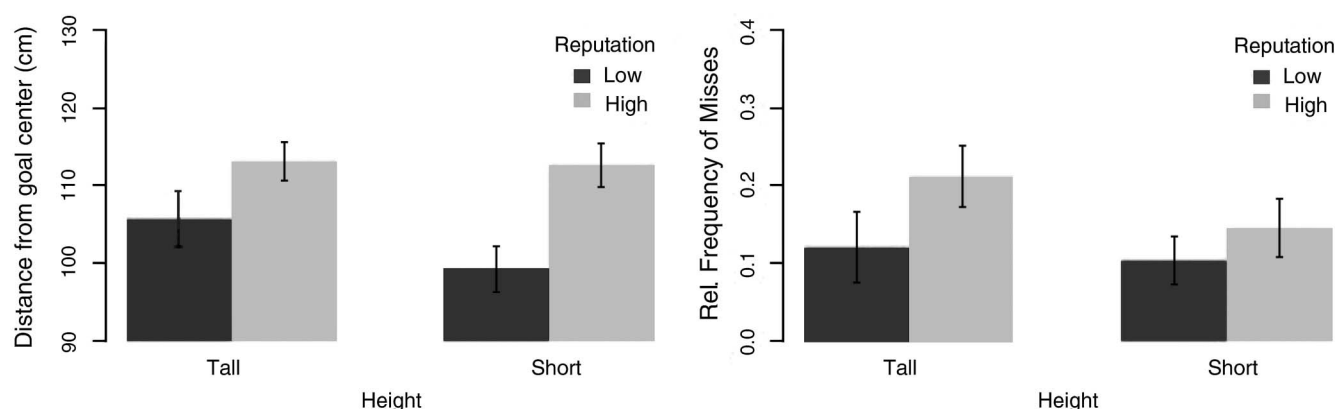


Figure 3 — Impact of size and reputation on distance from goal center (left) and accuracy (right). Graphs show means and 95% confidence intervals.

In our opinion, this does not provide strong evidence for the absence of an effect and is most likely due to a ceiling effect. As illustrated in Figure 3, height seems to affect shot placement for those blocks, where participants face a low reputation goalkeeper. In blocks facing a high reputation goalkeeper, participants positioned the ball very close to the goalpost even when facing short goalkeepers (approximately 10-cm distance to goalpost). Thus, when facing a tall goalkeeper, there might have been little room to place the shot farther out (without running the risk of missing the goal altogether).

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