# IGOID GROUP FIFA RESEARCH INSTITUTE

# DBU PROJECT PLAYER EVALUATION OF DANISH ARTIFICIAL TURF PITCHES CONSULTING WORK AND DATA ANALYSIS

#### **ANNEX I. DETALIED TABLES**

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# **PART 1. Descriptive Analysis**

Table 1. Descriptive statistics – sample characteristics

|                    | N     | Mean     | SD       | Min | Max     |
|--------------------|-------|----------|----------|-----|---------|
| Gender             |       |          |          |     |         |
| Men                | 3,614 | .8433868 | .363486  | 0   | 1       |
| Women              | 3,614 | .1566132 | .363486  | 0   | 1       |
| Age Group          |       |          |          |     |         |
| Kids (U12-14)      | 3,614 | .3406198 | .4739832 | 0   | 1       |
| Youth (U16-19)     | 3,614 | .3500277 | .4770443 | 0   | 1       |
| Senior             | 3,614 | .2374101 | .4255545 | 0   | 1       |
| M+ and K+          | 3,614 | .0719424 | .2584283 | 0   | 1       |
| Pitch Infill       |       |          |          |     |         |
| Cork               | 3,614 | .2036525 | .4027692 | 0   | 1       |
| Cork/Olive         | 3,614 | .0536801 | .2254166 | 0   | 1       |
| Non infill         | 3,614 | .0146652 | .1202253 | 0   | 1       |
| SBR                | 3,614 | .4216934 | .4938983 | 0   | 1       |
| Sand               | 3,614 | .3063088 | .4610234 | 0   | 1       |
| Footwear           |       |          |          |     |         |
| Græs (FG)          | 3,614 | .3539015 | .4782452 | 0   | 1       |
| Kunst (AG)         | 3,614 | .2888766 | .4533032 | 0   | 1       |
| Multi (AG, FG)     | 3,614 | .3572219 | .4792473 | 0   | 1       |
| Match result       |       |          |          |     |         |
| Draw               | 3,614 | .1192584 | .3241372 | 0   | 1       |
| Win                | 3,614 | .4667958 | .4989653 | 0   | 1       |
| Loss               | 3,614 | .4139458 | .4926072 | 0   | 1       |
| Precipitation (mm) | 3,610 | .0135272 | .059343  | 0   | .461111 |

Table 2. Descriptive statistics – variables of interest

|                         | N     | Mean     | SD       | Min | Max |
|-------------------------|-------|----------|----------|-----|-----|
| Experience              | 3,613 | 2.209244 | 1.331305 | 0   | 4   |
| <b>Ball Bounce</b>      | 3,614 | 1.013005 | .6212379 | 0   | 2   |
| Running                 | 3,613 | 1.145585 | .6883427 | 0   | 2   |
| <b>Rolling Passes</b>   | 3,614 | 1.291644 | .6601645 | 0   | 2   |
| Abrasion                | 3,614 | .5066408 | .5000251 | 0   | 1   |
| <b>Direction Change</b> | 3,613 | .6036535 | .4892057 | 0   | 1   |
| Injuries                | 3,614 | .3754842 | .4843147 | 0   | 1   |

Figure 1. Graph bar: Experience by type of infill

Variable definition: 0 "Very bad" 1 "Bad" 2 "Normal" 3 "Good" 4 "Very good"

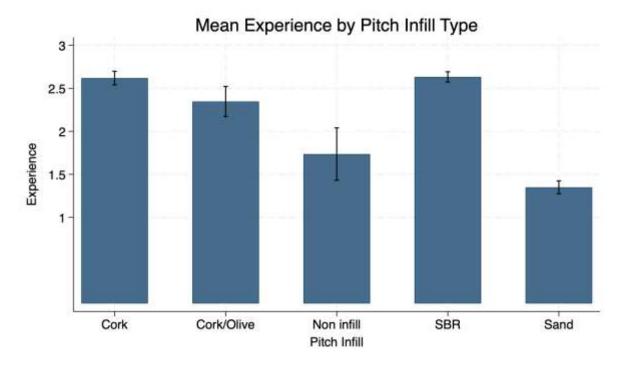


Figure 2. Graph bar: Ball Bounce by type of infill

Variable definition: 0 "Low" 1 "Normal" 2 "High"

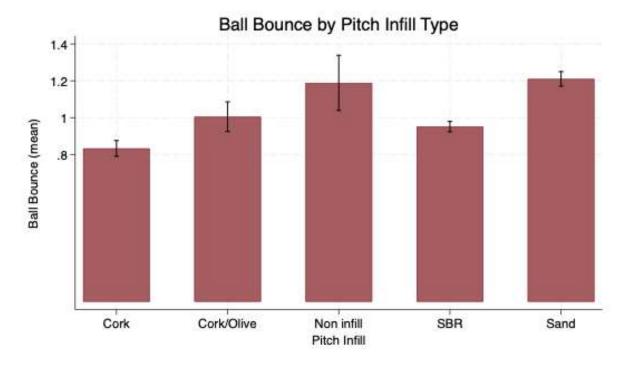


Figure 3. Graph bar: Running by type of infill

Variable definition: 0 "Soft" 1 "Normal" 2 "Hard"

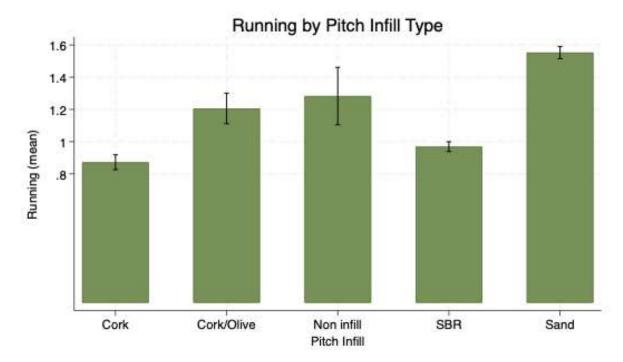


Figure 4. Graph bar: Rolling Passes by type of infill

Variable definition: Rolling Passes 0 "Slow" 1 "Normal" 2 "Fast"

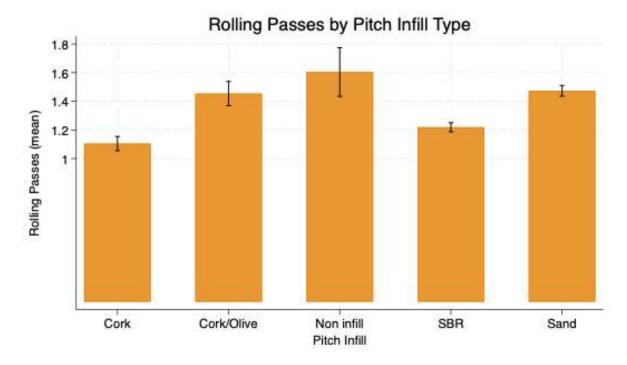


Figure 5. Graph bar: Direction Change by type of infill

Variable definition: Direction Change 0 "Liso" 1 "Normal" (Meaning unclear)

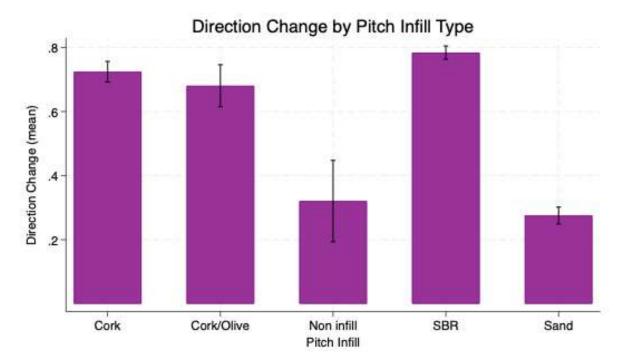


Figure 6. Graph bar: Abrasion by type of infill

Variable definition: Abrasion 0 "No" 1 "Yes"

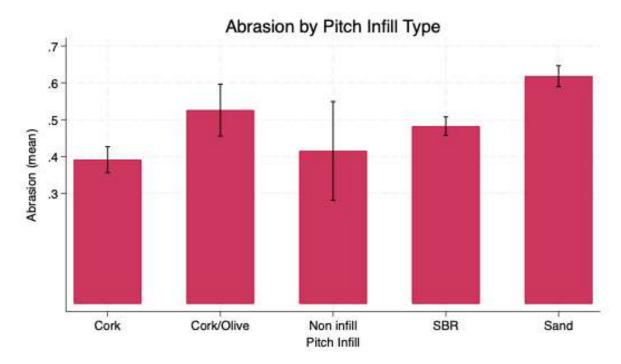
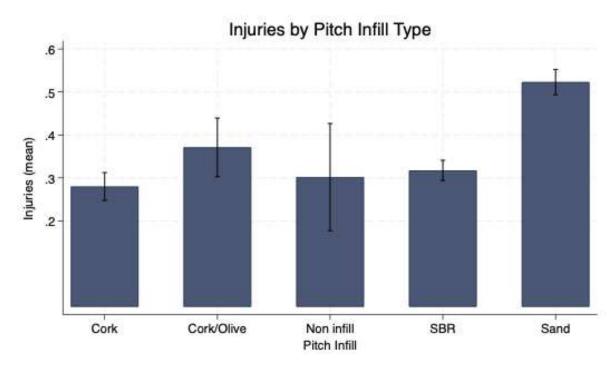


Figure 7. Graph bar: Injuries by type of infill

Variable definition: Injuries 0 "No" 1 "Yes"



## **PART 2. Main Analysis (logits)**

In this section, we present the results of the full logit models, including all control variables and robust standard errors (Tables 1.1, 2.1, and 3.1). We follow a stepwise regression approach to show the influence of other control variables and how they may affect the relationship (Models 1-6). Model 1 is a naive model, and Model 6 is the full model with all the control variables. Model 7 is the full model that addresses within-pitch correlation using clustered standard errors (26 pitches -relatively low N). Coefficients can be interpreted directly as the positive or negative probability of answering yes in the three dependent variables: abrasion, direction change, and injuries.

Additionally, we display graphs to easily visualize the influence of the infill type on the probability of answering yes in the three dependent variables: abrasion, direction change, and injuries. The results of the graphs are derived from Model 7 in the respective table, which are robust to the inclusion of player characteristics (gender, age), match conditions (result, precipitation), and equipment (footwear type).

#### 1. Abrasion

Table 1.1: Marginal Effects from Logit Model – Abrasion (0 "No" 1 "Yes")

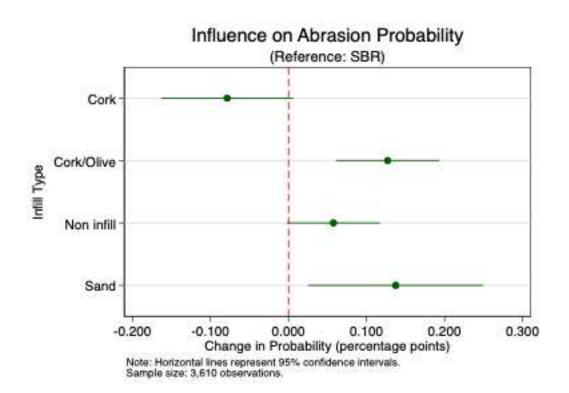
| SBR Cork         Ref0.091*** -0.097*** -0.079*** -0.127*** -0.137** -0.127*** -0.102*** -0.10                                  |                     | Model 1       | Model 2       | Model 3       | Model 4       | Model 5       | Model 6       | Model 7       |
|--|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Cork         -0.091****         -0.097****         -0.017***         -0.081***         -0.079***         -0.079**         -0.079**         -0.079**         -0.079**         -0.079**         -0.079**         -0.079**         -0.079**         -0.043         (0.032)         (0.022)         (0.022)         (0.022)         (0.022)         (0.023)         (0.034)           Non infill         -0.067         -0.050         0.004         0.057         0.057         0.058         0.058*           Sand         0.136***         0.133***         0.137***         0.137***         0.137***         0.137**         0.137**         0.137**         0.137**         0.137**         0.137**         0.137**         0.130**         0.137***         0.137**         0.137**         0.137**         0.137**         0.137**         0.137**         0.137**         0.137**         0.137***         0.137** <t< td=""><td>SBR</td><td>Ref.</td><td>Ref.</td><td>Ref.</td><td>Ref.</td><td>Ref.</td><td>Ref.</td><td>Ref.</td></t<>   | SBR                 | Ref.          |
| Cork/Olive         (0.022)         (0.022)         (0.022)         (0.022)         (0.022)         (0.043)         (0.041)         0.068*         0.128***         0.127***         0.058*         0.058*         0.058*           Non infill         -0.067         -0.050         0.004         0.057         0.057         0.058         0.058*         0.058*           Sand         0.136****         0.133****         0.131***         0.137***         0.137***         0.137**         0.137**         0.137**         0.137**         0.137***         0.137***         0.137***         0.137***         0.137***         0.137***         0.137***         0.137***         0.137***         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163****         0.163**   |                     |               |               |               |               |               | -0.079***     |               |
| Non infill   |                     | (0.022)       |               | (0.022)       | (0.022)       |               | (0.022)       | (0.043)       |
| Non infill   | Cork/Olive          | 0.043         | 0.061         | $0.068^{*}$   | 0.128***      | 0.127***      | 0.127***      | $0.127^{***}$ |
| Sand         (0.069) (0.067) (0.136*** 0.133*** 0.131*** 0.137*** 0.139*** 0.139*** 0.137*** 0.137*** 0.139*** 0.137*** 0.137*** 0.139*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.137*** 0.107***         (0.019) (0.019) (0.019) (0.019) (0.019) (0.019) (0.057)           Græs (FG)         Ref. Ref. Ref. Ref. Ref. Ref. Ref. Ref.   |                     | (0.038)       | (0.038)       | (0.037)       | (0.036)       | (0.036)       | (0.036)       | (0.034)       |
| Sand         0.136*** (0.019)         0.131*** (0.019)         0.131*** (0.019)         0.137*** (0.019)         0.137*** (0.019)         0.137*** (0.019)         0.137*** (0.019)         0.137*** (0.057)           Græs (FG)         Ref.         Ref.         Ref.         Ref.         Ref.         Ref.         Ref.         Ref.         0.165**** (0.163**** (0.163****)         0.163**** (0.020)         (0.022)         (0.023)         (0.023)         (0.023)         (0.023)         (0.023)         (0.023)         (0.022)         (0.022)         (0.022)         (0.022)         <  | Non infill          | -0.067        | -0.050        | 0.004         | 0.057         | 0.057         | 0.058         | $0.058^{*}$   |
| Græs (FG) Græs (FG) Ref. Kunst (AG) (0.019) (0.019) (0.019) (0.020) (0.020) (0.020) (0.019) (0.019) (0.019) (0.019) (0.019) (0.019) (0.010) (0.010) (0.019) (0.010) (0.010) (0.010) (0.010) (0.021) (0.022) (0.022) (0.022) (0.022) (0.024) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.035) Loss     Constant   Constant |                     | (0.069)       |               | (0.070)       | (0.073)       |               |               |               |
| Græs (FG)         Ref.         0.163***         0.103***         0.103***         0.103***         0.103***         0.103***         0.103***         0.103***         0.103***         0.103***         0.103***         0.102***         0.102***         0.102***         0.102***         0.102***         0.102***         0.102***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.126***         0.02   | Sand                | $0.136^{***}$ | 0.133***      | 0.131***      | 0.137***      | $0.139^{***}$ | $0.137^{***}$ | $0.137^{**}$  |
| Kunst (AG)         0.172***         0.169***         0.167***         0.165***         0.163***         0.163***           Multi (AG, FG)         0.095***         0.099***         0.105***         0.104***         0.103***         0.103***           Men         Ref.         Ref. <td></td> <td></td> <td>(0.019)</td> <td></td> <td>(0.019)</td> <td>(0.019)</td> <td>(0.019)</td> <td>(0.057)</td>  |                     |               | (0.019)       |               | (0.019)       | (0.019)       | (0.019)       | (0.057)       |
| Kunst (AG)         0.172****         0.169****         0.167****         0.165****         0.163***         0.163***           Multi (AG, FG)         0.095****         0.099***         0.105***         0.104***         0.103***         0.103***           Men         Ref.         Ref   | Græs (FG)           |               | Ref.          |               | Ref.          |               | Ref.          | Ref.          |
| Multi (AG, FG)       (0.020) (0.020) (0.020) (0.020) (0.020) (0.020) (0.020) (0.032) (0.019)       (0.019) (0.019) (0.019) (0.019)       (0.019) (0.019) (0.019)       (0.019) (0.019) (0.019)       (0.019) (0.026)         Men       Ref. (0.020) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023) (0.023)       (0.021) (0.022) (0.022) (0.023) (0.023) (0.036)         Senior       Ref. (0.022) (0.022) (0.022) (0.022) (0.022) (0.022) (0.024) (0.024)       Ref. (0.022) (0.022) (0.022) (0.022) (0.024) (0.024)         Youth (U16-19)       0.001 (0.022) (0.022) (0.022) (0.022) (0.023)       (0.037)         M+ and K+       0.042 (0.034) (0.034) (0.034) (0.034) (0.075)         Win       Ref. (0.024) (0.024) (0.026) (0.026) (0.025)         Draw       Ref. (0.026) (0.026) (0.026) (0.035)         Loss       0.066*** (0.026) (0.026) (0.035)         Precipitation (mm)       0.085 (0.046) (0.017) (0.017) (0.011)         Observations       3614 (3614) (3614) (3614) (3614) (3614) (3610)  | ` '                 |               | $0.172^{***}$ | $0.169^{***}$ | $0.167^{***}$ | 0.165***      | 0.163***      | 0.163***      |
| Men         Ref. volumen   | ` ,                 |               | (0.020)       | (0.020)       | (0.020)       | (0.020)       | (0.020)       | (0.032)       |
| Men         Ref. volumen   | Multi (AG, FG)      |               | 0.095***      | 0.099***      | 0.105***      | 0.104***      | 0.103***      | 0.103***      |
| Women       -0.106**** (0.023)       -0.105**** (0.023)       -0.102**** (0.023)       -0.102**** (0.036)         Senior       Ref.       <  |                     |               | (0.019)       | (0.019)       |               | (0.019)       |               |               |
| Women       -0.106**** (0.023)       -0.105**** (0.023)       -0.102**** (0.023)       -0.102**** (0.036)         Senior       Ref.       <  | Men                 |               |               | Ref.          | Ref.          | Ref.          | Ref.          | Ref.          |
| Color   Ref.   |                     |               |               | -0.106***     | -0.105***     |               | -0.102***     | -0.102***     |
| Kids (U12-14)       -0.126***  |                     |               |               |               |               |               | (0.023)       | (0.036)       |
| Kids (U12-14)       -0.126***  | Senior              |               |               |               | Ref.          | Ref.          | Ref.          | Ref.          |
| Youth (U16-19)  Youth (U16-19)  M+ and K+  Draw  Loss  Precipitation (mm)  Precipitation (mm)  Observations  3614  3614  3614  3614  10.0022  (0.022)  (0.022) (0.022) (0.022) (0.022) (0.022) (0.022) (0.037)  0.042  -0.042  -0.035 -0.035 -0.035 -0.035  0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.034) (0.046* 0.046* 0.046* 0.046* 0.068*** 0.068*** (0.017) (0.017) (0.017) (0.0134)  Observations  3614  3614  3614  3614  3614  3614  3614  3610  3610  2373.42  |                     |               |               |               | -0.126***     | -0.126***     | -0.126***     | -0.126***     |
| Youth (U16-19)       0.001       -0.001       -0.000       -0.000       -0.000         M+ and K+       0.042       (0.022)       (0.022)       (0.023)       (0.037)         Win       Ref.       Ref.       Ref.       Ref.         Draw       0.046*       0.046*       0.046*       0.046*         Loss       0.066***       0.066***       0.068***       0.068***         Precipitation (mm)       0.085       0.085       0.085         Observations       3614       3614       3614       3614       3614       3614       3610       3610         Log likelihood       -2454.46       -2418.89       -2408.13       -2383.78       -2376.25       -2373.42       -2373.42   | ()                  |               |               |               |               | (0.022)       | (0.022)       |               |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Youth (U16-19)      |               |               |               | ` /           | ,             | , ,           | ` /           |
| M+ and K+       -0.042 (0.034)       -0.035 (0.035)       -0.035 (0.035)       -0.035 (0.034)       -0.035 (0.034)       -0.035 (0.075)         Win Draw       Ref. Ref. Ref. Ref. (0.046*)       Ref. (0.026) (0.026)       0.046* (0.026)       0.035)         Loss       0.066*** (0.017)       0.068*** (0.017)       0.0017)       0.0017)         Precipitation (mm)       0.085 (0.142)       0.0134)         Observations       3614 (0.134)       3614 (0.134)       3614 (0.134)         Log likelihood       -2454.46 (0.2418.89)       -2408.13 (0.2383.78)       -2376.25 (0.25)       -2373.42 (0.2373.42)   | ,                   |               |               |               |               |               |               |               |
| Win       Ref.       Ref.       Ref.       Ref.       Ref.       0.046*       0.046*       0.046*       0.046*       0.046*       0.046*       0.046*       0.046*       0.026)       (0.026)       (0.026)       (0.035)       0.068***       0.068***       0.068***       0.068***       0.085*       0.085*       0.085*       0.085*       0.0142)       0.134)         Observations       3614       3614       3614       3614       3614       3610       3610         Log likelihood       -2454.46       -2418.89       -2408.13       -2383.78       -2376.25       -2373.42       -2373.42   | M+ and K+           |               |               |               | ,             | ,             | ` /           | ` /           |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                     |               |               |               | (0.034)       | (0.034)       | (0.034)       | (0.075)       |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Win                 |               |               |               |               | Ref.          | Ref.          | Ref.          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                     |               |               |               |               |               |               |               |
| Loss $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                     |               |               |               |               |               | (0.026)       |               |
| Precipitation (mm)  Observations 3614 3614 3614 3614 3614 3614 3610 3610  Log likelihood -2454.46 -2418.89 -2408.13 -2383.78 -2376.25 -2373.42 -2373.42  | Loss                |               |               |               |               | 0.066***      | 0.068***      | 0.068***      |
| Observations         3614         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -2454.46         -2418.89         -2408.13         -2383.78         -2376.25         -2373.42         -2373.42   |                     |               |               |               |               |               |               |               |
| Observations         3614         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -2454.46         -2418.89         -2408.13         -2383.78         -2376.25         -2373.42         -2373.42   | Precipitation (mm)  |               |               |               |               |               |               |               |
| Observations         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -2454.46         -2418.89         -2408.13         -2383.78         -2376.25         -2373.42         -2373.42  | 1 1001pianton (mmi) |               |               |               |               |               |               |               |
| Log likelihood -2454.46 -2418.89 -2408.13 -2383.78 -2376.25 -2373.42 -2373.42  | Observations        | 3614          | 3614          | 3614          | 3614          | 3614          |               |               |
|  |                     |               |               |               |               |               |               |               |
|  |                     |               |               |               |               |               |               |               |

Robust Standard errors in parentheses\* p < 0.10, \*\*\* p < 0.05, \*\*\*\* p < 0.01

Notes: a. We follow a step-wise regression approach to show the influence of other control variables and how they may affect the relationship. b. Model 1 is a naive model, Model 6 is a full model with all the control variables, and Model 7 includes clustered standard errors at the pitch level.

Results: The coefficients show the marginal effects as the change in probability of experiencing abrasion compared to SBR infill (reference category). For example, compared to SBR, Cork decreases perceived abrasion probability by 7.9 percent, but only significant at the 10% level (model 7).

Simple graphs for a broader audience are possible with logits (the results below account for the influence of all control variables in Model 7, Table 1.1):



#### 2. Direction Change

Table 2.1: Marginal Effects from Logit Model – Direction Change (0 "No" 1 "Yes")

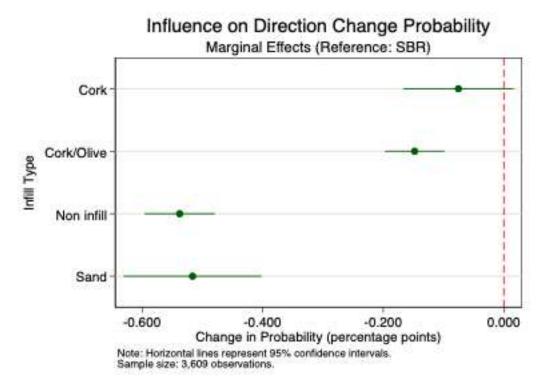
|                       | Model 1   | Model 2   | Model 3      | Model 4      | Model 5               | Model 6      | Model 7              |
|-----------------------|-----------|-----------|--------------|--------------|-----------------------|--------------|----------------------|
| SBR                   | Ref.      | Ref.      | Ref.         | Ref.         | Ref.                  | Ref.         | Ref.                 |
| Cork                  | -0.060*** | -0.056*** | -0.052***    | -0.067***    | -0.073***             | -0.075***    | -0.075               |
|                       | (0.020)   | (0.020)   | (0.019)      | (0.020)      | (0.020)               | (0.020)      | (0.047)              |
| Cork/Olive            | -0.104*** | -0.114*** | -0.118***    | -0.141***    | -0.144* <sup>**</sup> | -0.148***    | -0.148***            |
|                       | (0.035)   | (0.035)   | (0.035)      | (0.037)      | (0.037)               | (0.037)      | (0.025)              |
| Non infill            | -0.463*** | -0.475*** | -0.502***    | -0.535***    | -0.537***             | -0.538***    | -0.538***            |
|                       | (0.065)   | (0.064)   | (0.062)      | (0.059)      | (0.059)               | (0.059)      | (0.030)              |
| Sand                  | -0.508*** | -0.508*** | -0.507***    | -0.517***    | -0.517***             | -0.516***    | -0.516***            |
|                       | (0.017)   | (0.017)   | (0.017)      | (0.017)      | (0.017)               | (0.017)      | (0.058)              |
| Græs (FG)             |           | Ref.      | Ref.         | Ref.         | Ref.                  | Ref.         | Ref.                 |
| Kunst (AG)            |           | -0.087*** | -0.085***    | -0.067***    | -0.066***             | -0.065***    | -0.065**             |
|                       |           | (0.018)   | (0.018)      | (0.018)      | (0.018)               | (0.018)      | (0.029)              |
| Multi (AG, FG)        |           | -0.027    | -0.028*      | -0.014       | -0.014                | -0.014       | -0.014               |
|                       |           | (0.017)   | (0.017)      | (0.017)      | (0.017)               | (0.017)      | (0.022)              |
| Men                   |           |           | Ref.         | Ref.         | Ref.                  | Ref.         | Ref.                 |
| Women                 |           |           | $0.047^{**}$ | $0.047^{**}$ | $0.044^{**}$          | $0.040^{**}$ | $0.040^{*}$          |
|                       |           |           | (0.021)      | (0.020)      | (0.020)               | (0.021)      | (0.023)              |
| Senior                |           |           |              | Ref.         | Ref.                  | Ref.         | Ref.                 |
| Kids (U12-14)         |           |           |              | -0.047**     | -0.044**              | -0.044**     | -0.044               |
| ,                     |           |           |              | (0.019)      | (0.019)               | (0.019)      | (0.049)              |
| Youth (U16-19)        |           |           |              | -0.127***    | -0.124***             | -0.119***    | -0.119 <sup>**</sup> |
| ,                     |           |           |              | (0.020)      | (0.020)               | (0.020)      | (0.051)              |
| M+ and K+             |           |           |              | -0.022       | -0.024                | -0.025       | -0.025               |
|                       |           |           |              | (0.029)      | (0.029)               | (0.029)      | (0.095)              |
| Win                   |           |           |              |              | Ref.                  | Ref.         | Ref.                 |
| Draw                  |           |           |              |              | -0.000                | 0.000        | 0.000                |
|                       |           |           |              |              | (0.023)               | (0.023)      | (0.027)              |
| Loss                  |           |           |              |              | -0.068***             | -0.068***    | -0.068***            |
|                       |           |           |              |              | (0.015)               | (0.015)      | (0.019)              |
| Precipitation (mm)    |           |           |              |              |                       | -0.290***    | -0.290**             |
| - 1001pitation (mmi)  |           |           |              |              |                       | (0.108)      | (0.132)              |
| Observations          | 3613      | 3613      | 3613         | 3613         | 3613                  | 3609         | 3609                 |
| Log likelihood        | -2034.68  | -2022.87  | -2020.22     | -1996.82     | -1985.89              | -1979.79     | -1979.79             |
| Pseudo R <sup>2</sup> | 0.161     | 0.166     | 0.167        | 0.177        | 0.181                 | 0.183        | 0.183                |

Robust standard errors in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Notes: a. We follow a step-wise regression approach to show the influence of other control variables and how they may affect the relationship. b. Model 1 is a naive model, Model 6 is a full model with all the control variables, and Model 7 includes clustered standard errors at the pitch level.

Main result: The marginal effects show the change in probability of experiencing direction change compared to SBR infill (reference category). All alternative infill types significantly decrease direction change, except for Cork where differences follow same direction, but are not significant. For example, compared to SBR, Cork/Olive decreases direction change probability by 14.8 percent, while Sand and Non infill decrease the probability by more than 50 percent (model 7).

The results of the graph below account for the influence of all control variables in Model 7, Table 2.1):



3. Injuries
Table 3.1: Marginal Effects from Logit Model – Injuries (0 "No" 1 "Yes")

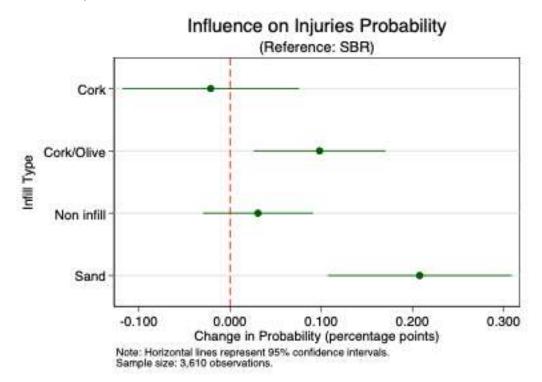
|                                       | Model 1  | Model 2       | Model 3       | Model 4      | Model 5       | Model 6       | Model 7      |
|---------------------------------------|----------|---------------|---------------|--------------|---------------|---------------|--------------|
| SBR                                   | Ref.     | Ref.          | Ref.          | Ref.         | Ref.          | Ref.          | Ref.         |
| Cork                                  | -0.038*  | -0.041**      | -0.041**      | -0.026       | -0.021        | -0.021        | -0.021       |
|                                       | (0.020)  | (0.020)       | (0.020)       | (0.021)      | (0.021)       | (0.021)       | (0.049)      |
| Cork/Olive                            | 0.054    | 0.062*        | 0.063*        | $0.098^{**}$ | 0.099***      | $0.098^{**}$  | 0.098***     |
|                                       | (0.037)  | (0.037)       | (0.037)       | (0.038)      | (0.038)       | (0.038)       | (0.037)      |
| Non infill                            | -0.016   | -0.005        | -0.004        | 0.029        | 0.031         | 0.031         | 0.031        |
|                                       | (0.064)  | (0.064)       | (0.066)       | (0.070)      | (0.068)       | (0.068)       | (0.031)      |
| Sand                                  | 0.205*** | 0.205***      | 0.205***      | 0.207***     | 0.208***      | 0.208***      | 0.208***     |
|                                       | (0.019)  | (0.019)       | (0.019)       | (0.019)      | (0.019)       | (0.019)       | (0.051)      |
| Græs (FG)                             |          | Ref.          | Ref.          | Ref.         | Ref.          | Ref.          | Ref.         |
| Kunst (AG)                            |          | $0.086^{***}$ | $0.086^{***}$ | 0.081***     | $0.079^{***}$ | $0.079^{***}$ | $0.079^{**}$ |
| ,                                     |          | (0.020)       | (0.020)       | (0.020)      | (0.020)       | (0.020)       | (0.032)      |
| Multi (AG, FG)                        |          | 0.019         | 0.019         | 0.021        | 0.020         | 0.020         | 0.020        |
| · · · /                               |          | (0.019)       | (0.019)       | (0.019)      | (0.019)       | (0.019)       | (0.024)      |
| Men                                   |          |               | Ref.          | Ref.         | Ref.          | Ref.          | Ref.         |
| Women                                 |          |               | -0.002        | 0.000        | 0.005         | 0.004         | 0.004        |
|                                       |          |               | (0.022)       | (0.022)      | (0.022)       | (0.022)       | (0.023)      |
| Senior                                |          |               |               | Ref.         | Ref.          | Ref.          | Ref.         |
| Kids (U12-14)                         |          |               |               | -0.055**     | -0.057***     | -0.057***     | -0.057**     |
| ()                                    |          |               |               | (0.021)      | (0.021)       | (0.021)       | (0.029)      |
| Youth (U16-19)                        |          |               |               | 0.022        | 0.018         | 0.020         | 0.020        |
| ()                                    |          |               |               | (0.022)      | (0.022)       | (0.022)       | (0.034)      |
| M+ and K+                             |          |               |               | 0.011        | 0.018         | 0.018         | 0.018        |
|                                       |          |               |               | (0.033)      | (0.034)       | (0.034)       | (0.076)      |
| Win                                   |          |               |               |              | Ref.          | Ref.          | Ref.         |
| Draw                                  |          |               |               |              | 0.037         | 0.038         | 0.038        |
|                                       |          |               |               |              | (0.025)       | (0.025)       | (0.032)      |
| Loss                                  |          |               |               |              | 0.104***      | 0.104***      | 0.104***     |
|                                       |          |               |               |              | (0.017)       | (0.017)       | (0.022)      |
| Precipitation (mm)                    |          |               |               |              |               | -0.072        | -0.072       |
| · · · · · · · · · · · · · · · · · · · |          |               |               |              |               | (0.132)       | (0.118)      |
| Observations                          | 3614     | 3614          | 3614          | 3614         | 3614          | 3610          | 3610         |
| Log likelihood                        | -2315.44 | -2305.36      | -2305.36      | -2297.20     | -2278.11      | -2275.59      | -2275.59     |
| Pseudo R <sup>2</sup>                 | 0.032    | 0.036         | 0.036         | 0.039        | 0.047         | 0.048         | 0.048        |

Robust standard errors in parentheses \* p < 0.10, \*\*\* p < 0.05, \*\*\*\* p < 0.01

Notes: a. We follow a step-wise regression approach to show the influence of other control variables and how they may affect the relationship. b. Model 1 is a naive model, Model 6 is a full model with all the control variables, and Model 7 includes clustered standard errors at the pitch level.

Main result: The marginal effects show the change in probability of experiencing injuries compared to SBR infill (reference category). Compared to SBR, only Cork/Olive and Sand significantly increase the probability of injuries (model 7).

The results of the graph below account for the influence of all control variables in Model 7, Table 3.1):



## PART 3. Main Analysis (Ordered logits)

In this section, we present the results of the full ordered logit models, including all control variables and robust standard errors (Tables 1.1, 2.1, 3.1, and 4.1). We follow a stepwise regression approach to show the influence of other control variables and how they may affect the relationship (Models 1-6). Model 1 is a naive model, and Model 6 is the full model with all the control variables. Model 7 is the full model that addresses within-pitch correlation using clustered standard errors (26 pitches -relatively low N). Coefficients cannot be interpreted directly. The results of infill type are robust to the inclusion of player characteristics (gender, age), match conditions (result, precipitation), and equipment (footwear type).

Additionally, we present marginal effects tables for each dependent variable (Tables 1.2, 2.2, 3.2, and 4.2). These results can be interpreted directly as the change in probability of being in each respective category (0-4 for experience, and 0-2 for the rest of the dependent variables).

The above-mentioned analyses include four dependent variables: experience, ball bounce, running, and rolling passes.

#### 4. Experience

Table 1.1: Ordered Logit Coefficients – Experience (0 "Very bad", 4 "Very good")

|                       | Model 1   | Model 2   | Model 3                            | Model 4               | Model 5               | Model 6             | Model 7                             |
|-----------------------|-----------|-----------|------------------------------------|-----------------------|-----------------------|---------------------|-------------------------------------|
|                       |           |           |                                    |                       |                       |                     |                                     |
| SBR                   | Ref.      | Ref.      | Ref.                               | Ref.                  | Ref.                  | Ref.                | Ref.                                |
| Cork                  | -0.085    | -0.060    | -0.011                             | -0.121                | -0.147*               | -0.149 <sup>*</sup> | -0.149                              |
|                       | (0.075)   | (0.077)   | (0.078)                            | (0.080)               | (0.080)               | (0.080)             | (0.343)                             |
| Cork/Olive            | -0.452*** | -0.490*** | -0.526***                          | -0.765***             | -0.772***             | -0.773***           | -0.773***                           |
|                       | (0.142)   | (0.139)   | (0.137)                            | (0.138)               | (0.136)               | (0.136)             | (0.274)                             |
| Non infill            | -1.334*** | -1.411*** | -1.646***                          | -1.899* <sup>**</sup> | -1.891***             | -1.891***           | -1.891***                           |
|                       | (0.200)   | (0.203)   | (0.221)                            | (0.222)               | (0.227)               | (0.227)             | (0.272)                             |
| Sand                  | -1.905*** | -1.913*** | -1.915***                          | -1.952***             | -1.985* <sup>**</sup> | -1.982***           | -1.982***                           |
|                       | (0.081)   | (0.081)   | (0.081)                            | (0.081)               | (0.082)               | (0.082)             | (0.438)                             |
| Coma (EC)             |           | Ref.      | Ref.                               | Ref.                  | Ref.                  | Ref.                | $\mathbf{p}_{\mathbf{c}}\mathbf{f}$ |
| Græs (FG)             |           | -0.481*** | -0.473***                          | -0.439***             | -0.437***             | -0.436***           | Ref.<br>-0.436***                   |
| Kunst (AG)            |           |           |                                    |                       |                       |                     |                                     |
| Mark: (AC EC)         |           | (0.077)   | (0.077)                            | (0.078)               | (0.078)               | (0.078)             | (0.149)                             |
| Multi (AG, FG)        |           | -0.087    | -0.107                             | -0.115*               | -0.112                | -0.112              | -0.112                              |
|                       |           | (0.069)   | (0.069)                            | (0.069)               | (0.070)               | (0.070)             | (0.127)                             |
| Men                   |           |           | Ref.                               | Ref.                  | Ref.                  | Ref.                | Ref.                                |
| Women                 |           |           | $0.414^{***}$                      | $0.406^{***}$         | $0.385^{***}$         | $0.380^{***}$       | $0.380^{**}$                        |
|                       |           |           | (0.078)                            | (0.079)               | (0.079)               | (0.079)             | (0.176)                             |
| Senior                |           |           |                                    | Ref.                  | Ref.                  | Ref.                | Ref.                                |
|                       |           |           |                                    | 0.376***              | 0.389***              | 0.389***            | 0.389*                              |
| Kids (U12-14)         |           |           |                                    |                       |                       |                     |                                     |
| Vand (III ( 10)       |           |           |                                    | (0.083)<br>-0.168**   | (0.084)               | (0.084)             | (0.218)                             |
| Youth (U16-19)        |           |           |                                    |                       | -0.147*               | -0.142*             | -0.142                              |
| 177                   |           |           |                                    | (0.085)               | (0.085)               | (0.085)             | (0.214)                             |
| M+ and K+             |           |           |                                    | -0.129                | -0.170                | -0.172              | -0.172                              |
|                       |           |           |                                    | (0.131)               | (0.135)               | (0.135)             | (0.439)                             |
| Win                   |           |           |                                    |                       | Ref.                  | Ref.                | Ref.                                |
| Draw                  |           |           |                                    |                       | -0.283***             | -0.282***           | -0.282*                             |
|                       |           |           |                                    |                       | (0.098)               | (0.098)             | (0.151)                             |
| Loss                  |           |           |                                    |                       | -0.551***             | -0.551***           | -0.551***                           |
|                       |           |           |                                    |                       | (0.064)               | (0.064)             | (0.082)                             |
| D                     |           |           |                                    |                       | ,                     |                     |                                     |
| Precipitation (mm)    |           |           |                                    |                       |                       | -0.338              | -0.338                              |
| 01                    | 2612      | 2612      | 2612                               | 2612                  | 2612                  | (0.499)             | (0.600)                             |
| Observations          | 3613      | 3613      | 3613                               | 3613                  | 3613                  | 3609                | 3609                                |
| Log likelihood        | -5299.48  | -5277.49  | -5265.10                           | -5236.48              | -5199.99              | -5194.81            | -5194.81                            |
| Pseudo R <sup>2</sup> | 0.065     | 0.069     | $\frac{0.071}{0, ** p < 0.05, **}$ | 0.076                 | 0.082                 | 0.082               | 0.082                               |

Robust standard errors in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Main infill result (full model): Compared to SBR, players have lower odds of rating the experience as high quality in all types of infill, except in Cork. The differences between SBR and Cork are only significant at 10%. Interestingly, this difference is only significant when we include the match result and disappears in the most conservative model with clustered standard errors. In general, players who lose their games are more likely to have a worse perceived experience.

Table 1.2: Marginal Effects from Ordered Logit-Experience (0 "Very bad", 4 "Very good")

| SBR         Ref.   |
|--|
| $ \begin{array}{c} \text{Cork/Olive} & \begin{array}{c} (0.022) & (0.026) & (0.029) & (0.015) & (0.062) \\ 0.067^{***} & 0.065^{***} & 0.049^{*} & -0.064^{***} & -0.117^{**} \\ (0.014) & (0.020) & (0.028) & (0.012) & (0.050) \\ \text{Non infill} & 0.248^{***} & 0.140^{***} & 0.028 & -0.209^{***} & -0.206^{***} \\ (0.022) & (0.025) & (0.036) & (0.020) & (0.049) \\ \text{Sand} & 0.267^{***} & 0.142^{***} & 0.021 & -0.220^{***} & -0.210^{***} \\ (0.058) & (0.029) & (0.033) & (0.043) & (0.054) \\ \end{array} \\ \text{Græs FG} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Kunst (AG)} & 0.051^{***} & 0.025^{**} & 0.013^{**} & -0.033^{**} & -0.057^{***} \\ (0.018) & (0.012) & (0.006) & (0.014) & (0.021) \\ \text{Multi (AG, FG)} & 0.012 & 0.007 & 0.004 & -0.007 & -0.016 \\ (0.014) & (0.008) & (0.005) & (0.009) & (0.018) \\ \end{array} \\ \text{Men} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Women} & -0.041^{**} & -0.023^{**} & -0.014^{**} & 0.023^{*} & 0.054^{**} \\ (0.021) & (0.011) & (0.006) & (0.013) & (0.024) \\ \end{array} \\ \text{Senior} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \end{array}$   |
| $ \begin{array}{c} \text{Cork/Olive} & 0.067^{***} & 0.065^{***} & 0.049^{*} & -0.064^{***} & -0.117^{**} \\ (0.014) & (0.020) & (0.028) & (0.012) & (0.050) \\ \text{Non infill} & 0.248^{***} & 0.140^{***} & 0.028 & -0.209^{***} & -0.206^{***} \\ (0.022) & (0.025) & (0.036) & (0.020) & (0.049) \\ \text{Sand} & 0.267^{***} & 0.142^{***} & 0.021 & -0.220^{***} & -0.210^{***} \\ (0.058) & (0.029) & (0.033) & (0.043) & (0.054) \\ \text{Græs FG} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Kunst (AG)} & 0.051^{***} & 0.025^{**} & 0.013^{**} & -0.033^{**} & -0.057^{***} \\ (0.018) & (0.012) & (0.006) & (0.014) & (0.021) \\ \text{Multi (AG, FG)} & 0.012 & 0.007 & 0.004 & -0.007 & -0.016 \\ (0.014) & (0.008) & (0.005) & (0.009) & (0.018) \\ \text{Men} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Women} & -0.041^{**} & -0.023^{**} & -0.014^{**} & 0.023^{**} & 0.054^{**} \\ (0.021) & (0.011) & (0.006) & (0.013) & (0.024) \\ \text{Senior} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & Ref$  |
| $\begin{array}{c} \text{Non infill} & (0.014) & (0.020) & (0.028) & (0.012) & (0.050) \\ 0.248*** & 0.140*** & 0.028 & -0.209*** & -0.206*** \\ (0.022) & (0.025) & (0.036) & (0.020) & (0.049) \\ \text{Sand} & 0.267*** & 0.142*** & 0.021 & -0.220*** & -0.210*** \\ (0.058) & (0.029) & (0.033) & (0.043) & (0.054) \\ \text{Græs FG} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Kunst (AG)} & 0.051*** & 0.025** & 0.013** & -0.033** & -0.057*** \\ (0.018) & (0.012) & (0.006) & (0.014) & (0.021) \\ \text{Multi (AG, FG)} & 0.012 & 0.007 & 0.004 & -0.007 & -0.016 \\ (0.014) & (0.008) & (0.005) & (0.009) & (0.018) \\ \text{Men} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Women} & -0.041** & -0.023** & -0.014** & 0.023* & 0.054** \\ (0.021) & (0.011) & (0.006) & (0.013) & (0.024) \\ \text{Senior} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & \text{Ref.} & \text{Ref.} & \text{Ref.} \\ \text{Ref.} & Ref.$ |
| Non infill       0.248***       0.140***       0.028       -0.209***       -0.206***         (0.022)       (0.025)       (0.036)       (0.020)       (0.049)         Sand       0.267***       0.142***       0.021       -0.220***       -0.210***         (0.058)       (0.029)       (0.033)       (0.043)       (0.054)         Græs FG       Ref.       Ref.       Ref.       Ref.       Ref.         Kunst (AG)       0.051***       0.025**       0.013**       -0.033**       -0.057***         (0.018)       (0.012)       (0.006)       (0.014)       (0.021)         Multi (AG, FG)       0.012       0.007       0.004       -0.007       -0.016         (0.014)       (0.008)       (0.005)       (0.009)       (0.018)         Men       Ref.       Ref.       Ref.       Ref.       Ref.         Women       -0.041**       -0.023**       -0.014**       0.023*       0.054**         (0.021)       (0.011)       (0.006)       (0.013)       (0.024)         Senior       Ref.       Ref.       Ref.       Ref.       Ref.  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |
| Sand       0.267*** (0.058)       0.142*** (0.029)       0.021 (0.033)       -0.220*** -0.210*** (0.054)         Græs FG       Ref.       Ref.       Ref.       Ref.       Ref.       Ref.         Kunst (AG)       0.051*** (0.012)       0.025** (0.013** -0.033** -0.057**** (0.014)       -0.057**** (0.012)       (0.006) (0.014) (0.0021)         Multi (AG, FG)       0.012 (0.007 (0.004) (0.004) (0.007) (0.007)       -0.016 (0.014) (0.008)       (0.005) (0.009) (0.018)         Men       Ref.       Ref.       Ref.       Ref.       Ref.         Women       -0.041** (0.023** -0.014** (0.023** 0.054*** (0.024)       -0.023** 0.054*** (0.004)       (0.006) (0.013) (0.024)         Senior       Ref.       Ref.       Ref.       Ref.       Ref.       Ref.  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |
| Græs FG  Kunst (AG)  0.051***  0.025**  0.013**  -0.033**  -0.057***  (0.018)  (0.012)  0.006)  (0.014)  (0.021)  Multi (AG, FG)  0.012  0.007  0.004  -0.007  -0.016  (0.014)  (0.008)  (0.005)  (0.009)  (0.018)  Men  Ref.  Senior  Ref.  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$   |
|  |
| Men       Ref.       Ref.       Ref.       Ref.       Ref.         Women       -0.041**       -0.023**       -0.014**       0.023*       0.054**         (0.021)       (0.011)       (0.006)       (0.013)       (0.024)         Senior       Ref.       Ref.       Ref.       Ref.       Ref.   |
| Women  |
| (0.021) (0.011) (0.006) (0.013) (0.024) Senior Ref. Ref. Ref. Ref. Ref.  |
| Senior Ref. Ref. Ref. Ref.   |
|  |
| Kids (U12-14) -0.042 -0.024* -0.014** 0.025 0.055**  |
|  |
| (0.027) $(0.014)$ $(0.006)$ $(0.020)$ $(0.027)$  |
| Youth (U16-19) 0.018 0.008 0.004 -0.012 -0.018   |
| (0.026) $(0.013)$ $(0.006)$ $(0.017)$ $(0.028)$  |
| M+ and K+ 0.021 0.010 0.004 -0.015 -0.021  |
| (0.056) $(0.025)$ $(0.010)$ $(0.038)$ $(0.053)$  |
| Win Ref. Ref. Ref. Ref. Ref.   |
| Draw 0.030* 0.017* 0.011** -0.018 -0.040**   |
| (0.018) $(0.010)$ $(0.005)$ $(0.014)$ $(0.020)$  |
| Loss 0.064*** 0.032*** 0.017*** -0.040*** -0.073***  |
| $(0.008) \qquad (0.008) \qquad (0.006) \qquad (0.009) \qquad (0.014)$  |
| Precipitation (mm) 0.039 0.020 0.011 -0.024 -0.045   |
| (0.067) $(0.035)$ $(0.020)$ $(0.042)$ $(0.081)$  |
| Number of Obs. 3,609   |

Robust standard errors clustered at the pitch level in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

Notes: a. These are the marginal effects from the full model in Table 1.1 (Model 7).

Result interpretation. Compared to SBR, Sand, Cork/Olive, and Non infill increase the probability of low experience ratings (0-2) and decrease the probability of high experience ratings (3-4). Specifically, Sand increases the probability of responding experience 0 by 26.6 percent and decreases the probability of responding experience 4 by 20.9 percent. Women tend to report higher experience quality and Loss results are associated with poorer experience ratings

#### 5. Ball Bounce

Table 2.1: Ordered Logit Coefficients – Ball Bounce (0 "Low", 1 "Normal", 2 "High")

| SBR         Ref. cork         Ref. consequence of the consequence o  |                       | Model 1  | Model 2  | Model 3  | Model 4  | Model 5  | Model 6  | Model 7  |
|--|-----------------------|----------|----------|----------|----------|----------|----------|----------|
| Cork         -0.395****         -0.399****         -0.345****         -0.360***         -0.358***         -0.358**           Cork/Olive         (0.086)         (0.086)         (0.087)         (0.089)         (0.089)         (0.089)         (0.199)           Cork/Olive         0.175         0.168         0.141         0.113         0.116         0.116         0.116           (0.142)         (0.143)         (0.142)         (0.146)         (0.184)   | CDD                   |          |          |          |          |          |          |          |
| Cork/Olive         (0.086)         (0.086)         (0.087)         (0.089)         (0.089)         (0.199)           Cork/Olive         0.175         0.168         0.141         0.113         0.115         0.116         0.116           (0.142)         (0.142)         (0.141)         (0.113)         0.115         0.116         0.116           Non infill         0.766***         0.756***         0.556**         0.534**         0.535**         0.535***         0.535***           Sand         0.897***         0.897***         0.909***         0.891***         0.890***         0.890***           Græs (FG)         Ref.   |                       |          |          |          |          |          |          |          |
| Cork/Olive         0.175         0.168         0.141         0.113         0.115         0.116         0.116           (0.142)         (0.143)         (0.142)         (0.143)         (0.145)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.146)         (0.143)         (0.149)         0.244)         (0.244)         (0.244)         (0.235)           Sand         0.897***         0.899****         0.891****         0.891****         0.890***         0.0972         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072         0.072  | Cork                  |          |          |          |          |          |          |          |
| Non infill   | C 1/O1                | ,        |          | ` /      | ,        | · /      | ,        | ` /      |
| Non infill   | Cork/Olive            |          |          |          |          |          |          |          |
| Sand         (0.249) (0.249) (0.249) (0.241) (0.244) (0.244) (0.244) (0.897*** 0.897*** 0.897*** 0.891**** 0.891**** 0.891*** 0.890*** 0.972 0.072 0.072 0.072 0.0880 0.0860 0.0860 0.0860 0.0860 0.0105)           Multi (AG, FG)         Ref. (0.085) (0.085) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) 0.090** 0.079 0.079 0.079 0.079 0.088)           Men         Ref. (0.077) (0.078) (0.079) (0.079) (0.079) (0.079) (0.079) (0.088)           Men         Ref. (0.440**** 0.456**  | NT 1 011              | (0.142)  | (0.143)  |          |          |          |          | (0.113)  |
| Sand         0.897****         0.897****         0.909****         0.891***         0.891***         0.890***         0.890***           Græs (FG)         Ref.  | Non ıntıll            |          |          |          |          |          |          |          |
| Græs (FG) Græs (FG) Ref. Kunst (AG)  Ref. Cunst (AG)  Rulti (AG, FG)  Rulti (AG, FG)  Ref. Cunst (AG, FG)  Ref. Cunst (AG, FG)  Ref. Cunst (AG, FG)  Ref. Ref. Ref. Ref. Ref. Ref. Ref. Ref  |                       | (0.249)  | (0.249)  |          | (0.244)  | (0.244)  | (0.244)  | (0.123)  |
| Græs (FG)         Ref.   | Sand                  |          |          |          |          |          |          |          |
| Kunst (AG)         -0.082 (0.085)         -0.072 (0.086)         -0.073 (0.086)         -0.072 (0.086)         -0.072 (0.086)         -0.072 (0.086)         -0.013 (0.086)         (0.086)         (0.086)         (0.086)         (0.086)         (0.086)         (0.086)         (0.0105)           Multi (AG, FG)         -0.013 (0.073)         -0.029 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.078)         -0.456****         0.078 (0.078)         0.078 (0.078)         0.078 (0.078)         0.078 (0.078)         0.078 (0.078)         0.078 (0.079)         0.014 (0.091)         0.099 (0.091)         0.099 (0.091)         0.099 (0   |                       | (0.086)  | (0.087)  | (0.087)  | (0.087)  | (0.087)  | (0.087)  | (0.257)  |
| Kunst (AG)         -0.082 (0.085) (0.085) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086)         -0.072 (0.086) (0.086) (0.086) (0.086) (0.086) (0.086) (0.086)         -0.072 (0.072) (0.072) (0.072) (0.072)         -0.028 (0.072) (0.079) (0.079) (0.079) (0.079) (0.079) (0.079)         -0.028 (0.079) (0.079) (0.079) (0.079) (0.079) (0.079) (0.079)         -0.028 (0.079) (0.079) (0.079) (0.079) (0.079) (0.079) (0.079)         Men         Ref.   | Græs (FG)             |          | Ref.     | Ref.     | Ref.     | Ref.     | Ref.     | Ref.     |
| Multi (AG, FG)       (0.085)       (0.085)       (0.086)       (0.086)       (0.086)       (0.086)       (0.0105)         Multi (AG, FG)       -0.013       -0.033       -0.029       -0.028       -0.028       -0.028         Men       Ref.       (0.077)       (0.078)       (0.079)       (0.079)       (0.079)       (0.088)         Men       Ref.       Ref.       Ref.       Ref.       Ref.       Ref.       0.456*****       0.456****       0.456****       0.456****       0.456****       0.456****       0.456****       0.456****       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.078       0.014       0.014       0.014       0.014       0.014       0.014       0.014       0.014       0.015 <td>` '</td> <td></td> <td>-0.082</td> <td>-0.072</td> <td>-0.074</td> <td>-0.073</td> <td>-0.072</td> <td>-0.072</td>  | ` '                   |          | -0.082   | -0.072   | -0.074   | -0.073   | -0.072   | -0.072   |
| Multi (AG, FG)         -0.013 (0.077)         -0.033 (0.078)         -0.029 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.028 (0.079)         -0.0456****         -0.0456****         -0.0456****         -0.0456****         -0.0456****         -0.0456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456*****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.456****         0.451         0.078         0.078         0.078         0.078         0.078         0.078         0.078         0.078         0.078         0.078         0.071         0.014         0.014         0.014         0.090         0.0   | ,                     |          |          | (0.085)  | (0.086)  | (0.086)  | (0.086)  | (0.105)  |
| Men         Ref. Women         Ref. (0.077)         (0.078)         (0.079)         (0.079)         (0.079)         (0.088)           Senior         Ref. (0.092)         Ref. (0.093)         Ref. (0.094)         Ref. (   | Multi (AG, FG)        |          | ,        | ` /      | ` /      | ` /      | ` /      | ` /      |
| Men Women         Ref. 0.440*** 0.456*** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.456**** 0.090* (0.093) (0.093) (0.093) (0.154)           Senior Kids (U12-14)         Ref. Ref. Ref. Ref. Ref. 0.080 0.078 0.078 0.078 0.078 (0.090) (0.091) (0.090) (0.154)         Ref. Nef. 0.018 0.017 0.014 0.014 0.014 (0.091) (0.092) (0.092) (0.171)           Youth (U16-19)         0.018 0.017 0.014 0.014 0.014 (0.091) (0.092) (0.092) (0.171)         Ref. Nef. 0.249* 0.245 0.245 0.245 0.245 (0.151) (0.151) (0.151) (0.151) (0.451)           Win Draw         Ref. Ref. Ref. Ref. O.039 0.039   | , ,                   |          |          |          |          |          |          |          |
| Women         0.440***         0.456****         0.456***         0.456***         0.456***           Senior         Ref.  | Man                   |          | ,        | , ,      | ,        | , ,      | ,        | ,        |
| Company   Comp   |                       |          |          |          |          |          |          |          |
| Senior         Ref. Kids (U12-14)         Ref. (0.080)         Ref. (0.090)         Ref. (0.091)         Ref. (0.091)         Ref. (0.091)         Ref. (0.092)         Ref. (0.092)         Ref. (0.171)           M+ and K+         0.249*         0.249*         0.245         0.245         0.245         0.245           Win         Ref. Ref. Ref. Ref. Ref. Ref. Ref. Ref.  | women                 |          |          |          |          |          |          |          |
| Kids (U12-14)       0.080       0.078       0.078       0.078         Youth (U16-19)       (0.090)       (0.091)       (0.090)       (0.154)         Youth (U16-19)       0.018       0.017       0.014       0.014         (0.091)       (0.092)       (0.092)       (0.171)         M+ and K+       0.249*       0.245       0.245       0.245         Win       Ref.       Ref.       Ref.       Ref.         Draw       -0.039       -0.039       -0.039       -0.039         (0.106)       (0.106)       (0.146)       (0.146)         Loss       -0.029       -0.029       -0.029         (0.072)       (0.072)       (0.070)         Precipitation (mm)       0.151       (0.705)       (0.820)         Observations       3614       3614       3614       3614       3610       3610         Log likelihood       -3274.20       -3273.67       -3262.77       -3261.00       -3260.89       -3259.02       -3259.02  |                       |          |          | (0.092)  | (0.093)  | (0.093)  | (0.093)  | (0.154)  |
| Youth (U16-19) Youth (U16-19)  M+ and K+  \[ \begin{array}{cccccccccccccccccccccccccccccccccccc  | Senior                |          |          |          | Ref.     | Ref.     | Ref.     | Ref.     |
| Youth (U16-19)  Youth (U16-19)  M+ and K+  O.249*  O.245  O.245  O.245  O.151)  Win  Draw  Ref.  Ref.  Ref.  Ref.  O.039  O.039  O.0451)  Ref.  Ref.  Ref.  O.039  O.039  O.0451)  Ref.  O.0451)  O.0451)  O.051  O.052  O.052  O.052  O.052  O.053  O.053  O.051  O.051  O.051  O.051  O.052  O. | Kids (U12-14)         |          |          |          | 0.080    | 0.078    | 0.078    | 0.078    |
| Youth (U16-19)       0.018       0.017       0.014       0.014         M+ and K+       0.249*       0.249*       0.245       0.245       0.245         Win       Ref.       Ref.       Ref.       Ref.         Draw       -0.039       -0.039       -0.039       -0.039         Loss       -0.029       -0.029       -0.029       -0.029         Precipitation (mm)       0.151       0.151       0.151         Observations       3614       3614       3614       3614       3614       3614       3610       3610         Log likelihood       -3274.20       -3273.67       -3262.77       -3261.00       -3260.89       -3259.02       -3259.02   | ,                     |          |          |          | (0.090)  | (0.091)  | (0.090)  | (0.154)  |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Youth (U16-19)        |          |          |          | ` /      | ` /      | ,        | , ,      |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                       |          |          |          |          |          |          |          |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | M+ and K+             |          |          |          | \        | ` /      | ` /      | ` /      |
| Win       Ref.       Ref.       Ref.       Ref.         Draw       -0.039       -0.039       -0.039         Loss       (0.106)       (0.106)       (0.146)         Loss       -0.029       -0.029       -0.029         (0.072)       (0.072)       (0.070)         Precipitation (mm)       0.151       (0.705)       (0.820)         Observations       3614       3614       3614       3614       3614       3610       3610         Log likelihood       -3274.20       -3273.67       -3262.77       -3261.00       -3260.89       -3259.02       -3259.02  |                       |          |          |          |          |          |          |          |
| Draw         -0.039         -0.039         -0.039           Loss         (0.106)         (0.106)         (0.146)           Precipitation (mm)         (0.072)         (0.072)         (0.072)           Observations         3614         3614         3614         3614           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02   | W/:                   |          |          |          | ,        | ` /      | ` /      | ,        |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                       |          |          |          |          |          |          |          |
| Loss -0.029 -0.029 -0.029 (0.072) (0.070)  Precipitation (mm) 0.151 0.151 (0.705) (0.820)  Observations 3614 3614 3614 3614 3614 3610 3610   | Draw                  |          |          |          |          |          |          |          |
| Precipitation (mm)         (0.072)         (0.072)         (0.070)           Precipitation (mm)         0.151         0.151         (0.705)         (0.820)           Observations         3614         3614         3614         3610         3610           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02  | Τ                     |          |          |          |          | ` /      | ,        | ` /      |
| Precipitation (mm)         0.151         0.151           Observations         3614         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02  | LOSS                  |          |          |          |          |          |          |          |
| Observations         3614         3614         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02  |                       |          |          |          |          | (0.072)  | (0.072)  | (0.070)  |
| Observations         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02  | Precipitation (mm)    |          |          |          |          |          | 0.151    | 0.151    |
| Observations         3614         3614         3614         3614         3614         3610         3610           Log likelihood         -3274.20         -3273.67         -3262.77         -3261.00         -3260.89         -3259.02         -3259.02  | - , ,                 |          |          |          |          |          | (0.705)  | (0.820)  |
|  | Observations          | 3614     | 3614     | 3614     | 3614     | 3614     |          |          |
|  | Log likelihood        | -3274.20 | -3273.67 | -3262.77 | -3261.00 | -3260.89 | -3259.02 | -3259.02 |
| 15000010 01050 01051 01051 01051 01051   | Pseudo R <sup>2</sup> | 0.030    | 0.030    | 0.034    | 0.034    | 0.034    | 0.034    | 0.034    |

Robust standard errors in parentheses\* p < 0.10, \*\*\* p < 0.05, \*\*\*\* p < 0.01

Main infill result: Compared to SBR, players have lower odds of reporting higher ball bounce in Cork (significant only at the 10% level). The difference is highly significant in Sand and Non infill, in which participants are more likely to report higher ball bounce compared to SBR. The type of footwear has no effect. Women are more likely to report higher levels of ball bounce than men.

Table 2.2: Marginal Effects from OLogit – BallBounce (0 "Low", 1 "Normal", 2 "High")

| Variable           | 0         | 1       | 2        |
|--------------------|-----------|---------|----------|
| SBR                | Ref.      | Ref.    | Ref.     |
| Cork               | 0.064*    | -0.022  | -0.042*  |
|                    | (0.035)   | (0.014) | (0.023)  |
| Cork/Olive         | -0.018    | 0.002   | 0.016    |
|                    | (0.019)   | (0.004) | (0.015)  |
| Non infill         | -0.074*** | -0.011  | 0.085*** |
|                    | (0.020)   | (0.010) | (0.020)  |
| Sand               | -0.110*** | -0.046  | 0.156*** |
|                    | (0.031)   | (0.031) | (0.054)  |
| Græs (FG)          | Ref.      | Ref.    | Ref.     |
| Kunst (AG)         | 0.011     | 0.001   | -0.011   |
|                    | (0.016)   | (0.001) | (0.016)  |
| Multi (AG, FG)     | 0.004     | 0.000   | -0.004   |
|                    | (0.013)   | (0.001) | (0.014)  |
| Men                | Ref.      | Ref.    | Ref.     |
| Women              | -0.060*** | -0.016  | 0.076*** |
|                    | (0.019)   | (0.010) | (0.027)  |
| Senior             | Ref.      | Ref.    | Ref.     |
| Kids (U12-14)      | -0.011    | -0.000  | 0.012    |
|                    | (0.023)   | (0.001) | (0.023)  |
| Youth (U16-19)     | -0.002    | -0.000  | 0.002    |
|                    | (0.026)   | (0.000) | (0.026)  |
| M+ and K+          | -0.034    | -0.005  | 0.039    |
|                    | (0.060)   | (0.017) | (0.076)  |
| Win                | Ref.      | Ref.    | Ref.     |
| Draw               | 0.006     | 0.000   | -0.006   |
|                    | (0.022)   | (0.001) | (0.022)  |
| Loss               | 0.004     | 0.000   | -0.004   |
|                    | (0.010)   | (0.000) | (0.011)  |
| Precipitation (mm) | -0.022    | -0.001  | 0.023    |
|                    | (0.120)   | (0.005) | (0.125)  |
| Number of Obs.     |           | 3,610   |          |

Robust standard errors clustered at the pitch level in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

#### 6. Running

Table 3.1: Ordered Logit Coefficients - Running (0 "Soft", 1 "Normal", 2 "Hard")

| SBR         Ref0.294** -0.302** -0.330** -0.291** -0.283** -0.280** -0.290** -0.290*** -0.290*** -0.290*** -0.290*** -0.290*** -0.290*** -0.290*** -0.290** -                                  |                    | Model 1   | Model 2       | Model 3       | Model 4       | Model 5       | Model 6       | Model 7       |
|--|--------------------|-----------|---------------|---------------|---------------|---------------|---------------|---------------|
| Cork         -0.294***         -0.302***         -0.330***         -0.291***         -0.282***         -0.283***         -0.283           Cork/Olive         0.731***         0.764***         0.783***         0.087)         (0.087)         (0.087)         (0.087)         (0.292)           Non infill         0.962***         0.990***         1.112***         1.198***         1.200***         1.200***           Non infill         0.962***         0.990***         1.112***         1.198***         1.200***         1.200***           Sand         1.914***         1.913**         1.911**         1.899**         1.904***         1.90   | SBR                | Ref.      | Ref.          | Ref.          | Ref.          | Ref.          |               | Ref.          |
| Cork/Olive         (0.084) (0.085) (0.085) (0.087) (0.087) (0.087) (0.090***         (0.090**** (0.156) (0.156) (0.156) (0.156) (0.156) (0.156) (0.160) (0.160) (0.160) (0.160) (0.202)         (0.087) (0.292) (0.90**** (0.020)***         (0.080) (0.281) (0.285) (0.160) (0.160) (0.160) (0.160) (0.202)         (0.080) (0.281) (0.285) (0.288) (0.288) (0.290) (0.290) (0.191)           Sand         1.914*** 1.913*** 1.911*** 1.899*** 1.904*** 1.904*** 1.904*** (0.088) (0.088) (0.088) (0.088) (0.088) (0.088) (0.088) (0.088) (0.088) (0.088) (0.089) (0.088) (0.088) (0.088)         (0.080) (0.081) (0.084) (0.086) (0.076) (0.076) (0.076) (0.077) (0.077) (0.077) (0.077) (0.077) (0.077)           Men         Ref. Ref. Ref. Ref. Ref. Ref. Ref. Ref.   | Cork               | -0.294*** | -0.302***     | -0.330***     | -0.291***     | -0.282***     | -0.283***     | -0.283        |
| Non infill   |                    | (0.084)   | (0.085)       | (0.085)       | (0.087)       | (0.087)       | (0.087)       | (0.292)       |
| Non infill   | Cork/Olive         | 0.731***  | 0.764***      | 0.783***      | 0.893***      | 0.899***      | $0.900^{***}$ | $0.900^{***}$ |
| Sand         (0.280) (0.281) (0.281) (0.285)         (0.288) (0.290) (0.290) (0.290) (0.191)         (0.04*** 1.904   |                    | (0.156)   |               | (0.155)       | (0.160)       |               | (0.160)       | (0.202)       |
| Sand         1.914*** (0.089)         1.913*** (0.088)         1.911*** (0.088)         1.899*** (0.089)         1.904*** (1.904   | Non infill         | 0.962***  | $0.990^{***}$ | 1.112***      | 1.198***      | 1.198***      | 1.200***      | 1.200***      |
| Græs (FG) Græs (FG) Kunst (AG)  Ref. Kunst (AG)  0.301***  0.296****  0.302****  0.300****  0.302****  0.300****  0.297***  0.218***  0.218***  0.218***  0.218**  0.218**  0.218**  0.218**  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0104)  Men  Men  Ref.  Ref. |                    |           | (0.281)       | (0.285)       | (0.288)       |               | (0.290)       | (0.191)       |
| Græs (FG) Græs (FG) Kunst (AG)  Ref. Kunst (AG)  0.301***  0.296****  0.302****  0.300****  0.302****  0.300****  0.297***  0.218***  0.218***  0.218***  0.218**  0.218**  0.218**  0.218**  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0077)  0.0104)  Men  Men  Ref.  Ref. | Sand               | 1.914***  | 1.913***      | 1.911***      | 1.899***      | 1.904***      | 1.904***      | 1.904***      |
| Kunst (AG)         0.301*** (0.084) (0.083) (0.084) (0.085) (0.076) (0.077) (0.077) (0.077) (0.077) (0.077) (0.077) (0.074)           Men         Ref. Ref. Wef0.246**** -0.227**** -0.218*** -0.217** -0.217* -0.217* (0.085) (0.086) (0.086) (0.086) (0.086) (0.086) (0.015)           Senior         Ref. Kids (U12-14)         Ref0.262**** -0.269**** -0.269*** -0.269*** -0.269** -0.269** -0.269** -0.269** -0.066 (0.090) (0.091) (0.091) (0.091) (0.0251)         Youth (U16-19) (0.094) (0.094) (0.094) (0.094) (0.094) (0.094) (0.094)         Winder (0.094) (0.094) (0.094) (0.094) (0.094) (0.094) (0.094) (0.094)         Ref. Ref. Ref. Ref. Ref. Ref. Ref. Ref.   |                    | (0.089)   | (0.088)       |               |               | (0.089)       | (0.089)       | (0.535)       |
| Kunst (AG)         0.301*** (0.084) (0.083) (0.084) (0.085) (0.076) (0.077) (0.077) (0.077) (0.077) (0.077) (0.077) (0.077) (0.074)           Men         Ref. Ref. Wef0.246*** -0.227*** -0.218** -0.217** -0.217* -0.217* (0.085) (0.086) (0.086) (0.086) (0.086) (0.086) (0.015)           Senior         Ref. Kids (U12-14)         Ref0.262*** -0.269*** -0.269*** -0.269** -0.269** -0.269* -0.269* (0.090) (0.091) (0.091) (0.091) (0.251)         Youth (U16-19) (0.094)   | Græs (FG)          |           | Ref.          | Ref.          | Ref.          | Ref.          | Ref.          | Ref.          |
| Multi (AG, FG)       (0.084) (0.084) (0.179** 0.191** 0.222*** 0.221*** 0.221*** 0.218*** 0.218**       (0.076) (0.076) (0.077) (0.077) (0.077) (0.077) (0.104)         Men       Ref. (0.084) (0.076) (0.077) (0.077) (0.077) (0.077) (0.077) (0.077) (0.074)         Men       Ref. (0.246*** -0.246**** -0.227**** -0.218** -0.217** -0.217** -0.217*         Women       Ref. (0.085) (0.086) (0.086) (0.086) (0.086) (0.086) (0.015)         Senior       Ref. (0.084) (0.096) (0.096) (0.096) (0.091) (0.091)         Kids (U12-14)       Ref. (0.090) (0.091) (0.091) (0.091) (0.251)         Youth (U16-19)       -0.066 (0.097) (0.091) (0.091) (0.091) (0.251)         Youth (U16-19)       -0.066 (0.094) (0.094) (0.094) (0.094) (0.094) (0.209)         M+ and K+       0.216 (0.226 (0.227) (0.227) (0.227)         Win       Ref. (0.144) (0.146) (0.146) (0.146) (0.146)         Draw       Ref. (0.106) (0.106) (0.106) (0.151)         Loss       0.180** (0.180** 0.182*** 0.182*** (0.071) (0.078)         Precipitation (mm)       -0.122 (0.554) (0.841)         Observations       3613 (3613) (3613) (3613) (3613) (3613) (3613) (3609) (3609) (0.054)         Log likelihood       -3306.69 (-3299.91) (-3296.29) (-3288.19) (-3284.96) (-3279.75) (-3279.75) (-3279.75) (-3279.75)         Pseudo R2       0.098 (0.100) (0.101) (0.103) (0.104) (0.104) (0.104) (0.104)   |                    |           | 0.301***      | $0.296^{***}$ | $0.302^{***}$ | $0.300^{***}$ | $0.297^{***}$ |               |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | ,                  |           |               | (0.083)       | (0.084)       | (0.084)       | (0.084)       |               |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Multi (AG, FG)     |           | $0.179^{**}$  | 0.191**       | 0.222***      | 0.221***      | 0.218***      | 0.218**       |
| Women         -0.246*** (0.085)         -0.227*** (0.086)         -0.218** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.086         -0.086         -0.086         -0.269*** (0.099)** (0.099)** (0.099)** (0.099)**         Ref. Ref. Ref. Ref. (0.099)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.094)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.0146)** (0.146)** (0.0464)** (0.0  |                    |           | (0.076)       | (0.076)       | (0.077)       |               | (0.077)       | (0.104)       |
| Women         -0.246*** (0.085)         -0.227*** (0.086)         -0.218** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.217** (0.086)         -0.086         -0.086         -0.086         -0.269*** (0.099)** (0.099)** (0.099)** (0.099)**         Ref. Ref. Ref. Ref. (0.099)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.091)** (0.094)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.099)** (0.0146)** (0.146)** (0.0464)** (0.0  | Men                |           |               | Ref.          | Ref.          | Ref.          | Ref.          | Ref.          |
| Countries   Coun |                    |           |               | -0.246***     | -0.227***     |               |               |               |
| Kids (U12-14)       -0.262*** -0.269*** -0.269*** -0.269*** -0.269*** -0.269       -0.269*** -0.269*** -0.269*** -0.269*** -0.269         Youth (U16-19)       -0.066 -0.075 -0.074 -0.074 -0.074         (0.094)       (0.094) (0.094) (0.094) (0.209)         M+ and K+       0.216 0.226 0.227 0.227 0.227         (0.144)       (0.146) (0.146) (0.146) (0.464)         Win Draw       Ref. Ref. Ref. Ref. O.079 0.079 0.079 0.079 (0.106) (0.106) (0.106) (0.151)         Loss       0.180** 0.182*** 0.182*** 0.182** (0.071) (0.071) (0.078)         Precipitation (mm)       0.122 (0.554) (0.841)         Observations Observations 13613 3613 3613 3613 3613 3609 3609       3609 3609         Log likelihood 2306.69 -3299.91 -3296.29 -3288.19 -3284.96 -3279.75 -3279.75       -3279.75 -3279.75         Pseudo R²       0.098 0.100 0.101 0.103 0.104 0.104 0.104 0.104  |                    |           |               |               |               |               |               |               |
| Kids (U12-14)       -0.262*** -0.269*** -0.269*** -0.269*** -0.269*** -0.269       -0.269*** -0.269*** -0.269*** -0.269*** -0.269         Youth (U16-19)       -0.066 -0.075 -0.074 -0.074 -0.074         (0.094)       (0.094) (0.094) (0.094) (0.209)         M+ and K+       0.216 0.226 0.227 0.227 0.227         (0.144)       (0.146) (0.146) (0.146) (0.464)         Win Draw       Ref. Ref. Ref. Ref. O.079 0.079 0.079 0.079 (0.106) (0.106) (0.106) (0.151)         Loss       0.180** 0.182*** 0.182*** 0.182** (0.071) (0.071) (0.078)         Precipitation (mm)       0.122 (0.554) (0.841)         Observations Observations 13613 3613 3613 3613 3613 3609 3609       3609 3609         Log likelihood 2306.69 -3299.91 -3296.29 -3288.19 -3284.96 -3279.75 -3279.75       -3279.75 -3279.75         Pseudo R²       0.098 0.100 0.101 0.103 0.104 0.104 0.104 0.104  | Senior             |           |               |               | Ref.          | Ref.          | Ref.          | Ref.          |
| Youth (U16-19)  Youth (U16-19)  M+ and K+  U10  Win  Draw  Draw  Precipitation (mm)  Precipitation (mm)  Observations  1 3613 3613 3613 3613 3613 3613 3613 3  |                    |           |               |               | -0.262***     | -0.269***     | -0.269***     |               |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | ,                  |           |               |               |               |               |               | (0.251)       |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Youth (U16-19)     |           |               |               | -0.066        | -0.075        | -0.074        | -0.074        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | ,                  |           |               |               | (0.094)       | (0.094)       | (0.094)       | (0.209)       |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | M+ and K+          |           |               |               | 0.216         | 0.226         | 0.227         |               |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                    |           |               |               | (0.144)       | (0.146)       | (0.146)       | (0.464)       |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Win                |           |               |               |               | Ref.          | Ref.          | Ref.          |
| Loss     0.180** 0.182*** 0.182**       Precipitation (mm)     0.122 (0.071)     0.122 (0.554)     0.182**       Observations     3613 3613 3613 3613 3613 3609     3609 3609       Log likelihood     -3306.69 -3299.91 -3296.29 -3288.19 -3284.96 -3279.75 -3279.75     -3279.75 -3279.75       Pseudo R²     0.098 0.100 0.101 0.103 0.104 0.104 0.104     0.104 0.104  | Draw               |           |               |               |               | 0.079         | 0.079         |               |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   |                    |           |               |               |               |               | (0.106)       | (0.151)       |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Loss               |           |               |               |               | $0.180^{**}$  | 0.182***      | 0.182**       |
| Observations         3613         3613         3613         3613         3613         3613         3613         3609         3609           Log likelihood         -3306.69         -3299.91         -3296.29         -3288.19         -3284.96         -3279.75         -3279.75           Pseudo R²         0.098         0.100         0.101         0.103         0.104         0.104         0.104  |                    |           |               |               |               | (0.071)       |               |               |
| Observations         3613         3613         3613         3613         3613         3613         3613         3609         3609           Log likelihood         -3306.69         -3299.91         -3296.29         -3288.19         -3284.96         -3279.75         -3279.75           Pseudo R²         0.098         0.100         0.101         0.103         0.104         0.104         0.104  | Precipitation (mm) |           |               |               |               |               | 0.122         | 0.122         |
| Log likelihood       -3306.69       -3299.91       -3296.29       -3288.19       -3284.96       -3279.75       -3279.75         Pseudo R²       0.098       0.100       0.101       0.103       0.104       0.104       0.104  | · ,                |           |               |               |               |               |               |               |
| Pseudo R <sup>2</sup> 0.098 0.100 0.101 0.103 0.104 0.104 0.104  | Observations       | 3613      | 3613          | 3613          | 3613          | 3613          | 3609          | 3609          |
|  | Log likelihood     | -3306.69  | -3299.91      | -3296.29      | -3288.19      | -3284.96      | -3279.75      | -3279.75      |
|  |                    |           |               |               |               | 0.104         | 0.104         | 0.104         |

Robust standard errors in parentheses\* p < 0.10, \*\*\* p < 0.05, \*\*\* p < 0.01

Main infill result: Individuals are more likely to report hardiness in running in all the other types of infill compared to SBR, except in Cork, in which no significant differences are found. The models examining the running variable have one of the highest Pseudo R2 so far.

Table 3.2: Marginal Effects from OLogit – Running (0 "Soft", 1 "Normal", 2 "Hard")

| Variable           | 0         | 1         | 2        |
|--------------------|-----------|-----------|----------|
| SBR                | Ref.      | Ref.      | Ref.     |
| Cork               | 0.052     | -0.012    | -0.040   |
|                    | (0.056)   | (0.016)   | (0.042)  |
| Cork/Olive         | -0.118*** | -0.058*** | 0.176*** |
|                    | (0.028)   | (0.010)   | (0.027)  |
| Non infill         | -0.144*** | -0.104*** | 0.247*** |
|                    | (0.026)   | (0.016)   | (0.027)  |
| Sand               | -0.183*** | -0.236**  | 0.419*** |
|                    | (0.032)   | (0.094)   | (0.114)  |
| Græs (FG)          | Ref.      | Ref.      | Ref.     |
| Kunst (AG)         | -0.039**  | -0.013*   | 0.053**  |
|                    | (0.018)   | (0.008)   | (0.023)  |
| Multi (AG, FG)     | -0.030*   | -0.009*   | 0.038**  |
|                    | (0.016)   | (0.005)   | (0.020)  |
| Men                | Ref.      | Ref.      | Ref.     |
| Women              | 0.030*    | 0.008     | -0.038*  |
|                    | (0.016)   | (0.006)   | (0.021)  |
| Senior             | Ref.      | Ref.      | Ref.     |
| Kids (U12-14)      | 0.036     | 0.012     | -0.048   |
|                    | (0.031)   | (0.015)   | (0.045)  |
| Youth (U16-19)     | 0.009     | 0.004     | -0.014   |
|                    | (0.026)   | (0.012)   | (0.038)  |
| M+ and K+          | -0.026    | -0.017    | 0.043    |
|                    | (0.053)   | (0.036)   | (0.089)  |
| Win                | Ref.      | Ref.      | Ref.     |
| Draw               | -0.011    | -0.003    | 0.014    |
|                    | (0.020)   | (0.007)   | (0.027)  |
| Loss               | -0.024**  | -0.009*   | 0.033**  |
|                    | (0.010)   | (0.005)   | (0.014)  |
| Precipitation (mm) | -0.016    | -0.006    | 0.022    |
|                    | (0.111)   | (0.039)   | (0.150)  |
| Number of Obs.     |           | 3,609     |          |

Robust standard errors clustered at the pitch level in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

#### 7. Rolling Passes

Table 4.1: Ordered Logit Coefficients - Rolling Passes (0 "Slow", 1 "Normal", 2 "Fast")

|                       | Model 1          | Model 2         | Model 3         | Model 4     | Model 5   | Model 6   | Model 7  |
|-----------------------|------------------|-----------------|-----------------|-------------|-----------|-----------|----------|
| SBR                   | Ref.             | Ref.            | Ref.            | Ref.        | Ref.      | Ref.      | Ref.     |
| Cork                  | -0.314***        | -0.306***       | -0.308***       | -0.283***   | -0.288*** | -0.288*** | -0.288   |
|                       | (0.088)          | (0.088)         | (0.089)         | (0.090)     | (0.090)   | (0.090)   | (0.262)  |
| Cork/Olive            | 0.704***         | 0.688***        | 0.689***        | 0.734***    | 0.736***  | 0.736***  | 0.736*** |
|                       | (0.144)          | (0.144)         | (0.144)         | (0.148)     | (0.147)   | (0.147)   | (0.096)  |
| Non infill            | 1.328***         | 1.315***        | 1.320***        | 1.381***    | 1.382***  | 1.382***  | 1.382*** |
|                       | (0.315)          | (0.315)         | (0.317)         | (0.319)     | (0.318)   | (0.318)   | (0.109)  |
| Sand                  | 0.812***         | 0.816***        | 0.816***        | 0.816***    | 0.815***  | 0.814***  | 0.814*** |
|                       | (0.078)          | (0.078)         | (0.078)         | (0.079)     | (0.079)   | (0.079)   | (0.281)  |
| Græs (FG)             |                  | Ref.            | Ref.            | Ref.        | Ref.      | Ref.      | Ref.     |
| Kunst (AG)            |                  | -0.170**        | -0.170**        | -0.194**    | -0.193**  | -0.193**  | -0.193   |
| ,                     |                  | (0.084)         | (0.084)         | (0.085)     | (0.085)   | (0.085)   | (0.120)  |
| Multi (AG, FG)        |                  | -0.110          | -0.110          | -0.118      | -0.116    | -0.116    | -0.116   |
|                       |                  | (0.074)         | (0.074)         | (0.075)     | (0.075)   | (0.075)   | (0.101)  |
| Men                   |                  |                 | Ref.            | Ref.        | Ref.      | Ref.      | Ref.     |
| Women                 |                  |                 | -0.012          | -0.001      | -0.008    | -0.008    | -0.008   |
|                       |                  |                 | (0.087)         | (0.088)     | (0.088)   | (0.088)   | (0.135)  |
| Senior                |                  |                 |                 | Ref.        | Ref.      | Ref.      | Ref.     |
| Kids (U12-14)         |                  |                 |                 | 0.029       | 0.030     | 0.030     | 0.030    |
| ,                     |                  |                 |                 | (0.089)     | (0.090)   | (0.090)   | (0.235)  |
| Youth (U16-19)        |                  |                 |                 | $0.159^{*}$ | 0.163*    | 0.163*    | 0.163    |
|                       |                  |                 |                 | (0.091)     | (0.092)   | (0.092)   | (0.220)  |
| M+ and K+             |                  |                 |                 | 0.212       | 0.201     | 0.201     | 0.201    |
|                       |                  |                 |                 | (0.144)     | (0.145)   | (0.145)   | (0.433)  |
| Win                   |                  |                 |                 |             | Ref.      | Ref.      | Ref.     |
| Draw                  |                  |                 |                 |             | -0.083    | -0.083    | -0.083   |
|                       |                  |                 |                 |             | (0.108)   | (0.108)   | (0.120)  |
| Loss                  |                  |                 |                 |             | -0.120*   | -0.120*   | -0.120   |
|                       |                  |                 |                 |             | (0.069)   | (0.069)   | (0.081)  |
| Precipitation (mm)    |                  |                 |                 |             |           | 0.023     | 0.023    |
| . ,                   |                  |                 |                 |             |           | (0.508)   | (0.747)  |
| Observations          | 3614             | 3614            | 3614            | 3614        | 3614      | 3610      | 3610     |
| Log likelihood        | -3392.52         | -3390.22        | -3390.21        | -3387.59    | -3386.03  | -3383.02  | -3383.02 |
| Pseudo R <sup>2</sup> | 0.029            | 0.030           | 0.030           | 0.030       | 0.031     | 0.031     | 0.031    |
| Robust standard       | arrors in norant | hasas* n < 0.10 | ** n < 0.05 *** | n < 0.01    |           |           |          |

Robust standard errors in parentheses\* p < 0.10, \*\*\* p < 0.05, \*\*\* p < 0.01

Main infill result: Compared to SBR, players have higher odds of reporting faster passes in all the other types of infill except in Cork, where the sign is negative and it loses significance in Model 7.

Table 4.2: Marginal Effects from Ordered Logit – Rolling Passes (0 "Slow", 1 "Normal", 2 "Fast")

| Variable           | 0         | 1         | 2        |
|--------------------|-----------|-----------|----------|
| SBR                | Ref.      | Ref.      | Ref.     |
| Cork               | 0.037     | 0.025     | -0.062   |
|                    | (0.036)   | (0.018)   | (0.054)  |
| Cork/Olive         | -0.065*** | -0.113*** | 0.178*** |
|                    | (0.011)   | (0.013)   | (0.022)  |
| Non infill         | -0.096*** | -0.235*** | 0.331*** |
|                    | (0.012)   | (0.019)   | (0.024)  |
| Sand               | -0.069*** | -0.128**  | 0.197*** |
|                    | (0.019)   | (0.052)   | (0.069)  |
| Græs (FG)          | Ref.      | Ref.      | Ref.     |
| Kunst (AG)         | 0.019*    | 0.025     | -0.044   |
|                    | (0.011)   | (0.016)   | (0.027)  |
| Multi (AG, FG)     | 0.011     | 0.016     | -0.027   |
|                    | (0.010)   | (0.014)   | (0.023)  |
| Men                | Ref.      | Ref.      | Ref.     |
| Women              | 0.001     | 0.001     | -0.002   |
|                    | (0.014)   | (0.017)   | (0.031)  |
| Senior             | Ref.      | Ref.      | Ref.     |
| Kids (U12-14)      | -0.003    | -0.004    | 0.007    |
|                    | (0.025)   | (0.028)   | (0.053)  |
| Youth (U16-19)     | -0.020    | -0.026    | 0.046    |
|                    | (0.041)   | (0.060)   | (0.100)  |
| M+ and K+          | -0.016    | -0.021    | 0.037    |
|                    | (0.024)   | (0.027)   | (0.050)  |
| Win                | Ref.      | Ref.      | Ref.     |
| Draw               | 0.008     | 0.011     | -0.019   |
|                    | (0.012)   | (0.016)   | (0.027)  |
| Loss               | 0.012     | 0.015     | -0.027   |
|                    | (0.008)   | (0.010)   | (0.018)  |
| Precipitation (mm) | -0.002    | -0.003    | 0.005    |
|                    | (0.074)   | (0.096)   | (0.171)  |
| Number of Obs.     |           | 3,610     |          |

Robust standard errors clustered at the pitch level in parentheses \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01