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Venue and Sex Effects in Icelandic Domestic Soccer

Þórir Rafn Hauksson[1,2], Ragnheiður Lóa Stefánsdóttir[1,3] and Peter Gerard O'Donoghue[1,*]

[1]*Department of Sports Science, Reykjavik University, Menntavegur 1, 102 Reykjavik, Iceland*
[2]*Njarðvík Knattspyrnudeild, Ungmennafélagið Njarvík, Íþróttamiðstöðinni Norðurstíg 4, 260 Reyjanesbær, Iceland*
[3]*Fjölnir Knattspyrnudeild, Ungmennafélagið Fjölnir, Egilshöll, Fossaleyni 1, 112 Reykjavik, Iceland*

Abstract:

Introduction / Objectives: Sex, venue, and league level influence soccer performance according to previous research. The purpose of this investigation was to analyse the effects of sex, level, and venue on Icelandic league soccer and determine performance indicators associated with match outcome.

Methods: A retrospective observational study used data from 1,244 matches: 484 from the men's top tier, 331 from the women's top tier, 379 from the men's second tier, and 50 from the women's second tier. Nonparametric tests compared match statistics between sexes, divisions, and home and away performances. Match outcome was modelled using match statistics for the home and away teams, sex, and league level.

Results: The percentage of successful passes was significantly greater in men's matches than women's matches ($p < 0.001$) and significantly greater in the top-tier divisions for both men ($p < 0.001$) and women ($p = 0.001$). The chance of a positive match outcome increased with the number of shots taken and the percentage of shots on target. However, the chance of a home win was negatively associated with the number of passes played by the home team.

Discussion: The greater passing accuracy in men's matches may be explained by physical and technical differences between male and female players. The higher passing accuracy in top-tier divisions may also be due to the greater technical ability of top-tier players.

Conclusion: The negative association between passes played and positive match outcome suggests that a shorter possession style is more successful in Icelandic domestic soccer.

Keywords: Match analysis, Situational variables, Performance indicators, Match outcome, League level, Ball possession.

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*Address correspondence to this author at the Department of Sports Science, Reykjavik University, Menntavegur 1, 102 Reykjavik, Iceland; E-mail: petero@ru.is

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1. INTRODUCTION

Research has shown that contextual factors, such as match venue, opposition quality, league level, and sex, can significantly influence team and player performance during competitive soccer matches [1, 2]. One of the most well-established contextual effects is the home advantage [3, 4], which has been attributed to multiple mechanisms including crowd support [5, 6], travel fatigue [7], and spatial familiarity [8]. Home advantage varies between countries [9] and is greater in men's soccer than in women's soccer [3]. This disparity was attributed to factors such as crowd effects and sex-related differences in territorial behaviour. Differences between men's and women's soccer, more generally, may be due to differing anthropometric and physiological characteristics [10]. Differences in soccer performance between men and women may also be due to women being challenged with adapting to rules and regulations designed for men's physical attributes [10].

The venue [1] and level effects [11] found in previous research may not apply in Icelandic domestic soccer. The unique characteristics of Icelandic soccer, such as its semi-professional structure, limited geographical scale, the domestic leagues being played in the summer, and varying levels of investment across men's and women's divisions, make it a unique context for investigating the impact of contextual variables. The particular contextual variables of interest are venue, sex, and level. Having established the research problem to determine the effects of sex, venue, and level on Icelandic domestic soccer performance, it is necessary to decide on a set of variables to represent performance in soccer. Soccer is arguably the most studied team sport in the performance analysis literature. Therefore, dependent variables used across multiple studies with varying purposes can be considered valid within the current investigation. Of particular interest are performance indicators that are associated with success in soccer. Shots, shots on target, the percentage of match time teams are in possession, the number of passes, and the percentage of successful passes differed between winning and losing teams in the 2017 men's African Cup of Nations [12] and the Greek soccer league [13]. Shots on target and possession percentage were also found to be important in the men's Chinese Super League [14], while winning men's Bundesliga matches is influenced by recovery of ball possession, number of passes, percentage of passes successfully played to a teammate, shots taken, and a lower number of ball losses [15]. Winning teams outperformed losing teams for passing accuracy and ball recovery while also losing possession less at the 2019 FIFA Women's World Cup [16]. Other factors associated with success are the use of set pieces [17], counter-attacks, and defensive variables [18]. Many of these variables, which are consistently used in research about soccer performance, are provided to practitioners in Icelandic soccer through the Wyscout platform (Hudl, Lincoln, NE). The performance indicators used in the current research are therefore derived from Wyscout data and include passing, shooting, possession variables, and variables on player duels. There are three research questions posed in the current investigation. The first question is to determine the variables that distinguish between home and away team performances in each combination of sex and division. The second question is to determine the variables that distinguish between men's and women's performances in the Bestadeild and Lengjudeild divisions. Finally, a model of match outcome is developed to determine the impact of performance indicators from home and away performances. The model also tests the contribution of sex and division to match outcome with respect to the home team.

2. MATERIALS AND METHODS

2.1. Research Design

This was an observational study using secondary source data from Wyscout. The soccer clubs agreed to the match statistics being provided on the Wyscout platform when they agreed to use it. The terms and conditions of the platform permit the data to be used for research purposes. The data source was validated against the authors' own manual video analysis using a set of 5 matches. The sex, division and venue effects were analysed during an initial descriptive study before a model of match outcome was developed. The research was approved by Reykjavik University Research Ethics Committee.

2.2. Matches

The 1,244 matches included in the current investigation were 484 from the Icelandic men's top division (Bestadeild Karla), 331 from the Icelandic women's top division (Bestadeild Kvenna), and 379 from the second tier league for men in Iceland (Lengjudeild Karla) played in the 2023 to 2025 seasons, as well as 50 matches from the second tier league for women in Iceland (Lengjudeild Kvenna) played in 2022. The matches from the 2023 to 2025 seasons were all matches in these leagues where the data can be accessed on the Wyscout platform, except the Lengjudeild play-off finals that were played at neutral venues. Wyscout did not cover the Lengjudeild Kvenna from 2023 to 2025, so matches from the 2022 season were the most recent matches that were available. The 50 Lengjudeild Kvenna matches were the only Lengjudeild Kvenna matches where data were provided on the Wyscout platform at the time of writing. There were 15 different teams represented in the Bestadeild Karla (with 12 teams in each season from 2023 to 2025) and 19 different teams in the Lengjudeild Karla (with 12 teams in each season from 2023 to 2025). There were 14 different teams represented in the Bestadeild Kvenna (with 10 teams in each season from 2023 to 2025) and 10 different teams in the Lengjudeild Kvenna (being the 10 teams in the 2022 season).

2.3. Variables

The following variables were considered for use in the current investigation:

- Number of passes
- Percentage of passes that were successfully played to a teammate
- Number of shots
- Percentage of shots that were on target
- Percentage of ball-in-play time that a team was in possession
- Number of ball losses
- Number of ball recoveries
- Number of duels engaged in
- Percentage of duels won by the team

The definitions of these variables are found in the Wyscout Glossary (https://dataglossary.wyscout.com/). There was an inconsistency in the Wyscout definitions for losses and recoveries in different thirds of the pitch. The definition of losses included the following text:

"A loss is recorded at the point where the player of the team actually loses possession of the ball. For non-passes, this would be equal to the point of his last action, but, for example, with an unsuccessful long pass, the loss will be recorded at the ending point of the pass, not at its starting point."

However, the definition for recoveries stated:

"A recovery is recorded at the point where the player of the team beginning the possession touches the ball. For example, with an unsuccessful long pass, the loss will be recorded at the starting point of the pass, and the recovery, at its ending point."

Thus, there was an inconsistency as to whether the start or end of a long pass was used as the location of a ball loss. Therefore, it was decided not to use the zones of ball losses or recoveries within the current research.

2.4. Reliability and Validity

The Wyscout data source used within the current investigation is a performance analysis data provider used by soccer leagues, clubs, coaches, analysts, and academics globally. The process used by Wyscout requires the events performed by each team within a match to be tagged by separate operators, with a third operator supervising the process and inspecting the match statistics produced [19]. Wyscout also uses automated and manual quality control processes to check its data [19]. The automated processes include checking events that are participated in by both teams, such as duels. The manual process involves checking match events that have been recorded. Both automatic and manual processes allow error detection, with error correction being done manually. It is noted that quality control is undertaken using a sample of matches. While the data collection and quality control processes used by Wyscout have been described [19], the level of reliability has not been reported. Therefore, there is a need to validate Wyscout data against data collected by a reliable video analysis process that applies the definitions and guidelines used by Wyscout.

The validation of Wyscout variables used in the current investigation consisted of two parts. Firstly, inter-operator reliability was determined for a manual tagging process undertaken by the authors. Separate systems developed in Nacsport Basic Plus (Nacsport, Gran Canaria, Spain) were used to analyse (a) passes and shots, (b) possession, (c) losses and recoveries, and (d) duels. Each of these systems was applied to a single match by two of the authors using Wyscout's definitions for events. Table **1** shows the results of the inter-operator agreement study for the manual tagging processes using percentage error [20]. Variables with percentage errors of less than 5% were considered to have good reliability. Two higher values occurred with variables derived from low-frequency variables: number of shots and the percentage of shots that were on target. One operator recorded 3 shots on target out of 13, while the other recorded 3 out of 12. Hence, the 8.0% error for the percentage of shots on target by the home team is due to a single instance that one operator counted as a shot, but the other operator did not. There was only one other variable with a percentage error of greater than 5% (the number of passes by the away team). However, this is considered acceptable when considered along with the number of passes played by the home team. The event lists for these observations were exported and processed to determine kappa values for the strength of inter-operator agreement. This was necessary as some disagreements at an event level may cancel others out during the calculation of percentage error. Shots on and off target ($\kappa = 0.941$) and successful and unsuccessful passes ($\kappa = 0.815$) had very good strengths of agreement. Duels won and lost ($\kappa = 0.793$), and ball losses and ball recoveries ($\kappa = 0.721$) had good strengths of agreement. A continuous time version of kappa revealed a very good strength of inter-operator agreement for possession and stoppage time ($\kappa = 0.908$).

Having established that the reliability of this manual tagging process was acceptable, the second part of the validation study compared Wyscout data with data recorded using the manual tagging process. Five matches were analysed using the set of four tagging systems developed in Nacsport Basic Plus; thus, 10 team performances were used in the validation study. These matches were two Bestadeild women's matches, two Bestadeild men's matches and one Lengjudeild men's match. Table **2** compares the values obtained during the video analysis with the corresponding values obtained from the Wyscout statistics. There was a good relative agreement between the values produced by Wyscout and those produced by the authors' manual tagging for all variables ($r > 0.9$) except losses and recoveries. The standard error of measurement for all variables was less than half of the standard deviation within the ten performances. Therefore, the variables are sufficiently reliable for the analytical goals of the study. The main disagreements between the Wyscout data and the corresponding values from manual tagging were for losses and recoveries. There was a systematic difference between the Wyscout values and those produced by the authors' video analysis, with Wyscout recording higher values for losses and lower values for recoveries.

Table 1. Inter-operator agreement of the author's manual tagging process.

Variable	Home Team			-	Away Team		
	Observer 1	Observer 2	% Error	-	Observer 1	Observer 2	% Error
Passes	435	453	4.1%	-	326	348	6.5%
%Successful passes	66.9%	66.7%	0.3%	-	62.6%	64.1%	2.4%
Shots	13	12	8.0%	-	11	11	0.0%
%Shots and target	23.1%	25.0%	7.9%	-	27.3%	27.3%	0.0%
%Possession	51.2%	52.1%	1.2%	-	48.6%	47.9%	1.2%
Losses	103	105	1.9%	-	128	122	4.8%
Recoveries	104	108	3.8%	-	91	92	1.1%
Duels	253	251	0.8%	-	253	251	0.8%
%Duels won	48.2%	47.8%	0.8%	-	49.0%	50.2%	2.4%

Table 2. Comparison of Wyscout and the author's manual tagging for 10 performances from 5 matches.

Variable	Observation (mean±SD)	Wyscout (mean±SD)	Pearson's r	Change in Mean	SEM
Passes	405.5±91.4	374.4±114.7	0.980	-31.1	20.7
%Successful passes	70.7±10.3	73.1±8.4	0.919	2.4	2.8
Shots	13.1±6.6	12.6±5.6	0.985	-0.5	1.0
%Shots on target	31.3±19.7	31.9±17.2	0.963	0.6	3.7
%Possession	50.0±8.1	50.0±8.4	0.979	0.0	1.2
Losses	111.3±25.8	131.5±29.6	0.846	20.2	10.6
Recoveries	107.5±22.3	90.6±16.7	0.844	-16.9	8.2
Duels	209.8±44.5	212.0±44.2	0.998	2.2	1.7
%Duels won	49.4±2.6	48.8±2.5	0.971	-0.6	0.4

Abbreviation: SEM = standard error of measurement.

When losses and recoveries are combined, the average value per team performance was 218.8 according to Wyscout and 222.1 according to the authors' video analysis. Some types of recovery recorded by the authors were classed as losses for the opposing team in Wyscout. This suggests that a consistent process may have been used by Wyscout to record losses and recoveries, and the change in the means seen in Table **2** has resulted from different interpretations of the Wyscout definitions by the authors.

2.5. Statistical Analysis

Shapiro-Wilk tests revealed that most variables violated the assumption of normality. Therefore, medians, lower and upper quartiles were used to describe the samples, and nonparametric tests were used to compare samples. Wilcoxon signed-rank tests were used to compare home and away performances within matches. This was done separately for men's and women's Bestadeild and Lengjudeild divisions, meaning that there would be four sets of comparisons between home and away performances. Therefore, a *p*-value of less than 0.0125 was required for statistical significance to minimise the risk of Type I error inflation. Mann-Whitney U tests were used to compare women's and men's matches; here the home and away team values were averaged for each match. This was done separately for Bestadeild and Lengjudeild matches. Given that there would be two sets of comparisons between females and males, *p*-values under 0.025 indicated a significant difference between sexes. Bestadeild matches were compared to Lengjudeild matches for women and men separately using Mann-Whitney U tests, with *p*-values under 0.025 indicating a significant difference due to two sets of league comparisons being done. Each Wilcoxon and Mann-Whitney U test was supported by a rank-biserial correlation (r_b), which is a non-parametric effect size. Absolute r_b values between 0.1 and 0.3 were interpreted as small effects, values from 0.3 to 0.5 were interpreted as medium effects, and values greater than 0.5 were interpreted as large effects.

A mixed-effects multinomial logistic regression was used to produce a predictive model of match outcome (home win, draw, or away win) in terms of the set of variables. The home and away team variables were included in each match record used in the mixed-effects multinomial logistic regression to avoid non-independence in the data. Home club, away club, and season were included as random effects because the data were from 19 women's teams and 27 men's teams, with all teams being represented in multiple matches. There were 16 numerical variables considered for entry into the mixed-effects multinomial logistic regression. One of these variables (the number of shots taken by the home team) had a single extreme outlier. This match was removed from the data used in the mixed-effects multinomial regression. Four of

the 120 pairs of numerical variables had absolute correlations of 0.8 or greater, suggesting strong multicollinearity in the data. It was decided to remove the percentage of duels won by the away team due to its high correlation with the percentage of duels won by the home team (r = -0.902). The percentage of possession time for the home team was removed due to its high absolute correlations with the number of passes played by the home team (r = 0.828) and the away team (r = -0.830). Finally, away ball losses were removed because they were highly correlated with home ball losses (r = 0.850). Prior to the mixed effects multinomial logistic regression, a series of Kruskal-Wallis H tests were applied to the data to compare home wins, draws, and away wins. This was done separately for the four leagues to determine if interactive effects needed to be included within the mixed effects multinomial logistic regression. A significant interactive effect was justified where a variable tended to increase significantly ($p < 0.0125$) between home wins and draws and between draws and away wins in one league, while decreasing significantly ($p < 0.0125$) between home wins and draws and between draws and away wins in another league. Sex and division were included as dichotomous predictors within the mixed-effects multinomial logistic regression. Nonparametric statistical tests were done in Jamovi version 2.3.38 (Jamovi, The Jamovi Project, Sydney, Australia). The mixed-effects multinomial logistic regression was done using the mblogit function from the mclogit package in R version 4.6.1 (Posit PBC, Boston, MA).

3. RESULTS

Table 3 shows that there was a single significant difference between the performances of the home and away teams within each of the four leagues. The greater number of ball losses by the away teams in the women's Lengjudeild had a medium effect, but the other significant differences here were small effects. Table 4 shows that men had a significantly higher percentage of successful passes, a lower number of losses and recoveries than women, with all of these differences being large effects. Men also did significantly fewer duels than women, with this being a large effect at the Bestadeild level and a medium effect at the Lengjudeild level. The percentage of passes successfully played to a teammate was significantly higher in the Bestadeild divisions for both sexes (small effect), with the other three significant differences between divisions only applying in the men's game.

Table 3. Home and away performances in the men's and women's Bestadeild and Lengjudeild divisions (median (lower quartile: upper quartile)).

Variable	Women's Soccer			-	Men's Soccer		
	Home	Away	p (r_b)	-	Home	Away	p (r_b)
Bestadeild	-	-	-	-	-	-	-
Passes	400 (437:472)	383 (329:447)	0.027 (0.14)	-	404 (338:475)	391 (325:459)	0.086 (0.09)
%Successful passes	72.2 (68.1:76.7)	71.1 (67.2:75.2)	0.017 (0.15)	-	80.1 (75.9:83.8)	79.6 (75.5:82.7)	0.093 (0.09)
Shots	14 (10:18)	12 (9:17)	0.013 (0.16)	-	13 (10:16)	12 (9:15)	0.033 (0.11)
%Shots and target	40.0 (29.4:50.0)	40.0 (30.0:50.0)	0.854 (0.01)	-	40.0 (29.4:50.0)	36.4 (27.1:46.1)	**0.001 (0.17)**
%Possession	51.5 (45.9:57.4)	48.5 (42.6:54.1)	**0.007 (0.17)**	-	51.1 (44.6:57.7)	48.9 (42.3:55.4)	0.054 (0.10)
Losses	144 (131:156)	145 (132:158)	0.093 (-0.11)	-	114 (104:126)	114 (104:125)	0.826 (0.01)
Recoveries	101 (95:110)	100 (91:109)	0.018 (0.15)	-	86 (78:94)	85 (77:93)	0.020 (0.12)
Duels	234 (210:254)	234 (210:254)	N/A	-	201 (184:222)	201 (184:222)	N/A
%Duels won	48.0 (45.5:50.8)	48.6 (45.8:51.3)	0.244 (-0.07)	-	48.2 (45.4:50.6)	47.4 (45.0:50.0)	0.110 (0.08)
-	-	-	-	-	-	-	-
Lengjudeild	-	-	-	-	-	-	-
Passes	391 (348:475)	366 (333:410)	0.183 (0.22)	-	392 (337:462)	373 (324:440)	0.016 (0.14)
%Successful passes	71.5(66.7:74.9)	69.2 (66.1:73.4)	0.220 (0.20)	-	78.6 (74.5:82.1)	78.2 (73.5:81.3)	0.057 (0.11)
Shots	13 (8.3:17)	13 (9:16)	0.902 (0.02)	-	13 (10:16)	12 (9:15)	**<0.001 (0.20)**
%Shots and target	41.4 (33.3:52.2)	46.1 (37.5:50.0)	0.391 (-0.14)	-	38.5 (28.6:50.0)	36.0 (25.0:47.2)	0.093 (0.10)
%Possession	51.8 (46.4:55.7)	48.2 (44.3:53.6)	0.172 (0.22)	-	51.5 (45.0:57.4)	48.5 (42.6:55.0)	0.018 (0.14)
Losses	145 (134:156)	151 (139:159)	**0.008 (-0.44)**	-	116 (104:129)	117 (106:127)	0.111 (-0.10)
Recoveries	106 (98:117)	103 (94:111)	0.137 (0.24)	-	85 (78:93)	84 (75:92)	0.093 (0.10)
Duels	242 (218:263)	242 (218:263)	N/A	-	214 (192:235)	214 (192:235)	N/A
%Duels won	47.3 (45.7:49.3)	49.9 (46.8:51.8)	0.032 (-0.35)	-	48.2 (45.7:51.0)	48.0 (45.2:50.7)	0.233 (0.10)

Note: Home and away performances were compared using Wilcoxon tests (α = 0.0125).

Table 4. Women's and men's performances in the Bestadeild and Lengjudeild (median (lower quartile: upper quartile)).

Variable	Bestadeild			-	Lengjudeild		
	Women	Men	p (r_b)	-	Women	Men	p (r_b)
Passes	401 (379:435)	403 (372:435)*	0.737 (0.01)	-	391 (362:411)	388 (356:421)	0.849 (0.02)
%Successful passes	71.6 (68.9:75.0)*	79.4 (76.7:82.0)*	**<0.001 (0.76)**	-	69.6 (66.7:72.1)	78.1 (75.1:80.7)	**<0.001 (0.81)**
Shots	14 (11.5:16)	13 (10.5:14.5)	**<0.001 (0.18)**	-	13.3 (11:14.5)	13 (10.5:15)	0.753 (0.03)
%Shots and target	39.4 (32.1:47.2)	38.3 (32.2:45.6)	0.182 (0.06)	-	42.7 (35.1:47.7)	37.7 (31.0:45.8)	**0.011 (0.22)**
Losses	144 (133:157)	114 (105:124)	**<0.001 (0.79)**	-	148 (134:158)	116 (107:128)	**<0.001 (0.80)**
Recoveries	101 (94:157)	85 (79:93)	**<0.001 (0.69)**	-	105 (99:112)	84.5 (78:91.5)	**<0.001 (0.79)**
Duels	234 (210:254)	201 (184:222)	**<0.001 (0.51)**	-	242 (218:263)	214 (192:235)*	**<0.001 (0.48)**
%Duels won	48.3 (47.8:48.8)	47.9 (47.3:48.5)	**<0.001 (0.29)**	-	48.3 (47.6:49.1)	48.1 (47.5:48.6)*	0.066 (0.16)

Note: Mann-Whitney U tests compared men's and women's performances within divisions (α = 0.025).
Mann-Whitney U tests also compared Bestadeild and Lengjudeild divisions within women's and men's soccer performances (α = 0.025).
* Mann-Whitney U test reveals a significantly greater value than the value for the other division within the given sex.

Kruskal-Wallis H tests did not reveal any variables warranting inclusion of interactive effects involving sex or division. Therefore, the multinomial logistic regression model summarised in Table 5 included sex and division as dichotomous variables without them being used to include interactive effects. The overall model test showed that including the predictor variables significantly improved the model fit (χ^2_{41} = 2069.8, p < .001, McFadden's R^2 = 0.257). Table 5 shows that the number of shots taken and the percentage of shots that were on target significantly distinguished between home wins, draws, and away wins. Home teams played significantly fewer passes when they won and drew than when they lost. Matches were significantly more likely to result in home wins than away wins when the home team's passing accuracy was high, the away team's passing accuracy was low, and the home team's ball losses were low.

Table 5. Mixed effects multinomial logistic regression results.

Variable	B	SE	Z	p	Odds Ratio	95% Confidence Interval	
						Lower	Upper
Home Win v Away Win as reference level	-	-	-	-	-	-	-
Intercept	0.227	2.801	0.081	0.936	1.254	0.005	303.831
Home team passes	-0.006	0.002	-3.144	**0.002**	0.994	0.991	0.998
Away team passes	0.003	0.002	1.410	0.158	1.003	0.999	1.006
Home team %successful passes	0.079	0.029	2.701	**0.007**	1.082	1.022	1.146
Away team %successful passes	-0.064	0.029	-2.248	**0.025**	0.938	0.886	0.992
Home team shots	0.158	0.020	7.779	**<0.001**	1.171	1.125	1.219
Away team shots	-0.148	0.020	-7.401	**<0.001**	0.863	0.830	0.897
Home team %shots on target	0.071	0.006	11.794	**<0.001**	1.074	1.061	1.087
Away team %shots on target	-0.060	0.006	-10.176	**<0.001**	0.942	0.931	0.953
Home team losses	-0.025	0.009	-2.795	**0.005**	0.976	0.959	0.993
Home team recoveries	0.015	0.011	1.379	0.168	1.015	0.994	1.037
Away team recoveries	0.015	0.011	1.338	0.181	1.015	0.993	1.037
Duels	-0.005	0.006	-0.876	0.381	0.995	0.985	1.006
Home team %duels won	0.011	0.010	1.120	0.263	1.011	0.992	1.031
Female v Male as reference level	-0.027	0.277	-0.097	0.922	0.973	0.565	1.676
Lengjudeild v Bestadeild as reference level	-0.300	0.186	-1.617	0.106	0.741	0.515	1.066
-	-	-	-	-	-	-	-
Draw v Away Win as reference level	-	-	-	-	-	-	-
Intercept	-0.567	2.902	-0.195	0.845	0.567	0.002	167.491
Home team passes	-0.005	0.002	-2.628	**0.009**	0.995	0.991	0.999
Away team passes	0.000	0.002	0.165	0.869	1.000	0.997	1.004
Home team %successful passes	0.047	0.030	1.549	0.121	1.048	0.988	1.111
Away team %successful passes	-0.031	0.030	-1.049	0.294	0.969	0.914	1.028
Home team shots	0.080	0.021	3.743	**<0.001**	1.083	1.039	1.129
Away team shots	-0.106	0.021	-5.114	**<0.001**	0.899	0.863	0.937

(Table 5) contd.....

Variable	B	SE	Z	p	Odds Ratio	95% Confidence Interval	
						Lower	Upper
Home team %shots on target	0.026	0.006	4.275	**<0.001**	1.027	1.014	1.039
Away team %shots on target	-0.038	0.006	-6.324	**<0.001**	0.963	0.952	0.974
Home team losses	-0.013	0.009	-1.368	0.171	0.987	0.970	1.005
Home team recoveries	0.016	0.011	1.374	0.169	1.016	0.993	1.039
Away team recoveries	0.012	0.012	1.030	0.303	1.012	0.989	1.035
Duels	0.004	0.006	0.783	0.434	1.005	0.993	1.016
Home team %duels won	-0.008	0.010	-0.777	0.437	0.992	0.972	1.012
Female v Male as reference level	0.485	0.295	1.645	0.100	1.623	0.911	2.892
Lengjudeild v Bestadeild as reference level	-0.062	0.192	-0.324	0.746	0.940	0.645	1.369

Note: The α level used was 0.05. SE = standard error.

4. DISCUSSION

The purpose of the current investigation was to analyse venue, sex and level effects within Icelandic domestic soccer and to determine performance indicators associated with match outcome. The first main finding was that match outcome predominantly depends on shooting variables, but that passing performance also distinguishes home and away wins. The second main finding was that sex has a larger effect on soccer performance than division or venue.

There were few significant venue effects, with none applying to all four combinations of sex and division. Home teams had more possession than away teams; significantly so in the women's Bestadeild (small effect). This may be explained by familiarity with the playing arena, especially where the away team does not normally play on the home team's playing surface. The majority of teams in the women's Bestadeild use artificial surfaces, with the others using natural grass. The playing surface has an impact on players' technique [21], which may in turn impact their ability to maintain possession. This may also explain why away teams in the women's Lengjudeild suffer significantly more ball losses when away from home than at home (medium effect). A further explanation of lower possession and more ball losses away from home may be due to lack of player availability. The Lengjudeild level is less professional than the Bestadeild divisions, especially in the women's game. Commitments away from soccer may make part-time soccer players less available for away matches than for home matches.

The number of shots taken was significantly greater for home than away teams in the men's Lengjudeild (small effect). Encouragement from home supporters is a source of home advantage [6] that may help players create more scoring opportunities. The percentage of shots that were on target was also greater for home teams than away teams in the men's Bestadeild (small effect). Familiarity with the home stadium environment is a source of home advantage in soccer [8]. Players who play and train regularly at their home venue may develop a clearer understanding of the playing space and the location of goalposts relative to surrounding architectural features such as stands and floodlight towers. This spatial awareness may improve the speed of decision-making and improve shot accuracy. Travel fatigue may also impact performance [7]. Although the matches within the current study are all played within Iceland, players may experience travel fatigue due to weather conditions occasionally disrupting both road and air travel. Fatigue can compromise shooting technique, which may in turn reduce the accuracy of shots.

The lack of home advantage with respect to shooting accuracy in women's soccer may be attributed to a lower competitive balance within the women's game in Iceland than in the men's game. Specifically, there is a larger gap in points per game between the top three teams and bottom three teams in the women's leagues despite these leagues only having 10 teams and the men's divisions having 12 teams. Thus, performance of higher quality women's teams may be less affected by venue than in the men's game where there is a greater strength in depth. Shooting accuracy may be more important in the men's game, especially as scoring the first goal in a game can interact with venue effect [4].

There were significant differences with medium to large effects between men's and women's matches at both Bestadeild and Lengjudeild levels. The lower percentage of passes that were successful in women's matches, together with the greater number of duels, ball losses, and ball recoveries, suggests that possessions may be broken up more and hence shorter in the women's game. Previous research has found that male players have greater physical strength than female players [11]. This may allow male players to play the ball more accurately over further distances, giving them more options to find a teammate than female players. Previous research has also found that male players have greater sprinting ability than female players [2], which may allow them to reach balls that may go out of play in the women's game. This may explain the reduced number of ball losses breaking up possessions in the men's game to a greater extent than in women's soccer. Alternatively, the lower percentage of successful passes in the women's game may be due to differences in technical development of female and male players in Iceland.

The differences in shooting between men's and women's matches depend on the division the matches are in. Women took significantly more shots than men in the Bestadeild divisions (large effect), but there was no significant difference in the percentage of shots that were

on target. However, this did not translate to more goals in the women's Bestadeild than in the men's Bestadeild; the average number of goals per game in the men's Bestadeild was 3.44 over the 2023, 2024 and 2025 seasons compared to 3.27 for the women's Bestadeild. This might be explained by differing locations from where shots are attempted. For example, shooting from inside the penalty area is more productive than shooting from elsewhere [22]. By contrast, in the Lengjudeild divisions, the number of shots taken was similar between men and women, but women got a significantly greater percentage of shots on target (small effect). This, combined with goalkeepers being smaller in women's soccer [23], resulted in a greater number of goals in women's Lengjudeild matches over the 2023, 2024 and 2025 seasons (3.93 per match) than in the men's Lengjudeild (3.46 per match).

The only significant level effect that applied in both men's and women's matches was that passing accuracy was significantly higher in the Bestadeild divisions (small effects). This may be explained by higher levels of soccer involving better positional play and technical execution [24]. The only other significant level effects were in the men's matches. Significantly more passes were played in men's Bestadeild matches than in men's Lengjudeild matches (small effect). This may be due to a higher passing rate in the Bestadeild or players at higher levels opting to use frequent short passes rather than long passes [25]. The significantly fewer duels in men's Bestadeild matches (small effect) might be due to more accurate passing and movement, making it more difficult for teams to challenge for the ball when out of possession. Previous research has found that higher levels of soccer involve more high-speed running when teams do not have the ball [26]. Where passing accuracy is lower at lower levels of soccer, opponents do not need to do as much high-speed running to be able to reach and challenge opponents with the ball. Where duels do occur, more are won by one team or the other in men's Lengjudeild than in men's Bestadeild matches. This may indicate greater competition at higher levels of soccer, with the outcomes of duels being less clear. The main level effect on match outcome is that there was less home advantage than at higher levels of the game. This may result from smaller audiences resulting in less crowd support effects [27].

The mixed-effects multinomial logistic regression model of match outcome distinguished wins and draws from losses in terms of process indicators for the home and away teams within matches, whether the match was a men's or women's match, and the division the match was played in. The number of shots taken and the percentage of these that were on target were significant predictors of match outcome. This agrees with previous research on soccer [28]. However, the current results reveal that the odds ratios for winning compared to losing are more pronounced for the number of shots than the percentage of shots on target in Icelandic domestic soccer. This is in contrast to previous research on the FIFA women's World Cup that found that shooting quality was more important to winning than the number of shots taken [16].

The number of passes was negatively associated with positive match outcomes, but the percentage of passes that successfully reached a teammate was positively associated with positive match outcomes. This may be explained by UEFA association ranking coefficients for the Icelandic leagues (32nd in Europe for the men's league and 16th in Europe for the women's league). Shorter direct passing sequences are more common at lower levels of soccer than at higher levels [29].

While passing accuracy was not as highly associated with match outcome as making a relatively low number of passes, passing accuracy by the home team was a significant predictor of a home win. Successful passing is central to maintaining possession, ball progression, and control. Elite teams tend to exhibit higher passing accuracy, especially in the opponent's half, which reflects both technical execution and decision-making under pressure [30]. The impact of passing accuracy on match outcome is connected to lower ball losses, which are also a predictor of winning. Reduced ball losses are an area of performance that reflects structural and tactical control of the match [31].

5. STUDY LIMITATIONS

There are some limitations to the current research. Firstly, the data came from 19 women's clubs and 27 men's clubs, with each team being involved in multiple matches. Secondly, the sample of women's Lengjudeild matches was smaller than those of the other leagues, and the data came from 2022 instead of the seasons since. Although the structure of this league has remained the same from 2022 to 2025 inclusive, the 2022 season may have differed from subsequent seasons in terms of tactical approaches and overseas players playing in Iceland. Thirdly, the validation study showed a lower level of agreement for losses and recoveries between Wyscout and the authors' own video analysis than was achieved for other variables. This independent validation of Wyscout variables is useful evidence about the quality of Wyscout data that may benefit other researchers in the future. However, it is worth noting that the validation study is based on a small set of five matches and that the scope of the validation study was for the use of Wyscout within Icelandic domestic soccer.

CONCLUSION

In conclusion, the current investigation has found venue, division, and sex effects on Icelandic domestic soccer performance. Venue effects varied according to sex and division, with home teams having more possession in the women's top division, a greater percentage of shots on target in the men's top division, fewer ball losses in the second tier of women's soccer, and more shots in the second tier of men's soccer. Passing accuracy was higher in the men's matches than the women's matches and was higher in top-tier divisions for both men and women. Success in Icelandic domestic soccer is associated with shooting and passing accuracy. However, the number of passes played by teams is negatively associated with

successful match outcomes. This suggests that a direct possession style with fewer passes may be better in Icelandic domestic soccer than a more elaborate possession style with a greater number of passes. Those involved in Icelandic domestic soccer should be informed about match statistics associated with positive match outcomes, and the values of performance indicators that apply in particular divisions.

AUTHORS' CONTRIBUTIONS

The authors confirm their contributions to the paper as follows: Þ.R.H.: Collected and checked data, analysed the data to compare match statistics between home and away matches, men's and women's matches, and matches in different divisions. He also wrote the parts of the introduction and discussion on venue, sex, and league-level effects and contributed to the validation of Wyscout data; R.L.S.: Collected and checked data, and modelled the relationship between match statistics and match outcome. She also wrote parts of the introduction and discussion about factors associated with match outcome and contributed to the validation of Wyscout data; P.G.O'.D.: Supervised the research, contributed to the validation of Wyscout data, combined the two types of analysis, integrated introduction and discussion points, and reviewed the manuscript. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

FIFA = Fédération Internationale de Football Association (Federation of Inernational Football Associations)

UEFA = Union of European Football Associations

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study involves passive human participants. The study was granted ethical approval by Reykjavik University Research Ethics Committee (RUREC), Iceland, project number 2026007.

HUMAN AND ANIMAL RIGHTS

All procedures involving human participants were conducted in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

The players and squads were passive human participants with respect to the study. They consented to team performance statistics being made available by Wyscout when accepting Wyscout as an analysis provider for the league. The terms and conditions of the Wyscout platform permit research to be published by organisations and individuals who have subscribed to the platform.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article is available from Wyscout (HUDL, Lincoln, NE) to Wyscout subscribers.

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CONFLICT OF INTEREST

The author(s) declare no conflict of interest, financial or otherwise.

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