



Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Brief report

Do professionals choke in the face of pressure and distraction?

David Butler^a, Robert Butler^a ,* Carl Singleton^b ^a Department of Economics, University College Cork, College Road, Cork, T12 K8AF, Republic of Ireland^b Economics Division, University of Stirling, Stirling, FK9 4LA, UK

ARTICLE INFO

Dataset link: [YouTube.com](https://www.youtube.com), [Facebook.com](https://www.facebook.com), 11 v11.com, [FbRef.com](https://fbref.com), <https://data.mendeley.com/datasets/k5dp6k9xp6/1>

Keywords:

Performance

Distraction

Penalty kicks

Football

ABSTRACT

We ask whether facing partisan audiences affects the execution of a skilled task. Our setting is penalty shootouts in the high-stakes environment of elite professional football (soccer). In this context, performers take penalties under intense pressure, while facing a subset of the crowd behind the goal who attempt to distract them through visual and auditory tactics. Using data on 1,322 penalties taken in the later rounds of major English cup competitions from 1992 to 2026, we find no evidence that having supportive allied spectators behind the goal provides a strategic advantage. This implies that elite professionals in this domain can effectively screen out crowd-induced distractions when performing under extreme stress.

1. Introduction

Understanding how social influence exerts pressure on agents is important to economics. These forces have implications for issues such as prosocial preferences (Bénabou & Tirole, 2006), public good provision (Daughety & Reinganum, 2010), and identity formation (Akerlof & Kranton, 2000, 2010). Empirical research has documented the effects of such pressure across a range of settings including voting (Schram & Van Winden, 1991), charitable giving (DellaVigna et al., 2012), favouritism (Butler et al., 2025; Dawson & Dobson, 2010; Sutter & Kocher, 2004), norm compliance (Battiston & Gamba, 2016), and – the topic of this paper – task performance (Dohmen, 2008). Increasingly, it has been recognised that social pressure can act as a non-monetary incentive, shaping individual motivations and behaviour (Scoppa, 2021).

Penalty kicks in football (soccer) have proven a particularly valuable setting for isolating the effects of social pressure (Palacios-Huerta, 2014, 2025). We appeal to this setting for reasons that are now well-established. The task offers a clean, natural, and high-stakes context to test economic theory and psychological factors influencing performance (e.g., Apesteguia & Palacios-Huerta, 2010; Balafoutas et al., 2019; Bar-Eli et al., 2007, 2020; Krumer, 2020; Palacios-Huerta, 2014, 2023; Singh & Mukherjee, 2026; Vandebroek et al., 2018). Our focus is on shootouts, which are especially advantageous, as these penalties are taken in an even more precisely structured environment and strip away match-level contextual factors.

In an especially notable contribution, Dohmen (2008) provides evidence that social environments significantly affect the execution of penalty kicks in football. Dohmen observes that players are more prone to choking under pressure by missing the goal entirely when playing in their home stadium, although higher stakes do not induce such effects. This analysis, based on 3619 penalties in Germany, was limited by the absence of information on the fan composition within the stadia, especially behind the goal where the kick was taken. We extend this line of enquiry by analysing a new observational dataset of penalty kicks, which allows the identification of crowd allegiance behind the goal where the penalties were taken. It is reasonable to suspect that these fans could mediate any social pressure and distraction felt by the players.

* Corresponding author.

E-mail addresses: david.butler@ucc.ie (D. Butler), r.butler@ucc.ie (R. Butler), carl.singleton@stir.ac.uk (C. Singleton).<https://doi.org/10.1016/j.joep.2026.102940>

Received 16 January 2026; Received in revised form 8 September 2026; Accepted 15 September 2026

Available online 19 September 2026

0167-4870/© 2026 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

The novelty of our test also lies in considering the implications of the first coin toss of a penalty shootout, which determines the goal and fans (stadium end) potentially most influencing the penalty task. To our knowledge, all behavioural research to date has focused on the implications of the second coin toss before a penalty shootout, the flip, which determines the sequence of kicks in a shootout (e.g., [Kassiss et al., 2021](#); [Pipke, 2025](#); [Santos, 2023](#)). We investigate how multisensory stimuli from partisan spectators – engaging in targeted distraction tactics – affect individuals carrying out a pressurised skill-based task. This question is motivated by an extensive history of psychological theory and lab experimentation testing whether perceptual and auditory distractions can impair task execution (e.g., [Baddeley & Hitch, 1974](#); [Corbetta & Shulman, 2002](#); [Eysenck et al., 2007](#); [Kahneman, 1973](#); [Lavie, 1995, 2005, 2010](#); [Treisman, 1964](#); [Wickens, 1980](#)).

Beyond extending ([Dohmen, 2008](#)), our analysis complements ([Ferraresi & Gucciardi, 2021](#)), who examine 545 penalty kicks and observe that the likelihood of missing a penalty increases for home teams playing behind closed doors (in empty stadiums). Their results contrast with [Dohmen \(2008\)](#), implying that supportive audiences may enhance task performance. However, similar to [Dohmen \(2008\)](#) and [Ferraresi and Gucciardi \(2021\)](#) lack fan identity data prior to the COVID-19 pandemic. To our knowledge, only [Park et al. \(2022\)](#) has examined the impact of specific audience subsets, placing an emphasis on how it influences goalkeeper positioning before penalties are taken.

Using hand-collected data on 1322 penalties across 134 shootouts from 1992 to 2026, we consider the influence of crowds behind the shootout goal, exploiting the natural variation generated by the referee's coin toss to identify the effect of crowd location on penalty performance. Across the full sample, we find no statistically significant evidence that facing hostile or supportive fans behind the goal affects the probability of missing or scoring a penalty. The result implies that elite professionals are largely resilient to crowd-induced distraction under extreme pressure.

Taken generally, this research lies across two strands of literature. First, it contributes to the growing body of work employing penalty kicks data as a 'natural laboratory' to test behavioural theories. For example, prior research has appealed to this context to consider the effects of pressure ([Arrondel et al., 2019](#)), choking ([Dohmen, 2008](#)), momentum ([Krumer, 2021](#)), and hastening behaviour ([Veldkamp & Koning, 2023](#)). Second, our analysis speaks to a volume of studies examining audience effects in football (e.g., [Bryson et al., 2021](#); [Bühren & Jung, 2025](#); [Fischer & Haucap, 2021](#); [Reade et al., 2022](#); [Scoppa, 2021](#)), offering a new angle by asking whether a specific subset of the crowd influences performance. As this literature develops, there is a growing interest in how the exact fan composition within stadia affects outcomes ([Colella et al., 2024](#); [Humphreys et al., 2022](#)).

2. Setting and anticipated effects

Penalty shootouts are a tie-breaking procedure used to determine the winner when a football match remains level after regulation or extra time. Each team takes penalty kicks, in alternating sequence from the spot marked 12 yards from the goal line, to decide the winner. If the score remains tied after five kicks each, then the shootout proceeds to 'sudden death' rounds, in which teams continue to alternate until one scores and the other fails to convert within the same round. All players that were on the field at the end of the match must take a penalty before anybody on their team takes a second penalty. The exception to this is if teams have an unequal number of players at the end of the match due to a dismissal, in which case the team with more players nominate a player not to participate in the shootout. Only the opposing goalkeeper defends the kick.

At the start of the 2016/17 season, the International Association Football Board (IFAB) introduced a rule requiring an additional coin toss before the start of a shootout. The new rule stated that, "unless there are other considerations, the referee tosses a coin to decide the goal at which the kicks will be taken which may only be changed for safety reasons or if the goal or playing surface becomes unusable" ([The International Football Association Board, 2016](#), p. 71). Previously, the decision was at the referee's discretion. While we test the robustness of our results to this rule change, we acknowledge that prior to 2016/17, a coin toss was most often used informally to determine which end was chosen, and thus which group of fans was positioned behind the goal.

The consequence of the referee's first coin toss prior to a shootout is that one set of penalty-takers face into a supporter subset who engage in antagonistic distraction tactics. This is a mixture of visual (e.g., banner and hand waving) and audio (e.g., heckling, taunts and shouting) distractions. The other set of kickers face a supportive – often quiet and motionless – audience, as the allegiances of fans behind the goal align with the objectives of the performer. The same principle applies to goalkeepers; they make decisions with or without nuisance from the nearby audience. This meets the criteria for distraction as the performers are not required to, and cannot attend to, any disturbance – but must complete a task under pressure.

In this scenario, what are the expected effects of a partisan subset of the crowd on penalty performance? First, it is reasonable to speculate that external distractions could increase the complexity of the task. For example, the executive functions of performers could be inhibited by stress and heightened anxiety ([Eysenck et al., 2007](#)). Attentional control may require additional processing resources. Thus, opposition fans impairing a performer could diminish the probability of accomplishing a task. While it is not possible to distinguish between the levels of hostility from crowds behind a goal, both the visual and auditory stimuli witnessed in this setting would be high load relative to everyday distractions. However, we note that this aggregate prediction may mask individual heterogeneity in responses to crowd hostility; for some kickers, opposition fans may serve as a source of reactive motivation rather than a debilitating stressor.

Second, since no extraneous load is borne by performers facing their own fans, a second expectation is plausible; taking penalties facing supportive (typically silent or encouraging) fans may increase pressure on players and lower the probability of successful task completion. This expectation appeals to a broad theory of choking ([Baumeister, 1984](#)), and could be framed as performers facing a relatively low visual and auditory load, but one where the shooter is monitored by an expectant audience. A body of evidence supports choking effects using data from professional sport in skill-based tasks (e.g., [Böheim et al., 2019](#); [Bühren et al., 2024](#);

Cohen-Zada et al., 2017; Dohmen, 2008). In short, one could propose that the absence of stimuli – or low-level supportive arousal – induces choking.

Third, it is also reasonable to anticipate a null effect based on theory and evidence. The performers are often ‘superstars’ and are remunerated as such (e.g., Bryson et al., 2014; Scarfe et al., 2021). They are highly trained professionals and accustomed to managing intensive performance demands, one of which is persistent efforts from supporters to interfere. Additionally, players get ample opportunity to practise the penalty task, albeit not under perfectly analogous (noisy) conditions or levels of pressure. Prior research also shows that the psychological profiles underlying footballers’ human capital are exceptional relative to the general population (Bonetti et al., 2025). To summarise this third plausible outcome, the exceptionalism of the performers, coupled with learning opportunities, would imply that they could be largely resilient or immune to visual and audio stressors.

3. Estimation

Consistent with much of the literature modelling penalty outcomes (e.g., Dohmen, 2008), we specify probit regression models to estimate the effects of fans behind the goal on the probability of a player missing entirely or scoring a penalty kick, controlling for a range of potential confounding factors.

The basic models we estimate are given by:

$$\Pr(\text{Miss}_i = 1 \mid \text{FBG}_i, \text{Home}_i, \mathbf{x}_i) = \Phi(\alpha + \beta_1 \text{FBG}_i + \beta_2 \text{Home}_i + \beta_3 \text{FBG}_i \times \text{Home}_i + \mathbf{x}_i' \lambda), \quad (1)$$

$$\Pr(\text{Score}_i = 1 \mid \text{FBG}_i, \text{Home}_i, \mathbf{x}_i) = \Phi(\mu + \delta_1 \text{FBG}_i + \delta_2 \text{Home}_i + \delta_3 \text{FBG}_i \times \text{Home}_i + \mathbf{x}_i' \gamma), \quad (2)$$

where $\Phi(\cdot)$ denotes the cumulative distribution function (CDF) of the standard normal distribution.

The dependent variable in Eq. (1) gives the probability that kick i is off target, missing the goal completely, aligning with the main focus in Dohmen (2008) and Ferraresi and Gucciardi (2021). In Eq. (2), the dependent variable represents whether the kick was scored, with the complement including both missed and saved kicks. The variable $\text{FBG}_i = 1$ (Fans Behind Goal) indicates that the kicker performed the penalty with supportive fans behind the goal, while $\text{Home}_i = 1$ if the kick occurred in the player’s home stadium. We also include the interaction between FBG_i and Home_i . Accordingly, β_3 and δ_3 allow us to test whether any effects of kicking in a home stadium and the affiliation of the supporters behind the goal are independent of one another on average. Given the interaction terms and the non-linear nature of the probit specification, we present and interpret our main results using predicted probabilities, evaluated at the sample means, for all explanatory variables.

We also include a broad set of control variables in Eqs. (1) and (2), contained within the vector $\mathbf{x}_i$. To account for yearly trends in penalty kick success, we include dummy variables for each season. To address contextual variation in pressure or other plausibly exogenous factors influencing the kicker, we include controls commonly used in the literature: the natural logarithm of the stadium attendance; dummy variables for the competition and the round (e.g., final vs. semi-final); and a dummy for whether the kick was potentially decisive (i.e., would end the shootout if scored or missed). Additional controls in $\mathbf{x}_i$ relate to the identities of the kicker or goalkeeper: linear terms for the kicker’s age, the goalkeeper’s age, the minutes played by the kicker in the previous season and during the current match, and the goalkeeper’s height; dummy variables for the kicker’s primary position (e.g., midfielder); and indicators for whether the kicker regularly takes penalties outside of shootouts and whether the goalkeeper is the team’s regular ‘first choice’. Standard errors are clustered at the shootout level.

4. Data

Our dataset comprises 1322 penalty kicks taken during 134 shootouts in the two elite English domestic cup competitions – The English Football League (EFL) Cup and The Football Association (FA) Cup. Notably and relevant for statistical power, this sample is around a third the total size of that studied by Dohmen (2008) (3619 kicks) but involves more kick takers (936 vs. 704). Our sample is almost 2.5 times larger than Ferraresi and Gucciardi (2021) (545 kicks). The setting is well-suited to examining our research question, as the competitions typically feature a substantial presence of away fans in stadia. Ticket allocations for travelling supporters in English cup competitions are generally increased relative to league matches by 10%–15% (Butler, 2019). Information on shootout environments and outcomes is obtained from archival footage, primarily hosted on YouTube.com. Data on match attendances and player characteristics are sourced from 11v11.com and FbRef.com.

The data cover penalty shootouts from the third round onward through to the finals, for both competitions, from the 1992–1993 to 2025–2026 seasons. The most recent match date in the dataset is 5 April, 2026, which was an FA Cup fixture between West Ham and Leeds Utd. Elite teams enter at the third-round stage, and we obtained publicly available footage of shootouts during this period to manually verify the allegiances of fans behind the goal and the corresponding penalty outcomes. Note, however, that we cannot verify the choice of the coin toss winners. No footage is available for 38 shootouts within this sampling window. For 11 earlier shootouts, the composition of fans is ambiguous, and these are therefore omitted from the analysis. A further 7 shootouts are omitted because they occurred behind closed doors during the COVID-19 pandemic. Fan allegiance is classified straightforwardly by observing jersey colours and the reactions of supporters to penalty outcomes (Park et al., 2022). From viewing the recordings, an almost universal behavioural pattern emerges: fans behind the goal engage in visual and auditory distractions during opposition penalties, while remaining largely silent or offering encouragement to their own team’s kickers. Supporters celebrate according to the outcome and often exchange gestures with players when results align with their preferences. Scoring players and saving goalkeepers frequently interact jubilantly with their own fans positioned behind the goal.

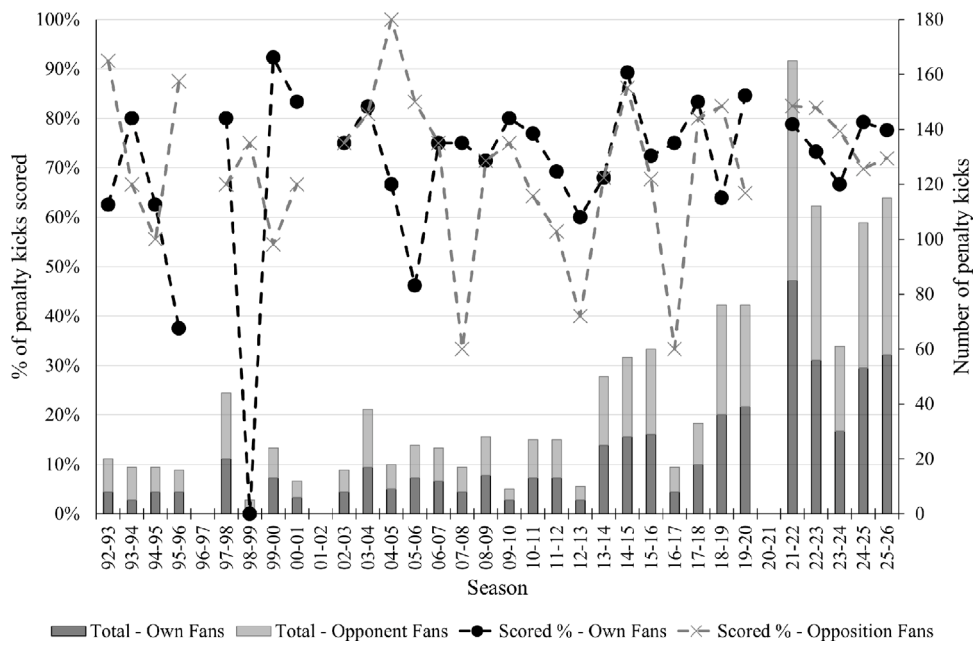


Fig. 1. Percentage of shootout penalty kicks scored and total number taken in front of own or opposition fans, by season of the FA Cup and EFL Cup, 1992/93-2025/26.

Notes: 1322 penalty kicks from 134 shootouts, with fan allegiance behind the goal determined by the authors using archive footage, primarily via [YouTube.com](https://www.youtube.com).

Fig. 1 represents the dataset, showing the number of penalty kicks taken (and % scored) in front of either home or away supporters. The greater frequency of shootouts in later years reflects two rule changes: the elimination of replays in the FA Cup for tied matches and the removal of additional/extra time. Both modifications increased the likelihood that matches would be decided by penalty shootouts. Table 1 provides descriptive statistics for the dataset and summarises all variables used in the estimations. On average, 74% of kicks are scored, 9% are off-target, and 49% are taken in front of the kicker's own fans. The average stadium attendance for these kicks is 34,029, with the maximum of 89,041 reported for Wembley Stadium semi-finals and finals. Returning to the issue of statistical power, based on the observed prevalence of scored (missed) outcomes in the data and the assignment of FBG, a simple design-based calculation implies a minimum detectable effect of approximately 6.7 (4.3) percentage points, with 80% power and a 5% two-sided test.

5. Results

Table 2 summarises the results from Eq. (1), with the coefficient estimates and standard errors in Panel A and corresponding predicted probabilities in Panel B. Column (1) presents estimates omitting all covariates except the home dummy. On average, there is effectively no difference in the frequency of a penalty being missed between kicks taken at a player's home stadium and those taken elsewhere ($H_0 : \beta_2 = 0$; $p = 0.743$). In column (2), we introduce the 'fans behind goal' (FBG) indicator. The results suggest that kicks at home in front of away fans are missed most often, consistent with the idea that majority home support in the wider stadium may generate social pressure on home players (Dohmen, 2008), while the presence of away fans directly behind the goal may amplify pressure and add distraction. However, none of the model coefficients are statistically significant from zero ($H_0 : \beta_1 = 0$; $p = 0.303$ and $H_0 : \beta_2 = 0$; $p = 0.393$). Column (3) adds the interaction between the home and FBG variables, which is also not significant ($H_0 : \beta_3 = 0$; $p = 0.462$). As we sequentially include additional controls in columns (4) and (5) the qualitative pattern of results remains unchanged. However, when we split the sample before and after the 2016 rule change, which introduced a coin toss to determine the goal where the shootout would take place, we find in the earlier period (column 6) that players were 14.4 percentage points more likely to miss when shooting at home but facing the opposition fans compared with when shooting at home facing their own supporters ($p = 0.041$).

Overall though and in the post-2016 rule change period, we find that the probability of missing is statistically independent of whether the kick is taken at home or in front of the kicker's own supporters, which speaks to the third anticipated outcome discussed in Section 2. Interestingly, overall stadium attendance is negatively and significantly associated with the likelihood of an off-target kick (column (5): $p = 0.031$), though this may reflect the fact that higher attendances tend to involve stronger teams and better players, and this effect attenuates in the post-2016 period.

Table 3 reports our estimates of Eq. (2) for the probability that a penalty is scored, with the equivalent model specifications to Table 2. On average in the sample (column 3), kicks are scored most frequently by players in their home stadium, when facing their

Table 1

Summary statistics for penalty kicks taken during a shootout in the English FA Cup or EFL Cup, seasons 1992/93-2025/26.

Variable	Definition	Mean/Share	St. dev.	Min.	Max.
Goal scored	1 = Successful penalty, 0 = Unsuccessful penalty	0.744			
Missed, off-target	1 = Missed target, 0 = On target	0.087			
Kicker's fans behind goal	1 = If fans behind the goal are supporting the kicker's club, 0 = otherwise	0.492			
Home	1 = If the kicker is taking the penalty at their home stadium	0.455			
Attendance	Recorded stadium attendance	34,029	22,931	2810	89,041
Competition	1 = FA Cup, 0 = EFL Cup	0.396			
Deciding penalty	1 = If the penalty decides the outcome, 0 = otherwise	0.191			
Kicker age	Age of the kicker	26.74	4.01	17.61	40.14
Goalkeeper	1 = If kicker is a goalkeeper	0.006			
Defender	1 = If kicker is a defender	0.317			
Midfielder	1 = If kicker is a midfielder	0.319			
Forward	1 = If kicker is a forward	0.359			
Last season minutes	Number of league minutes kicker played in previous season	1885	1037	1	4140
PK specialist	1 = if the kicker takes in-play penalties in the current or previous season or is a strategic sub	0.209			
Match minutes	The number of minutes the kicker played in the match	89.39	4.44	1.00	120.00
Goalkeeper age	Age of the goalkeeper	28.61	4.44	19.81	42.48
First choice goalkeeper	1 = If the goalkeeper is the first choice, 0 = otherwise	0.62			
Goalkeeper height	Height in centimetres of the goalkeeper	190.19	4.17	176	203

Notes: 1322 penalty kicks from 134 shootouts, with fan allegiance behind the goal determined by the authors using archive footage, primarily via [YouTube.com](https://www.youtube.com).

own fans behind the goal. However, there is no systematic evidence from any of the specifications to reject the null that the scoring rate is unaffected by whether the kick is taken in the player's home stadium and/or in front of supportive fans.

As a robustness check, we confirm that excluding shootouts in neutral stadiums has no meaningful bearing on our results. Following [Dohmen \(2008\)](#), we also verify that the results are robust to the possibility that players alter their strategies according to the environment of the kick, by including control variables for shot placement. This aligns with prior studies modelling and testing the mixed-strategy play of football players during penalty kicks (e.g., [Chiappori et al., 2002](#); [Palacios-Huerta, 2003](#)). Online Appendix Table A1 further shows that our results are robust to estimating equivalent linear probability models. Finally, Online Appendix Table A2 demonstrates that our main findings remain robust when restricting the sample to non-specialist penalty takers, addressing the potential selection concern highlighted by [Dohmen \(2008\)](#) that individuals most adept at handling pressure may be selected into taking penalties.

6. Conclusion

We exploited a natural setting to test the impact of pressure and salient visual and auditory distraction on task performance, constructing a new dataset of penalty kicks in professional football that captures an important omitted variable pertinent to this environment. On average, we find no statistically significant evidence that supportive or antagonistic fans directly behind the goal alter the probability of missing a penalty entirely.

We believe that the absence of systematic crowd effects does not necessitate any re-evaluation of goal-end selection policies. While our results are consistent with the first coin toss having no strong average effects on penalty outcomes, it remains valuable in maintaining perceptions of fairness and mitigating potential claims of referee bias. The results also speak to a widely held media view that facing one's own fans confers a decisive advantage (e.g., [Keys, 2025](#)), which is not borne out by the evidence presented here. Thus, the results could serve to inform an oft-held debate. Our results differ from notable previous literature such as [Dohmen \(2008\)](#) and [Ferraresi and Gucciardi \(2021\)](#). We can only speculate why this is the case, with candidate explanations being the different sample sizes, improvements in player performance, and the widespread adoption of sports psychology over the past two decades, of which penalty kicks has been the subject of research (e.g., [Arrondel et al., 2019](#); [Wood et al., 2015](#)). Psychological techniques have been used to increase penalty kick success rates and is used as a tool to overcome the pressure and anxiety of kicking. Future research could explore this further.

The generalisability of these findings is necessarily limited. Professional footballers operate under conditions of pressure and psychological demand that are of course atypical relative to most occupational settings. The ability to screen out crowd-induced distraction could likely be a product of both exceptional psychological profiles and extensive high-stakes experience. Wider cross-context inferences should, therefore, be drawn cautiously. Nonetheless, the finding that skilled professionals can execute complex technical tasks under intense stressors is reassuring, and parallels may exist in other high-stakes professions (e.g., surgery, aviation, or military operations, where optimal performance under distraction is similarly critical).

Several limitations remain. The data are hand-collected and penalty kicks were individually watched, imposing high costs on compilation and constraining the sample to two English cup competitions. This may limit external validity. Statistical power is also restricted by the rarity of the events studied despite the long time period covered. Some degree of selection bias in penalty taking may also persist despite controls for specialist and strategic substitutions. Only on occasion do players lack agency in whether to take a penalty. Information on the number, proximity, and exact behaviour of supporters behind the goal also remains inaccessible.

Table 2

Probit model estimates for the likelihood of a penalty kick being *missed* (off target) during a shootout in the English FA Cup or EFL Cup, seasons 1992/93-2025/26.

	92/93-24/25					92/93-15/16	16/17-25/26
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A. Coefficient estimates</i>							
Kicker's fans behind goal (FBG) (β_1)		-0.132 (0.128)	-0.045 (0.185)	-0.086 (0.197)	-0.077 (0.206)	-0.272 (0.345)	0.073 (0.236)
Home (β_2)	0.033 (0.101)	0.109 (0.128)	0.204 (0.160)	0.164 (0.170)	0.259 (0.174)	0.457 (0.286)	0.105 (0.247)
FBG $\times$ Home (β_3)			-0.184 (0.251)	-0.076 (0.283)	-0.157 (0.279)	-0.459 (0.422)	0.019 (0.341)
Ln(Attendance)					-0.192* (0.089)	-0.498** (0.180)	-0.163 (0.108)
FA Cup					-0.262* (0.122)	-0.539** (0.200)	-0.141 (0.170)
Constant (α)	-1.375*** (0.075)	-1.346*** (0.078)	-1.365*** (0.084)	-1.030* (0.430)	4.436 (2.612)	4.237 (5.320)	4.067 (2.818)
Pressure-Context controls					✓	✓	✓
Kicker-Keeper controls					✓	✓	✓
Season effects				✓	✓	✓	✓
<i>Panel B. Predicted probabilities (at sample means)</i>							
Kicker's fans behind goal:							
0		0.097	0.102	0.092	0.089	0.140	0.055
1		0.077	0.081	0.073	0.068	0.059	0.066
Home:							
0	0.085	0.079	0.083	0.074	0.067	0.078	0.054
1	0.090	0.096	0.101	0.093	0.093	0.119	0.068
FBG $\times$ Home:							
0 $\times$ 0		0.089	0.086	0.080	0.072	0.099	0.050
0 $\times$ 1		0.108	0.123	0.107	0.114	0.203 [†]	0.062
1 $\times$ 0		0.070	0.079	0.068	0.062	0.060	0.058
1 $\times$ 1		0.085	0.082	0.080	0.075	0.059 [†]	0.074
$H_0 : \beta_1 + \beta_3 = 0$; p -value			0.153	0.360	0.194	0.013	0.693
$H_0 : \beta_2 + \beta_3 = 0$; p -value			0.918	0.662	0.647	0.995	0.588
$H_0 : \beta_1 + \beta_2 + \beta_3 = 0$; p -value			0.820	0.988	0.838	0.182	0.231
N: kicks	1322	1322	1290	1290	1289	529	760

Notes: Coefficient estimates and predicted probabilities of the probit model given by Eq. (1), with whether the penalty kick was missed (off-target) as the dependent variable. Other 'Pressure-Context' control variables not displayed are dummy variables for each round of competition and an indicator for whether the kick was potentially decisive (i.e., ending the shootout if missed/scored). 'Kicker-goalskeeper' controls are continuous linear terms for the age of the kicker, the age of the goalkeeper, the minutes the kicker played in the previous season, the minutes they played during the match, and the height of the goalkeeper, as well as dummy variables for each regular major position of a player (e.g., midfielder), and indicators for whether the kicker regularly took penalty kicks outside of shootouts and if the goalkeeper is the team's regular 'first choice'.

* $p < .05$, ** $p < .01$, *** $p < .001$ indicate significance from zero of the model coefficients, two-sided tests, with standard errors in parentheses that account for clustering at the level of a shootout (134 clusters for columns 1–2). The sample size drops in columns (3–7) compared with Table 3 because no penalty kicks are missed in the sample during the 98/99, 04/05 and 09/10 seasons. [†] $p < .05$, ^{††} $p < .01$, ^{†††} $p < .001$ indicate predictive margins that are pairwise significantly different from one another, using the Delta Method with the cluster-robust variance matrix.

Finally, we would generally assume that coin toss winners always elect to shoot towards their own supporters, a highly plausible but unverified assumption. This is an avenue for future work. Future research could also address the above constraints if automated data-gathering processes enable fan composition identification at scale or opportunity to measure noise levels, as well as record keeping of which team won the coin toss.

Acknowledgements

The authors wish to express their thanks to the editor and two anonymous referees for their constructive comments and suggestions during earlier rounds of this submission, which have developed and improved the manuscript.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.joep.2026.102940>.

Table 3

Probit model estimates for the likelihood of a penalty kick being **scored** during a shootout in the English FA Cup or EFL Cup, seasons 1992/93–2025/26.

	92/93-24/25					92/93-15/16	16/17-25/26
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A. Coefficient estimates</i>							
Kicker's fans behind goal (FBG) (β_1)		−0.027 (0.093)	−0.109 (0.126)	−0.161 (0.139)	−0.238 (0.153)	−0.125 (0.273)	−0.206 (0.187)
Home (β_2)	0.096 (0.080)	0.112 (0.096)	−0.003 (0.143)	−0.052 (0.157)	−0.079 (0.164)	0.191 (0.253)	−0.111 (0.226)
FBG × Home (β_3)			0.201 (0.201)	0.296 (0.234)	0.410 (0.251)	0.093 (0.427)	0.378 (0.305)
Ln(Attendance)					0.097 (0.071)	0.100 (0.137)	0.096 (0.080)
FA Cup					0.163 (0.096)	0.108 (0.147)	0.146 (0.129)
Constant (α)	0.611*** (0.057)	0.618*** (0.060)	0.637*** (0.063)	0.779*** (0.256)	−2.077 (2.221)	1.621 (3.240)	−5.233 (3.129)
Pressure-Context controls					✓	✓	✓
Kicker-Keeper controls					✓	✓	✓
Season effects				✓	✓	✓	✓
<i>Panel B. Predicted probabilities (at sample means)</i>							
Kicker's fans behind goal:							
0		0.748	0.737	0.739	0.742	0.745	0.757
1		0.739	0.732	0.730	0.724	0.717	0.746
Home:							
0	0.730	0.727	0.720	0.721	0.715	0.696	0.740
1	0.760	0.763	0.751	0.751	0.755	0.773	0.765
FBG × Home:							
0 × 0		0.732	0.738	0.747	0.753	0.716	0.772
0 × 1		0.767	0.737	0.730	0.727	0.777	0.737
1 × 0		0.722	0.701	0.692	0.672	0.672	0.706
1 × 1		0.759	0.766	0.772	0.781	0.767	0.790
$H_0 : \beta_1 + \beta_3 = 0$; p -value			0.529	0.398	0.297	0.896	0.693
$H_0 : \beta_2 + \beta_3 = 0$; p -value			0.140	0.090	0.043	0.336	0.588
$H_0 : \beta_1 + \beta_2 + \beta_3 = 0$; p -value			0.327	0.362	0.318	0.245	0.624
N: kicks	1322	1322	1322	1322	1321	561	760

Notes: Coefficient estimates and predicted probabilities of the probit model given by Eq. (2). Other 'Pressure-Context' control variables not displayed are dummy variables for each round of competition and an indicator for whether the kick was potentially decisive (i.e., ending the shootout if missed/scored). 'Kicker-goalskeeper' controls are continuous linear terms for the age of the kicker, the age of the goalkeeper, the minutes the kicker played in the previous season, the minutes they played during the match, and the height of the goalkeeper, as well as dummy variables for each regular major position of a player (e.g., midfielder), and indicators for whether the kicker regularly took penalty kicks outside of shootouts and for whether the keeper is the team's regular 'first choice'.

* $p < .05$, ** $p < .01$, *** $p < .001$ indicate significance from zero of the model coefficients, two-sided tests, with standard errors in parentheses that account for clustering at the level of a shootout (134 clusters for columns 1–2).

† $p < .05$, †† $p < .01$, ††† $p < .001$ indicate predictive margins that are pairwise significantly different from one another, using the Delta Method with the cluster-robust variance matrix.

Data availability

In the analysis, data are used from several public sources. Information on penalty shootout environments and outcomes is obtained from archival footage, primarily hosted on [YouTube.com](https://www.youtube.com). A minority of matches are accessible via [Facebook.com](https://www.facebook.com). Data on match attendances and player characteristics are sourced from [11v11.com](https://www.11v11.com) and [FbRef.com](https://www.fbref.com). The analysis, dataset and at <https://data.mendeley.com/datasets/k5dp6k9xp6/1>.

References

- Akerlof, G. A., & Kranton, R. E. (2000). Economics and identity. *The Quarterly Journal of Economics*, 115(3), 715–753.
- Akerlof, G. A., & Kranton, R. E. (2010). Identity economics: How our identities shape our work, wages, and well-being. In *Identity economics*. Princeton University Press.
- Apesteguia, J., & Palacios-Huerta, I. (2010). Psychological pressure in competitive environments: Evidence from a randomized natural experiment. *American Economic Review*, 100(5), 2548–2564.

- Arrondel, L., Duhaiois, R., & Laslier, J.-F. (2019). Decision under psychological pressure: The shooter's anxiety at the penalty kick. *Journal of Economic Psychology*, 70, 22–35.
- Baddeley, A. D., & Hitch, G. J. (1974). Working memory. In G. H. Bower (Ed.), *Vol. 8, The psychology of learning and motivation* (pp. 47–89). New York: Academic Press.
- Balafoutas, L., Chowdhury, S. M., & Plessner, H. (2019). Applications of sports data to study decision making. *Journal of Economic Psychology*, 75, Article 102153.
- Bar-Eli, M., Azar, O. H., Ritov, I., Keidar-Levin, Y., & Schein, G. (2007). Action bias among elite soccer goalkeepers: The case of penalty kicks. *Journal of Economic Psychology*, 28(5), 606–621.
- Bar-Eli, M., Krumer, A., & Morgulev, E. (2020). Ask not what economics can do for sports – Ask what sports can do for economics. *Journal of Behavioral and Experimental Economics*, 89, Article 101597.
- Battiston, P., & Gamba, S. (2016). The impact of social pressure on tax compliance: A field experiment. *International Review of Law and Economics*, 46, 78–85.
- Baumeister, R. F. (1984). Choking under pressure: Self-consciousness and paradoxical effects of incentives on skillful performance. *Journal of Personality and Social Psychology*, 46(3), 610.
- Bénabou, R., & Tirole, J. (2006). Incentives and prosocial behavior. *American Economic Review*, 96(5), 1652–1678.
- Böheim, R., Grübl, D., & Lackner, M. (2019). Choking under pressure – Evidence of the causal effect of audience size on performance. *Journal of Economic Behavior and Organization*, 168, 76–93.
- Bonetti, L., Vestberg, T., Jafari, R., Seghezzi, D., Ingvar, M., Kringsbach, M. L., Filgueiras, A., & Petrovic, P. (2025). Decoding the elite soccer player's psychological profile. *Proceedings of the National Academy of Sciences*, 122(3), Article e2415126122.
- Bryson, A., Dolton, P., Reade, J. J., Schreyer, D., & Singleton, C. (2021). Causal effects of an absent crowd on performances and refereeing decisions during Covid-19. *Economics Letters*, 198, Article 109664.
- Bryson, A., Rossi, G., & Simmons, R. (2014). The migrant wage premium in professional football: A superstar effect? *Kyklos*, 67(1), 12–28.
- Bühren, C., Gschwend, M., & Krumer, A. (2024). Expectations, gender, and choking under pressure: Evidence from alpine skiing. *Journal of Economic Psychology*, 100, Article 102692.
- Bühren, C., & Jung, D. (2025). Performing without pressure? The effect of ghost games on effort-based and skill-based tasks in the german football bundesliga. *Journal of Economics and Behavioral Studies*, 17(4), 25–34.
- Butler, R. (2019). Away fan ticket allocation in the premier league. <http://www.sportseconomics.org/sports-economics/away-fan-ticket-allocation-in-the-premier-league>, Last accessed: 2025-08-19.
- Butler, D., Butler, R., & Singleton, C. (2025). Objective calls under the spotlight: Referee consistency and behaviour on football's biggest stage. *Journal of Sports Economics*, Article 15270025251396508.
- Chiappori, P.-A., Levitt, S., & Grosseclouse, T. (2002). Testing mixed-strategy equilibria when players are heterogeneous: The case of penalty kicks in soccer. *American Economic Review*, 92(4), 1138–1151.
- Cohen-Zada, D., Krumer, A., Rosenboim, M., & Shapir, O. M. (2017). Choking under pressure and gender: Evidence from professional tennis. *Journal of Economic Psychology*, 61, 176–190.
- Colella, F., Dalton, P. S., & Giusti, G. (2024). Moral support and performance. *Management Science*, 70(7), 4614–4628.
- Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews. Neuroscience*, 3(3), 201–215.
- Daughety, A. F., & Reinganum, J. F. (2010). Public goods, social pressure, and the choice between privacy and publicity. *American Economic Journal: Microeconomics*, 2(2), 191–221.
- Dawson, P., & Dobson, S. (2010). The influence of social pressure and nationality on individual decisions: Evidence from the behaviour of referees. *Journal of Economic Psychology*, 31(2), 181–191.
- DellaVigna, S., List, J. A., & Malmendier, U. (2012). Testing for altruism and social pressure in charitable giving. *The Quarterly Journal of Economics*, 127(1), 1–56.
- Dohmen, T. J. (2008). Do professionals choke under pressure? *Journal of Economic Behavior and Organization*, 65(3–4), 636–653.
- Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, 7(2), 336.
- Ferraresi, M., & Gucciardi, G. (2021). Who chokes on a penalty kick? Social environment and individual performance during Covid-19 times. *Economics Letters*, 203, Article 109868.
- Fischer, K., & Haucap, J. (2021). Does crowd support drive the home advantage in professional football? Evidence from German ghost games during the COVID-19 pandemic. *Journal of Sports Economics*, 22(8), 982–1008.
- Humphreys, B. R., Reade, J., Schreyer, D., & Singleton, C. (2022). Separating the crowds: Examining home and away attendances at football matches. In *Essays on sports economics in memory of stefan kesenne*. University of Oviedo Publishing.
- Kahneman, D. (1973). *Vol. 1063, Attention and effort* (pp. 218–226). Englewood Cliffs, NJ: Prentice-Hall.
- Kassis, M., Schmidt, S. L., Schreyer, D., & Sutter, M. (2021). Psychological pressure and the right to determine the moves in dynamic tournaments – Evidence from a natural field experiment. *Games and Economic Behavior*, 126, 278–287.
- Keys, R. (2025). Lionesses had 'distinct advantage' in penalties vs. Spain — Euro 2025. Jul, Daily Mail, last accessed [01/08/2025].
- Krumer, A. (2020). Pressure versus ability: Evidence from penalty shoot-outs between teams from different divisions. *Journal of Behavioral and Experimental Economics*, 89, Article 101578.
- Krumer, A. (2021). Does psychological momentum differ for home and away teams? Evidence from penalty shoot-outs in European cups. In *Behavioural sports economics* (pp. 159–171). Routledge.
- Lavie, N. (1995). Perceptual load as a necessary condition for selective attention. *Journal of Experimental Psychology: Human Perception and Performance*, 21(3), 451.
- Lavie, N. (2005). Distracted and confused?: Selective attention under load. *Trends in Cognitive Sciences*, 9(2), 75–82.
- Lavie, N. (2010). Attention, distraction, and cognitive control under load. *Current Directions in Psychological Science*, 19(3), 143–148.
- Palacios-Huerta, I. (2003). Professionals play minimax. *Review of Economic Studies*, 70(2), 395–415.
- Palacios-Huerta, I. (2014). *Beautiful game theory: How soccer can help economics*. Princeton University Press.
- Palacios-Huerta, I. (2023). Maradona plays Minimax. *Sports Economics Review*, 1, Article 100001.
- Palacios-Huerta, I. (2025). The Beautiful Dataset. *Journal of Economic Literature*, 63(4), 1363–1423.
- Park, S., Uiga, L., & Masters, R. (2022). Crowd reception influences avoidance behavior during football penalty-kicks, but you wouldn't know it: A retrospective analysis of professional games. *Psychology of Sport and Exercise*, 61, Article 102169.
- Pipke, D. (2025). No evidence of first-mover advantage in a large sample of penalty shootouts. *Journal of Economic Psychology*, 108, Article 102816.
- Reade, J. J., Schreyer, D., & Singleton, C. (2022). Eliminating supportive crowds reduces referee bias. *Economic Inquiry*, 60(3), 1416–1436.
- Santos, R. M. (2023). Effects of psychological pressure on first-mover advantage in competitive environments: Evidence from penalty shootouts. *Contemporary Economic Policy*, 41(2), 354–369.
- Scarfe, R., Singleton, C., & Telemo, P. (2021). Extreme wages, performance, and superstars in a market for footballers. *Industrial Relations: A Journal of Economy and Society*, 60(1), 84–118.
- Schram, A., & Van Winden, F. (1991). Why people vote: Free riding and the production and consumption of social pressure. *Journal of Economic Psychology*, 12(4), 575–620.
- Scoppa, V. (2021). Social pressure in the stadiums: Do agents change behavior without crowd support? *Journal of Economic Psychology*, 82, Article 102344.

- Singh, R., & Mukherjee, S. (2026). Replication: No action 'Bias' among elite soccer goalkeepers during penalty kicks. *Journal of Economic Psychology*, Article 102886.
- Sutter, M., & Kocher, M. G. (2004). Favoritism of agents – The case of referees' home bias. *Journal of Economic Psychology*, 25(4), 461–469.
- The International Football Association Board (2016). *Laws of the game 2016/17*. Fédération Internationale de Football Association (FIFA).
- Treisman, A. M. (1964). Verbal cues, language, and meaning in selective attention. *The American Journal of Psychology*, 77(2), 206–219.
- Vandebroek, T. P., McCann, B. T., & Vroom, G. (2018). Modeling the Effects of Psychological Pressure on First-Mover Advantage in Competitive Interactions. *Journal of Sports Economics*, 19(5), 725–754. <http://dx.doi.org/10.1177/1527002516672060>.
- Veldkamp, J., & Koning, R. H. (2023). Waiting to score. Conversion probability and the video assistant referee (VAR) in football penalty kicks. *Journal of Sports Sciences*, 41(18), 1692–1700.
- Wickens, C. D. (1980). The structure of attentional resources. In R. S. Nickerson (Ed.), *Attention and performance VIII*. Academic Press.
- Wood, G., Jordet, G., & Wilson, M. R. (2015). On winning the "lottery": Psychological preparation for football penalty shoot-outs. *Journal of Sports Sciences*, 33(17), 1758–1765.