Psychological Preparation of Goalkeepers for the 11-m Penalty Kick in Soccer—A Review

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In this article we reviewed a series of studies \((n = 18)\) on psychological preparation of the goalkeeper (GK) for the 11-m penalty kick in soccer. The main findings of this review were that deception strategies (e.g., standing slightly off-center) can increase the chances of the kick being directed to a desired direction, and that individual differences among GKs should be considered when planning sport psychology programs for GKs. A number of research limitations and methodological concerns, such as the lack of ecological validity of the tasks performed in the studies and the lack of studies on psychological interventions, were discussed. In addition, a number of practical implications for sport psychology consultants who work with GKs in soccer were suggested.

Stopping an 11-m penalty kick in soccer is considered to be one of the most challenging tasks the goalkeeper (GK) has to face. An 11-m penalty kick is a free kick at the goal that is executed from a point within the penalty area at a distance of 11 m (12 yards) from the goal, with only the goalkeeper allowed to defend it. It is awarded to the attacking team after a foul is made within the penalty area by one of the players of the defending team. Facing a kicker who stands 11 m from the goal and has the time to prepare him or herself for the kicking act makes it difficult for the GK to stop the ball. One statistical report (Major League Soccer, 2010) on soccer performances during the 2010 season in Major League Soccer (the American professional soccer league) showed that only a small number of penalty kicks were stopped. During this season, 56 penalty kicks were performed, and among them 48 were successfully completed by the kickers (i.e., 86% success of scoring).

When the GK prepares him or herself for the penalty kick, he or she takes into account a number of environmental factors, such as the stance of the kicker, the angle at which the kicker starts his or her run toward the ball, and the direction the kicker is looking toward before the kicking act. Although these conditions are not stable and may be difficult to anticipate, GKs can still prepare or alter their plan before initiating their movements, and therefore they should be provided with performance-enhancement sport psychology programs to enable them to do...
so. Those professionals who work with GKS (e.g., sport psychology consultants [SPCs] and soccer coaches) should obtain relevant knowledge on psychological interventions that can be used to enhance the GKS’ psychological preparation for his or her attempt to prevent the penalty kick. This knowledge can be implemented in the psychological preparation of GKS for the penalty kick, and can also be integrated within the general sport psychology program aimed at preparing GKS for practices and games.

In this article we review a series of studies (n = 18) on psychological preparation of GKS for the penalty kick in soccer. We did not find any similar reviews in the sport psychology literature on psychological preparation of GKS for the penalty kick, and therefore we consider it to be the first article to review this literature base. Based on this review, we attempted to (a) discuss a number of research limitations and methodological concerns associated with the reviewed studies, and (b) propose several practical implications for SPCs and soccer coaches who work with GKS on how to prepare the GKS for the penalty kick.

A literature search for peer-reviewed papers in the English language was conducted using two databases (SPORTDiscus and Google Scholar). Search terms included goalkeeper* and penalty kick. The inclusion criterion was that the studies include psychological aspects of performance of GKS during the penalty kick. A manual search of the reference lists in the relevant studies found in the computerized search was also performed. The search yielded 18 studies, and these are included in our review.

**Anticipation, Deception Strategies, and On-field Performances**

The studies included in our review were grouped into three categories according to two criteria: (a) The investigated psychological characteristic/intervention, and (b) the type of study—descriptive or experimental. Based on an analysis of the psychological characteristic/intervention investigated in each study, we came up with three main categories associated with psychological preparation of GKS for the penalty kick: Anticipation, deception strategies and tactical behaviors, and on-field performances. The category of on-field performances was composed of those actions GKS actually initiated during actual games to successfully stop penalty kicks.

**Anticipation**

Eleven studies examining anticipation in GKS were found: Two descriptive studies, four experimental studies, and five studies in which gaze behavior was recorded. In the descriptive and experimental studies, relevant and important features such as reaction times and accuracy measurements as the dependent variables associated with GK performances were described. In the studies on gaze behavior, gaze tracking systems were used to determine whether directing gaze to certain locations at specific times aided the GK in stopping penalty kicks.

**Descriptive Studies.** One study (Graham-Smith, Lees, & Richardson, 1999) that calculated movement duration of GKS found that it took 1.03 s on average to reach the farthest parts of the goal (e.g., top left corner) and .61 s to reach the
closest locations (e.g., closest areas to the GK). Unfortunately, these durations are usually not short enough to enable the GK to stop the ball, since the average ball flight time has been observed at between .344 s (Morya, Bigatao, Lees, & Ranvaud, 1997) and .648 s (Savelsbergh, Williams, van der Kamp, & Ward, 2002).

Anticipation of penalty kicks was examined in seven GKs playing for English Football League clubs (McMorris & Colenso, 1996). The GKs watched 10 videos showing right-footed kicks and 10 videos showing left-footed kicks. While watching each video, the GKs had to predict where the ball would cross the goal line in three temporal visual occlusion conditions: Two seconds before foot-ball contact, at foot-ball contact, and two seconds after foot-ball contact. Radial error in the predicted location was calculated for each kick. Lower radial errors were found in the right-footed kicks (approximately 10–11 cm) when compared with the left-footed kicks (approximately 12–12.5 cm). No differences in radial error were found between the three occlusion conditions. In interviews conducted after the procedure was completed, the GKs reported that it was difficult for them to pick up the cues from the left-footed kickers. However, they did say that they were able to pick up cues from the angle of run-up, position of the kicking foot at ball contact, and hip position at the time of ball contact.

A similar methodology to the one used by McMorris and Colenso (1996) was used in a study of 10 experienced collegiate GKs (McMorris, Copeman, Corcoran, Saunders, & Potter, 1993). Significant differences in radial error were found between the occlusion condition of two seconds after the foot-ball contact (48.72 cm), at foot-ball contact (69.98 cm), and two seconds before the foot-ball contact condition (74.72 cm). Vertical error was reduced from two seconds before ball contact to two seconds after ball contact. In addition, horizontal error improved from two seconds before ball contact to ball contact, but did not change between ball contact and two seconds after ball contact. It is unclear why one study (McMorris & Colenso, 1996) found no differences in performance based on different occlusion times and another study (McMorris et al., 1993) did find differences. However, even if waiting for ball contact before initiating movement can actually lead to better anticipation, it may not be practical. Unfortunately, if the ball travels at a speed of over 20.83 m·s⁻¹ (75 km·hr⁻¹), waiting until ball contact will not provide the GK with enough time to reach the ball before it passes the goal line. Average ball velocity of penalty kicks is usually much higher than this. According to one study (Morya et al., 1997), ball velocity was 32 ± 6 m·s⁻¹ in World Cup penalty kicks and 26 ± 3 m·s⁻¹ in regular league penalty kicks.

**Experimental Studies.** An attempt to teach 30 university students with no soccer experience to anticipate ball direction during penalty kicks was conducted by Savelsbergh, van Gastel, and van Kampen (2010). Participants were asked to watch clips of penalty kicks and to move a joystick in the direction they believed the ball would take when crossing the goal line. The participants watched 30 clips in a pretest phase, and were then divided into three experimental groups: (a) Perceptual training—watching a highlighted area that moved from the kicker’s face to the upper-body and hips, and then to the feet, (b) training—watching the clips without the highlighted area, and (c) control—no training. The control group received no training sessions and the two other groups received four training sessions over a period of six days. A posttest phase of an additional 30 clips was conducted for all participants after training was completed. The results of this study confirmed
that the perceptual training did lead to a shift in the search behavior patterns of the participants. In addition, compared with the control group and the training group, the perceptual training group was more successful in stopping penalty kicks during the posttest phase. However, it is possible that this type of training would not be as fruitful if the participants were experienced as goalkeepers, due to (a) the fact that goalkeepers are already proficient at anticipating ball direction, and (b) a possible ceiling effect. In addition, as the authors of this study suggested, the use of a joystick allows for corrections to be made while watching the video clips. Such corrections are very difficult to perform in a real-life situation once the GK is committed to a motion to one direction, since body inertia is difficult to overcome.

Another study (McMorris & Hauxwell, 1997) examined whether anticipation could be improved in 30 male soccer players (not GKs), who were divided into three groups: (a) Experimental 1—watching video clips of 250 full-flight penalties and being provided with specific instructions regarding where to look, (b) experimental 2—watching 500 video clips of full-flight penalties and being provided with specific instructions regarding where to look, and (c) a control (instructions were not provided). While watching the videos, the participants from both experimental groups were instructed to look at the angle of run-up, the point of foot-ball contact, and the angle of the kicker’s trunk at contact. All groups completed pretest and posttest phases in which they were required to note where they think the ball would cross the goal line at three visual occlusion conditions: Two seconds before foot-ball contact, at foot-ball contact, and two seconds after foot-ball contact. No significant differences in radial error, horizontal error, or vertical error were found between groups in the pretest phase. During the posttest phase, the two experimental groups had lower radial errors at the 2-s occlusion condition, lower horizontal error at the foot-ball contact condition, and lower vertical errors in all occlusion conditions, when compared with the control group. In addition, both experimental groups improved their radial error significantly from the pretest phase to the posttest phase at all occlusion conditions, whereas the control group improved significantly in the foot-ball condition only, but their performance declined at the 2-s occlusion condition. The results suggested that watching 250 video clips of full-flight penalty kicks improved anticipation. However, watching double that number provided no additional benefits.

Since most studies present group means and statistically examine relationships between those means, individual differences among GKs are often overlooked. Examining these differences can lead to the adoption of different training regimens for each individual GK. As indicated before, waiting until the point of foot-ball contact gives useful information regarding the direction of the kick but may be detrimental to performance, as GKs’ reaction times cannot catch up with the flight time of the ball. However, GKs who have excellent reaction times can be taught to wait almost until foot-ball contact. In fact, it may be possible to calculate the last moment the GK can wait until before ball contact, based on his or her reaction times and average the ball flight times. Such GKs will benefit from being able to observe the greatest number of cues concerning the direction of the ball. In contrast, GKs with slower reaction times may need to learn how to search for cues that will help them effectively anticipate ball direction. One study that addressed differences between individual GKs in stopping penalty kicks was found (Dicks,
Davids, & Button, 2010). Seven competitive and experienced GKs were filmed as they faced 10 nondeception penalty kicks and 10 deception kicks (the kicker used a technique to mask the direction he was kicking to, such as looking in the opposite direction), evenly directed to two target areas at each side of the goal. In addition, baseline reaction times to each of six locations (right—bottom, middle, top, and left—bottom, middle, top) of each GK were measured by asking the GK to move his hand as quickly as possible to a football located in the center of each of these locations, and these times were recorded. Significant individual differences were found in almost all variables. For example, differences were found in baseline reaction times, penalty-kick movement time (the time movement was initiated in relation to foot-ball contact of the kicker), and saves. In the nondeception trials, all GKs saved between 5–6 kicks out of 10. However, in the deception trials, the GKs’ success varied from between 0–3 saves. Similarly to previous findings (Kuhn, 1988; McMorris et al., 1993), movement was initiated relatively late in successfully timed trials, earlier in unsuccessfully timed trials (i.e., jumping to the correct side but getting there too late to stop the ball), and much earlier in incorrectly anticipated trials (i.e., before ball contact). Lastly, the GKs with faster baseline reaction times started their movements later than GKs with slower reaction times.

**Anticipation and Gaze Behavior.** Visual search behavior and success in stopping simulated penalty kicks were examined in 16 GKs from the three highest leagues in the Netherlands (Savelsbergh, van der Kamp, Williams, & Ward, 2005). The GKs viewed clips of penalty kicks and had to move a joystick in the direction of the kick. A success was recorded when the joystick was in the correct location at the time the ball reached the imaginary goal line. Based on their success, the GKs were divided into two groups: Successful—stopped 37–63% of penalty kicks, and nonsuccessful—stopped less than 30% of kicks. It was found that the successful group initiated joystick movement later (-230 ms before foot-ball contact) than the nonsuccessful group (-359 ms before foot-ball contact). In addition, the successful GKs devoted more time fixating on the nonkicking leg, whereas the nonsuccessful group spent more time fixating on the kicker’s head. Apparently, using an anticipation strategy that is based on the nonkicking leg position in proximity to the kicker’s foot-ball contact can lead to improved penalty-kick saving performance.

In another study, gaze behavior was recorded in seven expert (playing in the second division of the National League in the Netherlands) and seven novice (recreational players) GKs (Savelsbergh et al., 2002). The GKs watched clips of penalty kicks and were instructed to move a joystick to the correct location to stop the ball. After a short reaction-time test, the GKs observed five clips for each of six locations around the goal line (top-left, middle-left, bottom-left, top-right, middle-right, and bottom-right), in a randomized order. Half of the filmed kicks were performed by a right-footed kicker and half by a left-footed kicker. While the results showed no statistically significant differences ($p = .06$) between groups in the percentages of saved penalty kicks, the actual difference was approximately 10% (35.7 ± 11.8% vs. 25.9 ± 10.8% for the expert and the novice GKs, respectively). While Savelsbergh et al. (2002) did not report an effect size, one can use the means and standard deviations which were mentioned above to calculate an effect size of .91. The differences in the penalties stopped by the GKs were supported
by the differences in accuracy in predicting the height of the ball. The expert GKs performed fewer fixations (2.9±.4) of longer durations (585 ± 108 ms) than novice GKs (4.0±.5 and 430 ± 75.9 ms, respectively). In addition, while the novice GKs fixated mostly on the trunk, arm, and hip regions, the expert GKs fixated on the kicking leg, nonkicking leg, and ball. As the authors suggested, expert GKs appear to have better perceptual skills compared with novices. Expert GKs are quicker and more accurate in anticipating the direction of the ball, and they use fewer fixations of longer durations to do so.

Gaze behavior was also examined in a study of six college GKs (Seonjin & Seungmin, 2006) who watched videos of penalty kicks. The videos showed the movement of the kicker and the ball. The objective of the GKs was to anticipate one of four possible directions at which the ball was aimed (top-left, bottom-left, top-right, and bottom-right). The GKs performed this procedure until 10 saves and 10 misses were completed. Two distinct phases of the kick were defined: The approach phase—from the first movement until the kicking leg is separated from the ground before ball impact, and the kick-swing phase—from the moment the kicking leg is separated from the ground until ball impact. The results showed that average fixation time during the approach phase was longer in saves than in misses. However, no differences in fixation time were found in the kick-swing phase. In addition, longer fixations toward the shoulder, the kicking leg, and the area between the ball and the kicking leg in the approach phase, as well as toward the area between the ball and the kicking leg and nonkicking leg in the kick-swing phase, were found in savings compared with misses. The data from these studies (Savelsbergh et al., 2002, 2005; Seonjin & Seungmin, 2006) suggest that fixating on specific cues during a penalty kick may possibly be related to the chances of the GK to prevent a goal. However, it is unclear whether the data from a video simulation is transferable to real-life game situations.

Can picking up cues while the kicker runs to the ball improve the chances of GKs to stop the ball? According to one study (Dicks, Button, & Davids, 2010a), the answer to this question depends on whether the kicker is trying to deceive the GK as he approaches the ball. Eight experienced GKs were asked to stop penalty kicks that were kicked toward a white screen representing a goal. The GKs wore special goggles that could be opaque or transparent. The GKs had to stop 100 kicks that were aimed at one of the bottom corners of the goal, under both deception and nondeception conditions. In addition, five conditions of view durations of the kicker and the ball were presented. The view of the kicker and ball began: (a) 4 m before the ball position, (b) 1.6 m before the ball position, (c) .8 m before the ball position, (d) .4 m before the ball position, or (e) right behind the ball position. More saves were made under the nondeception trials compared with the deception trials, while the GKs performed more response correction during the deception trials. In general, more saves were made under the first two conditions (4.0 and 1.6 m before the ball) compared with the last two conditions (.4 m and right before the ball). However, early information and visual cues were helpful (i.e., increased number of saves) under the nondeception trials, but were detrimental to performance under the deception trials. The authors of this study suggested that since kickers are likely to attempt to deceive the GKs, GKs should attempt to pick up cues during later stages of the run-up to the ball, to increase their chances to stop the ball while minimizing the chance for deception by picking up confusing cues from earlier stages of the run-up to the ball.
Measuring gaze behaviors under different methodological conditions can lead to different results. One study of eight GKs, each with over 11 years of experience, examined gaze behavior under in situ and under video simulation conditions (Dicks, Button, & Davids, 2010b). The GKs faced 15 penalty kicks under each of five conditions: (a) Video simulation verbal (to watch a clip and verbally judge where the kick is directed), (b) video simulation movement (to watch a clip and move a joystick in the direction the kick is directed), (c) in situ verbal (to stand in front of a white screen representing a goal and face an actual kicker, and verbally judge where the kick is directed), (d) in situ movement (to perform a simplified body movement toward the ball), and (e) in situ interception (to perform freely in attempting to stop the ball). Significantly more saves were achieved under the in situ movement (13.00±.73) and in situ interception (14.24±.31) when compared with both video verbal (9.43 ± 1.0) and video movement (9.57±.65) conditions. Gaze behavior differed between experimental conditions: In the in situ interception condition, the GKs fixated on the ball earlier and for longer durations compared with any other condition; in the two video conditions, the GKs most frequently fixated on the head, torso, kicking leg, and nonkicking leg. In all conditions except for the in situ interception, as the run-up to the ball advanced, gaze was directed toward the kicking leg and the nonkicking leg. Importantly, during the most ecologically valid condition (e.g., in situ interception), gaze was directed toward the ball more than toward any other location. It was proposed by the authors that the different experimental task constraints may explain the different results in gaze behavior between studies.

While it appears that directing gaze toward the kicking leg and the nonkicking leg is related to stopping a penalty kick, these findings are from video-based models. Different methodologies lead to different gaze behaviors, and therefore additional research performed in more ecologically valid conditions is needed to clarify this issue.

**Deception Strategies and Tactical Behaviors**

Since the odds of stopping a penalty kick are against the GK, deception strategies and tactical behaviors used by GKs before the initiation of the kick (e.g., standing slightly off-center of the goal line or standing on the line while the hands are stretched to the sides) may increase the likelihood of the ball being kicked in a specific direction. We found four studies examining such strategies and behaviors.

In one study (Masters, van der Kamp, & Jackson, 2007), 200 video clips of penalty kicks from a number of tournaments were analyzed. It was found that in 96% of the kicks, GKs stood slightly to the left or the right of the center line of the goal. The average lateral displacement was 9.95 cm, which resulted in a 2.9% difference between the area to the left and the area to the right of the GK. While this displacement was not a purposeful strategy, more kicks were directed to the side with the larger area (59%). This observation was followed by an experiment where 51 participants viewed slides in which a block was positioned on the goal line. The participants were required to indicate whether the greater area was to the right or to the left of the block. Participants noticed differences in the areas of .5%, but had low confidence in their answers. In a follow-up experiment, 20 participants viewed slides of a GK standing in the goal area. Again, differences of .5% in the areas produced above-level results with low confidence. However, when
the differences in area sizes were 3.0% or more, both the accuracy and confidence in judgment increased. Lastly, a group of 32 participants were required to virtually kick the ball only if the GK was at the center of the goal. Despite the decision to kick the ball only when they perceived the GK to be standing on the center of the goal line, the kick was directed more often to the side with the larger area, at area differences of 1.6–3.0%. Once the area difference was above 3.0%, no kicks were taken. These data suggest that GKs can increase the likelihood of influencing the kicker by standing 6–10 cm from the center line. This can result in an increase of 10% in the chance that the ball will be kicked into the larger area.

It appears that GKs can also distract penalty takers and impair their kicking accuracy by moving their arms up and down. This was shown in a study (Wood & Wilson, 2010a) of 18 university players who kicked five penalty kicks under each of two conditions: Low-anxiety (players were asked to do their best but were told that the study only measured the reliability of an eye-tracker) and high-anxiety (£50 was offered to the best penalty kicker in the study; the players were told that the results of the study would be circulated among the players). The GK moved his hands up and down in two of the five kicks under each condition while keeping the arms close to the body during the other three kicks. Under both conditions, kicking accuracy was reduced by 32 cm (i.e., kicks were directed closer to the center of the goal) when the GK moved his arms. In addition, the GK saved more shots when he moved his arms compared with when his arms were kept next to his body ($\eta^2 = .21$). Gaze data suggested that penalty takers were more distracted by a moving GK under both conditions. Specifically, under the high-anxiety condition, the players found it difficult to disengage their gaze from the moving GK. These gaze behavior data are in line with data from 14 experienced soccer players who, when anxious, made faster fixations toward the GK for longer durations, which led to reduced kicking accuracy (Wilson, Wood, & Vine, 2009). In addition, another study from the same group of researchers (Wood & Wilson, 2010b) suggested that better penalty kickers tend to direct their gaze to the target area they aim at, and poorer kickers tend to direct their gaze toward the GK. From these data it appears that GKs can try to move and distract penalty kickers, thus negatively affecting their accuracy and leading to more centralized kicks at the goal.

Another study examined the effect of the soccer players’ uniform color and gaze behavior on the GKs’ impression of them (Greenlees, Leyland, Thelwell, & Filby, 2008). Twelve experienced, semiprofessional GKs viewed four video clips of each of four penalty kick conditions: (a) 90% direct gaze with red uniforms, (b) 10% direct gaze with red uniforms, (c) 90% direct gaze with white uniforms, and (d) 10% direct gaze with white uniforms. Direct gaze was established by asking the kickers to look directly at the camera. When the gaze was not directed at the camera, it was directed downward. To examine the impression of the penalty takers, the participants were asked to rate seven characteristics—assertiveness, competitiveness, experience, confidence, composure, focus, and relaxation. In addition, the participants rated their expectations of success in saving each kick, as well as the perception of power and accuracy of each kick. The results showed that kickers were rated more positively when they directed their gaze at the GK 90% of the time as compared with 10% of the time. The authors suggested that athletes can create an impression of dominance by gazing directly at their opponent. In addition, wearing red uniforms was associated with more positive ratings as compared
with white uniforms. However, caution should be taken when interpreting these findings, as colors can have different meanings in different cultural settings. While red can be related to dominance in one culture, it can be related to fear in another. Lastly, a gaze-by-uniform interaction was found when the expectations of saving goals were examined. Specifically, under the 90% direct gaze conditions, no differences in expectations of success based on uniform colors were found. In contrast, under the 10% gaze conditions, expectations of success were greater when the uniform color was white and not red. It should also be noted that the 90% direct gaze conditions produced lower expectations of success compared with the 10% direct gaze conditions.

Can GKs’ posture affect penalty kick direction by creating a visual illusion of size? One known visual illusion is the Müller-Lyer illusion, which consists of two forms—wings in and wings out—that lead to an under- or over-estimation of a shaft, respectively (Predebon, 2001). One study examined the importance of this illusion for goalkeeping (van der Kamp & Masters, 2008). Fifteen male undergraduate students were asked to judge the size of GKs in photographs. The GKs in the photos had their arms in one of four positions: (a) Stretched to the sides, (b) raised up in about 45° to resemble the wings-out Müller-Lyer illusion configuration, (c) lowered to about 45° to resemble the wings-in Müller-Lyer illusion configuration, and (d) arms held down alongside the body. The GKs appeared larger in the arms-up posture and smaller when the arms were lowered or held down alongside the body. The differences were between 3–5%, which is about 6–9 cm for a 186-cm tall GK. Following this procedure, 24 male undergraduate students were asked to perform a team-handball penalty throw at a simulated goal. Ten throws in each of the four GK’s postures were performed. In the arms-up posture, the ball was thrown further from the body, yet not far enough as to miss the goal completely. In addition, the balls landed lower in the arms up and arms stretched to the sides compared with arms down and arms held alongside the body. The findings of this study suggest that the GK’s posture can influence ball direction, and that standing with arms up (making oneself look bigger) causes the ball to be thrown further away from the GK, thus making a save harder to accomplish. Postures that make the GK look smaller may actually cause the ball to be directed closer to the GK. Two limitations for soccer GKs should be noted. First, the team-handball goal is much smaller than the soccer goal, and it is unclear whether these postures would affect the perception of the soccer kicker as much as they affect the team-handball penalty taker. Second, the participants in this study were nonathletes and it is possible that penalty throwers or kickers would react differently to the illusion of size, since they are experienced.

GKs can reveal their dive direction by early movements based on anticipation of ball direction. In one study (Javier Nunez Sanchez, Sicilia, Guerrero, & Pugnaire, 2005), an analysis of the movements caused by anticipation of ball direction was conducted in 12 GKs from the Spanish professional and amateur leagues (six expert and six amateur GKs). Out of a total of 240 penalty kicks that were filmed, anticipatory movements were performed in 220 (91.65%). In addition, the GKs misjudged the ball direction on 94 kicks (43.54%) and judged the direction correctly on 124 kicks (56.88%). The anticipation of the GKs led to a motion to the side of the ball that caused a knee extension of over 150° (i.e., knee opposite to anticipation side almost fully extended). This motion occurred between the last
step of the kicker’s run-up to the ball and the foot-ball contact. No significant differences were found between the expert and the amateur GKs. This knee extension was predictive of dive direction in 98.2% of the kicks. GKs should be aware that this motion can alert kickers to their dive direction and encourage them to kick to the other side of the goal.

**On-Field Performances**

Two studies on overt behaviors performed by GKs before the execution of penalty kicks in real-game situations were found. Such data obtained in real-game situations can increase our understanding of what actions GKs actually take to successfully stop penalty kicks. Two strategies used by GKs when approaching penalty kicks were examined in 83 penalty kicks from the Bundesliga and the European Cup games in two seasons (1981–2 and 1982–3; Kuhn, 1988). In the first strategy, the GKs moved at or after foot-ball contact, and in the second strategy movement began before foot-ball contact. Similar to other studies (e.g., McMorris et al., 1993), waiting for foot-ball contact appeared to be a better strategy than trying to guess the ball direction before the foot-ball contact. The GKs were successful in 9 out of 15 penalty kicks in which they waited for the ball contact, and in only 4 out of 51 times when they moved before the ball contact. Since waiting for the ball contact appears to be a better strategy, GKs should practice improving their reaction and movement times.

In another study (Morya et al., 1997), an analysis of penalty kicks from the 2002 World Cup and European and South American club games between 2000–2002 was conducted. The direction and speed of each shot was measured and the GKs’ motions were recorded. A total of 75 penalty kicks were analyzed (37 from World Cup and 38 from league games). Ball speed was much higher in World Cup penalty kicks (32 ± 6 m·s⁻¹) when compared with regular league kicks (26 ± 3 m·s⁻¹). A goal was scored in 70% (26 out of 37) of the analyzed kicks in the World Cup and in 82% of the kicks in league games (31 out of 38). An analysis of the GKs’ patterns of behavior demonstrated before the kicks indicated that in approximately 40% of the time the GKs dived on ball contact or later, and in 60% of the time the GKs dived before ball contact. The GKs managed to save more goals when diving at or after ball contact (36%, 10/29) as compared with diving before ball contact (11%, 5/46). Diving to the correct side occurred in approximately 30% of the dives performed before ball contact and in 70% of the dives at or after ball contact. It appears that waiting for ball contact can lead to improved chances of stopping the ball, although, depending on the kick velocity, it may not give the GK enough time to reach the ball.

**Research Limitations and Methodological Concerns**

Before implementing those interventions found to assist GKs in their attempts to stop penalty kicks in soccer, coaches and SPCs should be aware of a number of research limitations and methodological concerns associated with the reviewed studies. Based on the studies reviewed in this article, the following five research limitations and methodological concerns are discussed:
The Lack of Ecological Validity

Most of the studies on GKs in soccer in our review were conducted under well-controlled laboratory conditions. The GKs who participated in these studies were given specific pieces of equipment, such as joysticks, to perform the laboratory tasks, particularly the anticipation tasks. In addition, in most studies verbal reports given by the GKs (e.g., answering the question: “What will be the landing point of the kicked ball?”) were collected to assess the outcome of the performed tasks. The use of laboratory settings improves the control over the independent variable/s and the measurements of the dependent variable/s, however it does not reflect what the GK actually expects to do during a game.

The use of specific pieces of equipment such as joysticks in the studies on anticipation of GKs (e.g., Savelsbergh et al., 2005) indeed increased the ecological validity of the actions performed by the GKs. While using the joystick apparatus the GKs were asked not only to passively watch a specific soccer event and anticipate its occurrence, but also to act physically to complete the anticipation task. The completion of the physical act when anticipating the soccer event created in the GK an illusion that he was actually part of a vivid event. However, the use of equipment such as a joystick cannot accurately reproduce what GKs actually do when attempting to stop a penalty kick. It is suggested that additional effort should be made to increase the ecological validity of the tasks performed by GKs in studies on penalty kicks in soccer. Soccer coaches, SPCs, and researchers specializing in measurement and evaluation of sport tasks should cooperate with each other in developing new, simulated environments for GKs who want to practice how to stop penalty kicks. The use of virtual learning environments and three-dimensional settings should be considered. It is assumed that the new training environments would enable researchers to increase the ecological validity of the acts performed by GKs in these studies.

The Lack of Studies on Psychological Interventions

To achieve a high level of proficiency in stopping the penalty kick, GKs should be prepared for anticipating the pathway and direction of the kicked ball. Indeed, most of the descriptive and experimental studies discussed in our review examined relevant aspects associated with anticipation in GKs (e.g., Savelsbergh et al., 2005, 2010). Surprisingly, we did not find studies on other psychological interventions that are frequently used in sport, such as imagery, self-talk, relaxation, and preperformance routines. Taking into consideration the characteristics of the penalty kick, namely that the kick is externally paced but performed in a semistable and almost predictable setting (Lidor, 2007), we assume that GKs could benefit from the use of additional sport psychology interventions, such as imagery and relaxation, since these interventions have been found to enhance performance in other sports (see Onestak, 1991; Smith, Wright, Allsopp, & Westhead, 2007). The use of imagery in psychological preparation for the penalty kick should be specifically examined, since the GK has the time to activate imagery processes before the actual execution of the kick in a game situation. Preperformance routines should be also examined for the same reason, namely that the GK has a given period of time to prepare him- or herself for the kicking act.
The Lack of Qualitative Studies

We did not find any qualitative studies on psychological preparation of GKs for the penalty kick. Descriptive and experimental studies are essential for examining the effectiveness of psychological interventions such as anticipation strategies, video simulation, and deception strategies on performance enhancement in GKs. However, in qualitative studies data can be gathered on psychological aspects related to the penalty kick, such as the feelings, perceptions, and thoughts of GKs from the moment they know that they are going to stand against the kicker until the moment they succeed or fail to stop the kick. For example, qualitative data are needed to provide answers to questions such as: What did the GK think about after he or she failed to stop a penalty kick? How did the GK refocus his or her attention after failing to stop a penalty kick? How did the GK “psyche down” after preventing a penalty kick in a crucial moment of the game? These qualitative data can help SPCs and coaches better understand the psychological needs of the individual GK, and subsequently enable the SPC to plan effective psychological interventions that reflect these needs.

The Lack of Studies on On-field Performances

Only two studies on on-field performances of GKs during the act of a penalty kick were found (Kuhn, 1988; Morya et al., 1997). A systematic analysis of the main actions demonstrated by GKs during actual games while preparing themselves for the penalty kick event should be carefully performed. Among these actions are the stance of the GK on the goal line when waiting for the kick, his or her body movements on the line while waiting for the kick, the movements of the GK’s hands while standing on the goal line before the execution of the kick, and the direction the GK is looking just before the execution of the kick. The analysis of real-game actions demonstrated by GKs can help SPCs and coaches understand what GKs actually do when faced with the kicking act. For example, based on these data, the preperformance routines performed by the GK before the execution of a penalty kick during an actual game can be observed. SPCs can assess the consistency/lack of consistency of the routines performed by the GK, and, based on the analysis of these routines, appropriate psychological interventions can be selected for the GKs (e.g., adopting a consistent set of motor behaviors to be performed by the GK before each penalty kick).

The Lack of Studies Examining the Use of Psychological Interventions Under Distracted Conditions

GKs are required to prepare themselves for the penalty kick under distracted conditions. While attempting to stop a penalty kick, GKs are exposed to external distractions, among them noise generated by hostile fans sitting in the stands behind the GK, “trash talk” delivered by players from the opposing team, and verbal instructions given by coaches and teammates. This distracted environment can negatively influence the ability of the GK to be focused and tuned for the penalty kick event. It should be one of the objectives of SPCs and soccer coaches to assess the contribution of a given psychological technique (e.g., an anticipation strategy) to the penalty kicks that are performed under challenging, distracted conditions.
Practical Implications for the SPC

Four practical implications for SPCs who aim to prepare GKs psychologically for the penalty kick are suggested:

First, video clips showing penalty kicks performed by different kickers can be used in sport psychology programs for GKs. Although we did not find empirical evidence that actual penalty kick performance was enhanced by the use of video clips, we do suggest that SPCs use them in their consultation sessions with GKs. The main reason for this is that by watching the clips, GKs can increase their familiarity with the penalty kick act (see McMorris & Colenso, 1996; McMorris & Hauxwell, 1997). For example, GKs can observe kicking performances of players who kick with their right leg and those who kick with their left leg, or learn from different styles of kicking that are shown to the GKs in the video clips.

Second, SPCs should convince them that when anticipating a penalty kick they should initiate their movement as late as possible to have a better chance of diving in the right direction (see McMorris et al., 1993). It may not be beneficial for the GK to decide at early phases of the penalty kick in which direction or to which area to jump. It is true that by waiting a longer period of time the GK can be late in his or her response to the kick. However, since it is a challenging task to stop a penalty kick in soccer (see statistics on performances of penalty kicks; Major League Soccer, 2010), gathering information related to the kick can help the GK increase the chances of jumping to the correct place at the appropriate time.

Third, a number of deception strategies can be taught that can increase the chances of the kick being directed in a desired direction (see Masters et al., 2007; Wood & Wilson, 2010a). For example, while appearing large in the goal area seems useful, it is possible that keeping the hands alongside the body and appearing smaller can actually lead to balls being directed closer to the middle of the goal. In addition, standing slightly to one side of the goal can increase the chances of the ball being directed to the side of the larger area. GKs should select the most appropriate deception strategies and use them as part of their preperformance routines. They should then develop an arsenal of deception strategies to select the ones that most fit a given penalty kicking style.

Fourth, individual differences among GKs should be considered by SPCs and soccer coaches (Dicks et al., 2010). Each GK’s strengths and weaknesses should be assessed, and psychological training should be individually tailored based on these assessments. For example, the reaction times of the GK should be measured to select the most appropriate psychological training for the GK who is slow in reacting, as well as for the GK who is fast in his or her response.

References


