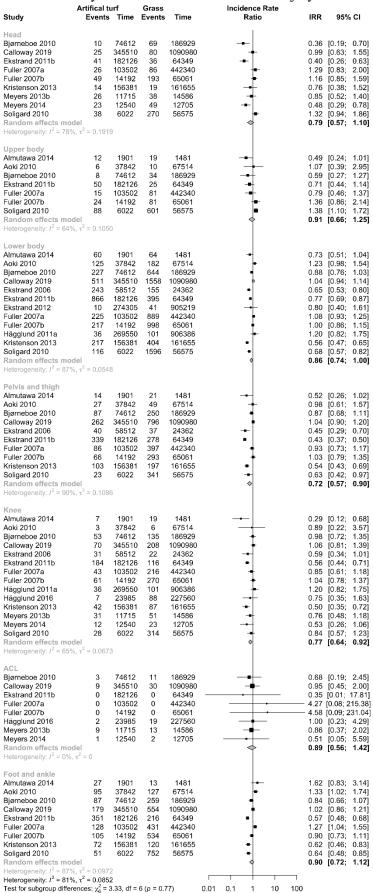
Supplementary figures

Supplementary figure 1: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in both men and women.



Supplementary figure 2: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in men.

Artifical turf Grass Incidence Rate

Study	Artifical turf Events Time	Grass Events Time	Incidence Rate Ratio	IRR 95% CI
Head Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Meyers 2014 Random effects mod Heterogeneity: $l^2 = 82\%$		30 54500 44 208842 66 27803		0.36 [0.19; 0.70] 0.99 [0.63; 1.55] 0.38 [0.23; 0.63] 0.92 [0.48; 1.79] 1.82 [1.18; 2.78] 0.76 [0.38; 1.52] 0.48 [0.29; 0.78] 0.71 [0.45; 1.12]
Upper body Almutawa 2014 Bjørneboe 2010 Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mod Heterogeneity: I ² = 0%,		19 1481 34 186929 22 54500 48 208842 42 27803		0.49 [0.24; 1.01] 0.59 [0.27; 1.27] 0.76 [0.46; 1.27] 0.69 [0.34; 1.41] 1.10 [0.58; 2.10] 0.73 [0.54; 0.97]
Lower body Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Ekstrand 2012 Fuller 2007a Fuller 2007b Hägglund 2011a Kristenson 2013 Random effects mod Heterogeneity: /² = 87%		155 24362 349 54500 41 905219 420 208842 448 27803 101 906386		0.73 [0.51; 1.04] 0.88 [0.76; 1.03] 1.04 [0.94; 1.14] 0.65 [0.53; 0.80] 0.79 [0.69; 0.89] 0.80 [0.40; 1.61] 1.21 [1.00; 1.47] 1.06 [0.87; 1.30] 1.20 [0.82; 1.75] 0.56 [0.47; 0.65] 0.86 [0.73; 1.03]
Pelvis and thigh Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Random effects mod Heterogeneity: $I^2 = 92\%$		37 24362 258 54500 196 208842 174 27803		0.52 [0.26; 1.02] 0.87 [0.68; 1.11] 1.04 [0.90; 1.20] 0.45 [0.29; 0.70] 0.42 [0.36; 0.50] 1.06 [0.78; 1.42] 0.93 [0.67; 1.31] 0.54 [0.43; 0.69] 0.70 [0.53; 0.92]
Knee Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Hägglund 2011a Kristenson 2013 Meyers 2014 Random effects mod Heterogeneity: l ² = 77%		22 24362 107 54500 90 208842 86 27803 101 906386		0.29 [0.12; 0.68] 0.98 [0.72; 1.35] 1.06 [0.81; 1.39] 0.59 [0.34; 1.01] 0.53 [0.41; 0.68] 0.99 [0.63; 1.55] 1.21 [0.79; 1.87] 1.20 [0.82; 1.75] 0.50 [0.35; 0.72] 0.53 [0.26; 1.06] 0.76 [0.58; 0.99]
ACL Bjørneboe 2010 Calloway 2019 Meyers 2014 Random effects mod Heterogeneity: /² = 0%,		11 186929 30 1090980 2 12705	-	0.68 [0.19; 2.45] 0.95 [0.45; 2.00] 0.51 [0.05; 5.59] 0.84 [0.45; 1.57]
Foot and ankle Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Random effects mod Heterogeneity: I ² = 87% Heterogeneity: I ² = 83% Test for subgroup differe	$\tau^2 = 0.1050$ $\tau^2 = 0.1037$	199 54500 219 208842 253 27803 120 161655	0.1 0.5 1 2 10	1.62 [0.83; 3.14] 0.84 [0.66; 1.07] 1.02 [0.86; 1.21] 0.56 [0.47; 0.67] 1.37 [1.06; 1.76] 0.95 [0.72; 1.25] 0.62 [0.46; 0.83] 0.90 [0.69; 1.17]

Supplementary figure 3: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in women.

Study	artifical turf Events Tir	Grass ne Events		Incidence Rate Ratio	IRR	95% CI
Head Ekstrand 2011b Fuller 2007a Fuller 2007b Meyers 2013b Random effects mode Heterogeneity: I ² = 59%,		98 42 97 127	9849 233498 37258 14586		1.77 0.75 0.85	[0.17; 1.27] [0.98; 3.20] [0.46; 1.24] [0.52; 1.40] [0.56; 1.47]
Upper body Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mode Heterogeneity: I ² = 27%,		98 33	9849 233498 37258		0.90 1.64	[0.13; 2.04] [0.38; 2.16] [0.86; 3.13] [0.60; 2.03]
Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mode Heterogeneity: /² = 0%, r′		98 469	9849 233498 37258		0.92 0.91	[0.57; 1.11] [0.73; 1.16] [0.73; 1.13] [0.77; 1.03]
Pelvis and thigh Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mode Heterogeneity: I ² = 19%,		98 201	9849 233498 37258	- B	0.74 1.07	[0.39; 1.09] [0.51; 1.09] [0.69; 1.67] [0.61; 1.07]
Knee Ekstrand 2011b Fuller 2007a Fuller 2007b Hägglund 2016 Meyers 2013b Random effects mode Heterogeneity: /² = 0%, τ²		98 126 97 184 985 88	9849 233498 37258 227560 14586		0.75 0.98 0.75 0.76	[0.48; 2.07] [0.46; 1.21] [0.68; 1.42] [0.35; 1.63] [0.48; 1.18] [0.68; 1.06]
ACL Hägglund 2016 Meyers 2013b Random effects mode Heterogeneity: $I^2 = 0\%$, τ^2			227560 14586		0.86	[0.23; 4.29] [0.37; 2.02] [0.43; 1.86]
Foot and ankle Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mode Heterogeneity: $I^2 = 0\%$, τ^2 Heterogeneity: $I^2 = 0\%$, τ^2 Test for subgroup different	= 0.0053 = 0	98 212 97 281	9849 233498 37258 0.98)	0.2 0.5 1 2 5	1.10 0.81	[0.50; 1.47] [0.80; 1.51] [0.59; 1.12] [0.74; 1.17]

Supplementary figure 4: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in professional players.

Study	Artifical turf Events Time	Grass Events	Time	Incidence Rate Ratio	IRR 95% CI
Head Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Kristenson 2013 Random effects mod Heterogeneity: $I^2 = 71\%$,		80	186929 1090980 64349 161655	- a -	0.36 [0.19; 0.70] 0.99 [0.63; 1.55] 0.40 [0.26; 0.63] 0.76 [0.38; 1.52] 0.58 [0.35; 0.95]
Upper body Almutawa 2014 Bjørneboe 2010 Ekstrand 2011b Random effects mod Heterogeneity: $I^2 = 0\%$, 1		19 34 3 25	1481 186929 64349	-B- -B- -B- 	0.49 [0.24; 1.01] 0.59 [0.27; 1.27] 0.71 [0.44; 1.14] 0.62 [0.44; 0.89]
Lower body Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Ekstrand 2012 Hägglund 2011a Kristenson 2013 Random effects mod Heterogeneity: I ² = 87%,		155 395 41 101	1481 186929 1090980 24362 64349 905219 906386 161655		0.73 [0.51; 1.04] 0.88 [0.76; 1.03] 1.04 [0.94; 1.14] 0.65 [0.53; 0.80] 0.77 [0.69; 0.87] 0.80 [0.40; 1.61] 1.20 [0.82; 1.75] 0.56 [0.47; 0.65] 0.80 [0.67; 0.96]
Pelvis and thigh Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Kristenson 2013 Random effects mod Heterogeneity: /² = 94%,		37 278	1481 186929 1090980 24362 64349 161655		0.52 [0.26; 1.02] 0.87 [0.68; 1.11] 1.04 [0.90; 1.20] 0.45 [0.29; 0.70] 0.43 [0.37; 0.50] 0.54 [0.43; 0.69] 0.62 [0.45; 0.85]
Knee Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Hägglund 2011a Kristenson 2013 Random effects mod Heterogeneity: I ² = 81%,		208 22 3 116 101	1481 186929 1090980 24362 64349 906386 161655		0.29 [0.12; 0.68] 0.98 [0.72; 1.35] 1.06 [0.81; 1.39] 0.59 [0.34; 1.01] 0.56 [0.44; 0.71] 1.20 [0.82; 1.75] 0.50 [0.35; 0.72] 0.71 [0.52; 0.99]
ACL Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Random effects mod Heterogeneity: /² = 0%, 1	3 74612 9 345510 0 182126	30	186929 1090980 64349	-	0.68 [0.19; 2.45] 0.95 [0.45; 2.00] 0.35 [0.01; 17.81] 0.85 [0.45; 1.61]
Foot and ankle Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Kristenson 2013 Random effects mod Heterogeneity: $I^2 = 87\%$, Heterogeneity: $I^2 = 84\%$, Test for subgroup differe	$\tau^2 = 0.0936$ $\tau^2 = 0.0864$	554 216 120	1481 186929 1090980 64349 161655	0.01 0.1 1 10	1.62 [0.83; 3.14] 0.84 [0.66; 1.07] 1.02 [0.86; 1.21] 0.57 [0.48; 0.68] 0.62 [0.46; 0.83] 0.81 [0.60; 1.10]

Supplementary figure 5: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in amateur players.

Head Fuller 2007a Fuller 2007b Meyers 2013b Meyers 2014 Soligard 2010 Random effects model Heterogeneity: $I^2 = 70\%$, τ^2	26 49 26 23 38	103502 14192 11715 12540 6022	86 193 38 49 270	442340 65061 14586 12705 56575		1.16 0.85 0.48 1.32	[0.83; [0.85; [0.52; [0.29; [0.94; [0.69 ;	1.59] 1.40] 0.78] 1.86]
Upper body Aoki 2010 Fuller 2007a Fuller 2007b Soligard 2010 Random effects model Heterogeneity: $I^2 = 14\%$, $\tau^2 = 14\%$	6 15 24 88 = 0.015	37842 103502 14192 6022	10 81 81 601	67514 442340 65061 56575	- -	0.79 1.36 1.38	[0.39; [0.46; [0.86; [1.10; [0.97 ;	1.37] 2.14] 1.72]
Lower body Aoki 2010 Fuller 2007a Fuller 2007b Soligard 2010 Random effects model Heterogeneity: $I^2 = 85\%$, $\tau^2 = 100$	125 225 217 116	37842 103502 14192 6022	182 889 998 1596	67514 442340 65061 56575	■ G ■ ♦	1.08 1.00 0.68	[0.98; [0.93; [0.86; [0.57; [0.77 ;	1.25] 1.15] 0.82]
Pelvis and thigh Aoki 2010 Fuller 2007a Fuller 2007b Soligard 2010 Random effects model Heterogeneity: $I^2 = 21\%$, $\tau^2 = 10\%$	27 86 66 23	37842 103502 14192 6022	49 397 293 341	67514 442340 65061 56575	■ ■ ■ •	0.93 1.03 0.63	[0.61; [0.73; [0.79; [0.42; [0.79 ;	1.17] 1.35] 0.97]
Knee Aoki 2010 Fuller 2007a Fuller 2007b Hägglund 2016 Meyers 2013b Meyers 2014 Soligard 2010 Random effects model Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0\%$	3 43 61 7 31 12 28	37842 103502 14192 23985 11715 12540 6022	6 216 270 88 51 23 314	67514 442340 65061 227560 14586 12705 56575		0.85 1.04 0.75 0.76 0.53 0.84	[0.22; [0.61; [0.78; [0.35; [0.48; [0.26; [0.57; [0.74;	-
ACL Fuller 2007a Fuller 2007b Hägglund 2016 Meyers 2013b Meyers 2014 Random effects model Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0\%$	0 0 2 9 1	103502 14192 23985 11715 12540	0 0 19 13 2	442340 65061 227560 14586 12705	-	- 4.58 1.00 0.86 0.51	[0.08; 2 [0.09; 2 [0.23; [0.37; [0.05; [0.48 ;	31.04] 4.29] 2.02] 5.59]
Foot and ankle Aoki 2010 Fuller 2007a Fuller 2007b Soligard 2010 Random effects model	95 128 105 51	37842 103502 14192 6022	127 431 534 752	67514 442340 65061 56575	•	1.27 0.90 0.64	[1.02; [1.04; [0.73; [0.48; [0.72 ;	1.55] 1.11]

Supplementary figure 6: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury sustained in games.

Study	Artifical tu Events		Grass Events	Time	Incidence Rate Ratio	IRR	95%	CI
Head Calloway 2019 Fuller 2007b Meyers 2013b Meyers 2014 Soligard 2010 Random effects model to the second s		345510 14192 11715 12540 6022	80 193 38 49 270	1090980 65061 14586 12705 56575		1.16 0.85 0.48 1.32	[0.94;	1.55] 1.59] 1.40] 0.78] 1.86] 1.31]
Upper body Fuller 2007b Soligard 2010 Random effects mod Heterogeneity: I ² = 0%		14192 6022	81 601	65061 56575		1.38	[0.86; [1.10; [1.12 ;	1.72]
Lower body Calloway 2019 Fuller 2007b Soligard 2010 Random effects mod Heterogeneity: $I^2 = 87\%$		345510 14192 6022	1558 998 1596	1090980 65061 56575	G • ♦	1.00 0.68	[0.94; [0.86; [0.57; [0.70 ;	1.15] 0.82]
Pelvis and thigh Calloway 2019 Fuller 2007b Soligard 2010 Random effects mod Heterogeneity: $I^2 = 59\%$		345510 14192 6022	796 293 341	1090980 65061 56575	- - -	1.03 0.63	[0.90; [0.79; [0.42; [0.73 ;	1.35] 0.97]
Knee Calloway 2019 Fuller 2007b Meyers 2013b Meyers 2014 Soligard 2010 Random effects mod Heterogeneity: I ² = 229		345510 14192 11715 12540 6022	208 270 51 23 314	1090980 65061 14586 12705 56575	# 	1.04 0.76 0.53 0.84	[0.57;	1.37]
ACL Calloway 2019 Fuller 2007b Meyers 2013b Meyers 2014 Random effects mo Heterogeneity: $I^2 = 0\%$		345510 14192 11715 12540	30 0 13 2	1090980 65061 14586 12705	- +	- 4.58 0.86 0.51	[0.45; [0.09; 2 [0.37; [0.05; [0.53 ;	31.04] 2.02] 5.59]
Foot and ankle Calloway 2019 Fuller 2007b Soligard 2010 Random effects mod Heterogeneity: $I^2 = 74^\circ$ Heterogeneity: $I^2 = 60^\circ$ Test for subgroup differ	6, $\tau^2 = 0.0408$ 6, $\tau^2 = 0.0344$	ļ	554 534 752 6 (p = 0	1090980 65061 56575	0.01 0.1 1 10 100	0.90 0.64	[0.86; [0.73; [0.48; [0.66 ;	1.11] 0.85]

Supplementary figure 7: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury sustained in training sessions.

Study	Artifical to Events	urf Time	Grass Events	Time	Incidence Rate Ratio	IRR	95% CI
Head Fuller 2007a	26	103502	86	442340	•	1.29	[0.83; 2.00]
Upper body Fuller 2007a	15	103502	81	442340	-	0.79	[0.46; 1.37]
Lower body Fuller 2007a	225	103502	889	442340	P	1.08	[0.93; 1.25]
Pelvis and thigh Fuller 2007a	86	103502	397	442340	-	0.93	[0.73; 1.17]
Knee Fuller 2007a	43	103502	216	442340	=	0.85	[0.61; 1.18]
ACL Fuller 2007a	0	103502	0	442340		—— 4.27	[0.08; 215.38]
Foot and ankle Fuller 2007a Heterogeneity: I ² = 30% Test for subgroup differ				442340 20)	0.01 0.1 1 10	1.27	[1.04; 1.55]

Supplementary figure 8: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in adult players.

	Artifical turf	Grass		Incidence Rate		
Study	Events Tin		Time	Ratio	IRR 95%	CI
Head Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Meyers 2014 Random effects mode Heterogeneity: I ² = 76%,		510 80 126 36 502 86 92 193 381 19 15 38	186929 1090980 64349 442340 65061 161655 14586 12705		0.40 [0.26;	1.55] 0.63] 2.00] 1.59] 1.52] 1.40] 0.78]
Upper body Almutawa 2014 Bjørneboe 2010 Ekstrand 2011b Fuller 2007a Fuller 2007b Random effects mode Heterogeneity: J ² = 48%,		12 34 126 25 502 81	1481 186929 64349 442340 65061	- a -		
Lower body Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Ekstrand 2012 Fuller 2007a Fuller 2007b Hägglund 2011a Kristenson 2013 Random effects model Heterogeneity: J² = 87%,		12 644 510 1558 12 155 126 395 305 41 502 889 92 998 550 101	1481 186929 1090980 24362 64349 905219 442340 65061 906386 161655		1.00 [0.86; 1.20 [0.82;	0.87] 1.61] 1.25] 1.15] 1.75] 0.65]
Pelvis and thigh Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Random effects mode Heterogeneity: I ² = 92%,		12 250 510 796 12 37 126 278 502 397 92 293	1481 186929 1090980 24362 64349 442340 65061 161655		0.87 [0.68; 1.04 [0.90; 0.45 [0.29; 0.43 [0.37; 0.93 [0.73; 1.03 [0.79;	0.50] 1.17] 1.35] 0.69]
Knee Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Hägglund 2011a Kristenson 2013 Meyers 2013b Meyers 2014 Random effects model Heterogeneity: J² = 73%,		12 135 510 208 12 22 126 116 502 216 92 270 550 101 881 87 15 51	1481 186929 1090980 24362 64349 442340 65061 906386 161655 14586 12705		0.98 [0.72; 1.06 [0.81; 0.59 [0.34; 0.56 [0.44; 0.85 [0.61; 1.04 [0.78; 1.20 [0.82; 0.50 [0.35; 0.76 [0.48; 0.53 [0.26;	0.68] 1.35] 1.39] 1.01] 0.71] 1.18] 1.37] 1.75] 0.72] 1.18] 1.06] 0.94]
ACL Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Fuller 2007a Fuller 2007b Meyers 2013b Meyers 2014 Random effects mode Heterogeneity: I ² = 0%, τ		510 30 126 0 502 0 92 0 15 13	186929 1090980 64349 442340 65061 14586 12705		0.68 [0.19; 0.95 [0.45; 0.35 [0.01; 	2.00] 17.81] 15.38] 31.04] 2.02] 5.59]
Foot and ankle Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Random effects mode Heterogeneity: I ² = 88%, Test for subgroup differer	$\tau^2 = 0.0893$ $\tau^2 = 0.0831$	12 259 510 554 126 216 502 431 92 534 381 120	1481 186929 1090980 64349 442340 65061 161655	0.01 0.1 1 10 10	0.57 [0.48; 1.27 [1.04; 0.90 [0.73; 0.62 [0.46; 0.89 [0.69 ;	1.07] 1.21] 0.68] 1.55] 1.11] 0.83]

Supplementary figure 9: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by the anatomical location of the injury in youth players.

Study	Artifical to Events		Grass Events	Time	Incidence Rate Ratio	IRR	95% CI
Head Soligard 2010	38	6022	270	56575	-	1.32	[0.94; 1.86]
Upper body Aoki 2010 Soligard 2010 Random effects mode Heterogeneity: $I^2 = 0\%$, τ^2		37842 6022	10 601	67514 56575	- 	1.38	[0.39; 2.95] [1.10; 1.72] [1.09; 1.69]
Lower body Aoki 2010 Soligard 2010 Random effects mode Heterogeneity: $I^2 = 93\%$,		37842 6022	182 1596	67514 56575	-	0.68	[0.98; 1.54] [0.57; 0.82] [0.51; 1.62]
Pelvis and thigh Aoki 2010 Soligard 2010 Random effects mode Heterogeneity: $I^2 = 46\%$,		37842 6022 5	49 341	67514 56575		0.63	[0.61; 1.57] [0.42; 0.97] [0.51; 1.20]
Knee Aoki 2010 Hägglund 2016 Soligard 2010 Random effects mode Heterogeneity: $I^2 = 0\%$, τ'		37842 23985 6022		67514 227560 56575	-	0.75 0.84	[0.22; 3.57] [0.35; 1.63] [0.57; 1.23] [0.59; 1.15]
ACL Hägglund 2016	2	23985	19	227560		- 1.00	[0.23; 4.29]
Foot and ankle Aoki 2010 Soligard 2010 Random effects mode Heterogeneity: $l^2 = 93\%$, Heterogeneity: $l^2 = 75\%$, Test for subgroup differer	$\tau^2 = 0.253$ $\tau^2 = 0.078$	9	752	67514 56575	0.5 1 2	0.64	[1.02; 1.74] [0.48; 0.85] [0.45; 1.91]

Supplementary figure 10: Forest plot of the injury incidence rate ratios on artificial turf compared to grass stratified by the geographical global regions.

	Artifical to	ırf	Grass		Incidence Rate		
Study	Events	Time	Events	Time	Ratio	IRR	95%-CI
Middle-East							
Almutawa 2014	72	1901	83	1481		0.68	[0.49; 0.93]
Central Europe, Eas	-Asia. and	the US/					
Aoki 2010	186	37842	298	67514		1.11	[0.93; 1.34]
Calloway 2019	536	345510	1638	1090980	-		[0.94; 1.14]
Ekstrand 2006	483	58512	274	24362			[0.63; 0.85]
Ekstrand 2011b	998	182126	494	64349			[0.64; 0.80]
Fuller 2007a	311	103502	1283	442340		1.04	[0.92; 1.17]
Fuller 2007b	317	14192	1477	65061	-		[0.87; 1.11]
Lanzetti 2017	23	1270	20	1310	-	— 1.19	[0.65; 2.16]
Meyers 2013b	272	11715	421	14586		0.80	[0.69; 0.94]
Meyers 2014	268	12540	454	12705		0.60	[0.51; 0.70]
Rössler 2017	166	115711	161	156011	_ -	1.39	[1.12; 1.73]
Random effects mod	lel					0.91	[0.78; 1.07]
Heterogeneity: $I^2 = 90\%$	τ_0 , $\tau^2 = 0.0582$	2					
Northern Europe							
Bjørneboe 2010	267	74612	800	186929		0.84	[0.73; 0.96]
Kristenson 2013	375	156381	591	161655		0.66	[0.58; 0.75]
Kristenson 2016	119	5938	253	10513		0.83	[0.67; 1.04]
Soligard 2010	206	6022	2248	56575		0.86	[0.75; 0.99]
Steffen 2007	119	39979	286	73044		0.76	[0.61; 0.94]
Random effects mod						0.78	[0.70; 0.87]
Heterogeneity: $I^2 = 60\%$							
Heterogeneity: $I^2 = 87\%$					1	1	
Test for subgroup difference	ences: $\chi_2^2 = 3$	3.74, df =	2 (p = 0.1)	15)	0.5 1 2	2	

Supplementary figure 11: Sensitivity analysis with only third generation artificial turfs included. Forest plot of the incidence of overall injuries on artificial turf compared to grass stratified by sex.

	Artifical tu	ırf	Grass		Incidence Rate		
Study	Events	Time	Events	Time	Ratio	IRR	95%-CI
Both Soligard 2010	206	6022	2248	56575	-	0.86	[0.75; 0.99]
Men Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Kristenson 2016 Lanzetti 2017 Meyers 2014 Random effects mod Heterogeneity: /² = 88%,		1901 74612 345510 58512 143571 56504 7195 156381 5938 1270 12540	83 800 1638 274 437 629 665 591 253 20 454	1481 186929 1090980 24362 54500 208842 27803 161655 10513 1310 12705		0.84 1.03 0.73 0.72 1.11 1.06 0.66 0.83 — 1.19 0.60	[0.49; 0.93] [0.73; 0.96] [0.94; 1.14] [0.63; 0.85] [0.64; 0.81] [0.94; 1.31] [0.90; 1.25] [0.58; 0.75] [0.67; 1.04] [0.65; 2.16] [0.51; 0.70] [0.72; 0.94]
Women Ekstrand 2011b Fuller 2007a Fuller 2007b Meyers 2013b Steffen 2007 Random effects mod Heterogeneity: $I^2 = 81\%$, Test for subgroup differe	$\tau^2 = 0$ $\tau^2 = 0.0258$		57 654 812 421 286	9849 233498 37258 14586 73044	0.5 1	0.93 0.88 0.80 0.76	[0.55; 1.01] [0.76; 1.12] [0.73; 1.05] [0.69; 0.94] [0.61; 0.94] [0.76; 0.91]

Supplementary figure 12: Sensitivity analysis with only third generation artificial turfs included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified between professional and amateur players.

	Artifical to	ırf	Other		Incidence Rate		
Study	Events	Time	Events	Time	Ratio	IRR	95%-CI
Professional Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011b	72 267 536 483 998	1901 74612 345510 58512 182126	83 800 1638 274 494	1481 186929 1090980 24362 64349	——————————————————————————————————————	0.84 1.03 0.73	[0.49; 0.93] [0.73; 0.96] [0.94; 1.14] [0.63; 0.85] [0.64; 0.80]
Kristenson 2013 Kristenson 2016	375 119	156381 5938	591 253	161655 10513		0.66	[0.58; 0.75] [0.67; 1.04]
Lanzetti 2017 Random effects mod Heterogeneity: $I^2 = 84\%$		1270	20	1310	◇		[0.65; 2.16] [0.70; 0.90]
Amateur Fuller 2007a Fuller 2007b Meyers 2013b Meyers 2014 Soligard 2010 Steffen 2007 Random effects mod Heterogeneity: $I^2 = 87\%$	$6, \tau^2 = 0.0345$		1283 1477 421 454 2248 286	442340 65061 14586 12705 56575 73044		0.98 0.80 0.60 0.86 0.76	[0.92; 1.17] [0.87; 1.11] [0.69; 0.94] [0.51; 0.70] [0.75; 0.99] [0.61; 0.94] [0.71; 0.98]
Heterogeneity: $I^2 = 85\%$ Test for subgroup differ			1 (p = 0.6	65)	0.5 1	2	

Supplementary figure 13: Sensitivity analysis with only third generation artificial turfs included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by matches and training sessions.

Study	Artifical turf Events Tim	Other e Events	Time	Incidence Rate Ratio	IRR	95%-CI
Study	Events IIII	e Events	Time	Ratio	IKK	95%-CI
Both Almutawa 2014 Bjørneboe 2010 Ekstrand 2006 Ekstrand 2011b Kristenson 2013 Kristenson 2016 Steffen 2007 Random effects mod Heterogeneity: /² = 27%		2 800 2 274 26 494 81 591 8 253	1481 186929 24362 64349 161655 10513 73044		0.84 0.73 0.71 0.66 0.83 0.76	[0.49; 0.93] [0.73; 0.96] [0.63; 0.85] [0.64; 0.80] [0.58; 0.75] [0.67; 1.04] [0.61; 0.94] [0.69; 0.80]
Match Calloway 2019 Fuller 2007b Lanzetti 2017 Meyers 2013b Meyers 2014 Soligard 2010 Random effects mod Heterogeneity: I ² = 88%		02 1477 0 20 5 421 40 454	1090980 65061 1310 14586 12705 56575		0.98 — 1.19 0.80 0.60 0.86	[0.94; 1.14] [0.87; 1.11] [0.65; 2.16] [0.69; 0.94] [0.51; 0.70] [0.75; 0.99] [0.72; 1.03]
Training Fuller 2007a Heterogeneity: I ² = 85% Test for subgroup difference			442340	0.5 1	1.04 2	[0.92; 1.17]

Supplementary figure 14: Sensitivity analysis with only third generation artificial turfs included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury mechanism (contact vs non-contact).

Study	Artifical to Events		Grass Events	Time	Incidence Rate Ratio	IRR	95% CI
Contact Almutawa 2014 Fuller 2007a Fuller 2007b Lanzetti 2017 Meyers 2013b Meyers 2014 Steffen 2007 Random effects mod Heterogeneity: $l^2 = 87\%$		1901 103502 14192 1270 11715 12540 39979	59 584 1073 5 234 294 153	1481 442340 65061 1310 14586 12705 73044		1.11 0.99 - 2.06 0.82 0.56 0.63	[0.30; 0.70] [0.92; 1.32] [0.86; 1.14] [0.71; 6.04] [0.67; 1.00] [0.46; 0.68] [0.46; 0.86] [0.60; 1.02]
Non-contact Almutawa 2014 Fuller 2007a Fuller 2007b Lanzetti 2017 Meyers 2013b Meyers 2014 Random effects mod Heterogeneity: $l^2 = 39\%$ Heterogeneity: $l^2 = 78\%$ Test for subgroup differe	$\tau^2 = 0.013$ $\tau^2 = 0.055$	0	23 691 398 15 187 160	1481 442340 65061 1310 14586 12705	0.2 0.5 1 2 5	0.93 0.97 0.89 0.79 0.67 0.86	[0.74; 2.11] [0.78; 1.11] [0.76; 1.22] [0.43; 1.88] [0.62; 0.99] [0.53; 0.86] [0.74; 1.00]

Supplementary figure 15: Sensitivity analysis with only third generation artificial turfs included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury type (fracture, sprain, ligament injury).

Study	Artifical tu Events	rf Time	Grass Events	Time	Incidence Rate Ratio	IRR	95% CI
Contusion Bjørneboe 2010 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: $I^2 = 129$	70 97 6 83	74612 103502 14192 156381 1270 6022	153 165 364 93 1 883	186929 442340 65061 161655 1310 56575	# # #	1.11 0.88 1.08 6.19 0.88	[0.64; 1.19] [0.80; 1.56] [0.68; 1.14] [0.81; 1.43] [0.75; 51.41] [0.71; 1.11] [0.84; 1.07]
Sprain Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: I ² = 619	99 110 117 119 0 6	1901 74612 345510 58512 103502 14192 156381 1270 6022	20 279 328 46 440 547 186 1	1481 186929 1090980 24362 442340 65061 161655 1310 56575		0.90 1.14 0.90 1.07 0.98 0.66 0.34 0.46	[0.23; 0.96] [0.71; 1.13] [0.92; 1.40] [0.63; 1.27] [0.87; 1.32] [0.80; 1.20] [0.53; 0.83] [0.01; 8.44] [0.20; 1.04]
Strain Almutawa 2014 Bjørneboe 2010 Calloway 2019 Ekstrand 2006 Ekstrand 2011a Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: 1² = 869	59 492 120 66 124 13 13	1901 74612 345510 58512 269550 103502 14192 156381 1270 6022	49 258 842 61 2416 525 298 251 14 168	1481 186929 1090980 24362 906386 442340 65061 161655 1310 56575		0.85 1.07 0.40 0.68 0.98 1.02 0.51 0.96 0.73	[0.48; 1.07] [0.67; 1.09] [0.93; 1.22] [0.28; 0.58] [0.62; 0.75] [0.80; 1.19] [0.78; 1.33] [0.41; 0.63] [0.45; 2.04] [0.41; 1.28] [0.62; 0.93]
Other Almutawa 2014 Bjørneboe 2010 Ekstrand 2012 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: $I^2 = 499$ Test for subgroup differ	68 64 33 4 8 del 4 , 2 = 0.0594 6 , 2 = 0.0514		14 110 41 234 268 55 4 89	1481 186929 905219 442340 65061 161655 1310 56575	0.1 0.51 2 10	0.59 0.80 1.24 1.09 0.62 1.03 0.84	[0.40; 1.73] [0.39; 0.91] [0.40; 1.61] [0.95; 1.63] [0.83; 1.44] [0.40; 0.95] [0.26; 4.12] [0.41; 1.74] [0.68; 1.12]

Supplementary figure 16: Sensitivity analysis with only prospective studies included. Forest plot of the incidence of overall injuries on artificial turf compared to grass stratified by sex.

Study	Artifical to	ırf Time	Grass Events	Time	Incidence Rate Ratio	IRR	95%-CI
Study	Events	Tille	Events	Tille	Ratio	IKK	95%-01
Both Aoki 2010 Rössler 2017 Soligard 2010 Random effects mod Heterogeneity: $l^2 = 86\%$		37842 115711 6022	298 161 2248	67514 156011 56575	-	1.39 0.86	[0.93; 1.34] [1.12; 1.73] [0.75; 0.99] [0.83; 1.43]
Men Almutawa 2014 Bjørneboe 2010 Ekstrand 2006 Ekstrand 2011b Fuller 2007a Fuller 2007b Kristenson 2013 Kristenson 2016 Lanzetti 2017 Meyers 2014 Random effects mod Heterogeneity: l² = 84%		1901 74612 58512 143571 56504 7195 156381 5938 1270 12540	83 800 274 437 629 665 591 253 20 454	1481 186929 24362 54500 208842 27803 161655 10513 1310 12705		0.84 0.73 0.72 1.11 1.06 0.66 0.83 — 1.19 0.60	[0.49; 0.93] [0.73; 0.96] [0.63; 0.85] [0.64; 0.81] [0.94; 1.31] [0.90; 1.25] [0.58; 0.75] [0.67; 1.04] [0.65; 2.16] [0.51; 0.70] [0.70; 0.92]
Women Ekstrand 2011b Fuller 2007a Fuller 2007b Meyers 2013b Steffen 2007 Random effects mod Heterogeneity: $I^2 = 0\%$, Heterogeneity: $I^2 = 83\%$ Test for subgroup differe	$\tau^2 = 0$ $\tau^2 = 0.0385$		57 654 812 421 286	9849 233498 37258 14586 73044	0.5 1	0.93 0.88 0.80 0.76	[0.55; 1.01] [0.76; 1.12] [0.73; 1.05] [0.69; 0.94] [0.61; 0.94] [0.76; 0.91]

Supplementary figure 17: Sensitivity analysis with only prospective studies included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified between professional and amateur players.

Study	Artifical turf Events Ti	Other ne Events		Incidence Rate Ratio	IRR	95%-CI
Professional Almutawa 2014 Bjørneboe 2010 Ekstrand 2006 Ekstrand 2011b Kristenson 2013 Kristenson 2016 Lanzetti 2017 Random effects model Heterogeneity: $I^2 = 43\%$,	267 74 483 58 998 182 375 156 119 59 23 12	01 83 112 800 112 274 126 494 381 591 38 253 70 20	1481 186929 24362 64349 161655 10513 1310		0.84 0.73 0.71 0.66 0.83 — 1.19	[0.49; 0.93] [0.73; 0.96] [0.63; 0.85] [0.64; 0.80] [0.58; 0.75] [0.67; 1.04] [0.65; 2.16] [0.68; 0.81]
Amateur Aoki 2010 Fuller 2007a Fuller 2007b Meyers 2013b Meyers 2014 Rössler 2017 Soligard 2010 Steffen 2007 Random effects mode Heterogeneity: /² = 88%, Test for subgroup differe	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	342 298 502 1283 192 1477 715 421 540 454 711 161 22 2248 379 286 df = 1 (p = 0	67514 442340 65061 14586 12705 156011 56575 73044	0.5	1.04 0.98 0.80 0.60 1.39 0.86 0.76	[0.93; 1.34] [0.92; 1.17] [0.87; 1.11] [0.69; 0.94] [0.51; 0.70] [1.12; 1.73] [0.75; 0.99] [0.61; 0.94] [0.77; 1.09]

Supplementary figure 18: Sensitivity analysis with only prospective studies included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by matches and training sessions.

Study	Artifical to Events		Other Events	Time	Incidence Rate Ratio	IRR	95%-CI
Both Almutawa 2014 Aoki 2010 Bjørneboe 2010 Ekstrand 2006 Ekstrand 2011b Kristenson 2013 Kristenson 2016 Rössler 2017 Steffen 2007 Random effects mod Heterogeneity: $l^2 = 85\%$		1901 37842 74612 58512 182126 156381 5938 115711 39979	83 298 800 274 494 591 253 161 286	1481 67514 186929 24362 64349 161655 10513 156011 73044		1.11 0.84 0.73 0.71 0.66 0.83 1.39 0.76	[0.49; 0.93] [0.93; 1.34] [0.73; 0.96] [0.63; 0.85] [0.64; 0.80] [0.58; 0.75] [0.67; 1.04] [1.12; 1.73] [0.61; 0.94] [0.71; 0.97]
Training Fuller 2007a	311	103502	1283	442340	-	1.04	[0.92; 1.17]
Match Fuller 2007b Lanzetti 2017 Meyers 2013b Meyers 2014 Soligard 2010 Random effects mod Heterogeneity: $I^2 = 85\%$ Test for subgroup differe	$\tau^2 = 0.0393$ $\tau^2 = 0.0423$	3	1477 20 421 454 2248	65061 1310 14586 12705 56575	0.5 1 2	- 1.19 0.80 0.60 0.86 0.83	[0.87; 1.11] [0.65; 2.16] [0.69; 0.94] [0.51; 0.70] [0.75; 0.99] [0.68; 1.01]

Supplementary figure 19: Sensitivity analysis with only prospective studies included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury mechanism (contact vs non-contact).

	Artifical turf	Grass		Incidence Rate		
Study	Events Tin	e Events	Time	Ratio	IRR	95% CI
Contact Almutawa 2014 Fuller 2007a Fuller 2007b Lanzetti 2017 Meyers 2013b	35 190 151 1035 231 141 10 127 154 117	02 584 92 1073 0 5 15 234	1481 442340 65061 1310 14586		1.11 0.99 — 2.06 0.82	[0.30; 0.70] [0.92; 1.32] [0.86; 1.14] [0.71; 6.04] [0.67; 1.00]
Meyers 2014 Steffen 2007 Random effects mod Heterogeneity: $I^2 = 87\%$			12705 73044	+	0.63	[0.46; 0.68] [0.46; 0.86] [0.60; 1.02]
Non-contact Almutawa 2014 Fuller 2007a Fuller 2007b Lanzetti 2017 Meyers 2013b Meyers 2014 Random effects mod Heterogeneity: /2 = 39%	τ_0 , $\tau^2 = 0.0131$	02 691 92 398 0 15 15 187	1481 442340 65061 1310 14586 12705		0.93 0.97 0.89 0.79 0.67	[0.74; 2.11] [0.78; 1.11] [0.76; 1.22] [0.43; 1.88] [0.62; 0.99] [0.53; 0.86] [0.74; 1.00]
Heterogeneity: $I^2 = 78\%$ Test for subgroup difference		f = 1 (p = 0.	52)	0.2 0.5 1 2	5	

Supplementary figure 20: Sensitivity analysis with only prospective studies included. Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury type (fracture, sprain, ligament injury).

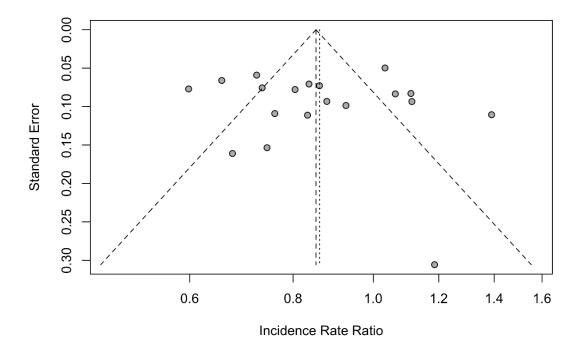
Study	Artifical turf Events Time	Grass Events Time	Incidence Rate Ratio	IRR 95% CI
Contusion Aoki 2010 Bjørneboe 2010 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: $I^2 = 4\%$		153 186929 2 165 442340 364 65061		1.19 [0.68; 2.09] 0.87 [0.64; 1.19] 1.11 [0.80; 1.56] 0.88 [0.68; 1.14] 1.08 [0.81; 1.43]
Sprain Almutawa 2014 Aoki 2010 Bjørneboe 2010 Ekstrand 2006 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: $l^2 = 639$		2 440 442340 547 65061		0.47 [0.23; 0.96] 1.23 [0.95; 1.61] 0.90 [0.71; 1.13] 0.90 [0.63; 1.27] 1.07 [0.87; 1.32] 0.98 [0.80; 1.20] 0.66 [0.53; 0.83] 0.34 [0.01; 8.44] 0.46 [0.20; 1.04] 0.88 [0.73; 1.05]
Strain Almutawa 2014 Aoki 2010 Bjørneboe 2010 Ekstrand 2006 Ekstrand 2011a Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: I ² = 809		2 2416 906386 2 525 442340 298 65061		0.72 [0.48; 1.07] 1.17 [0.77; 1.78] 0.85 [0.67; 1.09] 0.40 [0.28; 0.58] 0.68 [0.62; 0.75] 0.98 [0.80; 1.19] 1.02 [0.78; 1.33] 0.51 [0.41; 0.63] 0.96 [0.45; 2.04] 0.73 [0.41; 1.28] 0.76 [0.61; 0.93]
Other Almutawa 2014 Aoki 2010 Bjørneboe 2010 Ekstrand 2012 Fuller 2007a Fuller 2007b Kristenson 2013 Lanzetti 2017 Soligard 2010 Random effects mo Heterogeneity: I² = 429 Heterogeneity: I² = 709 Test for subgroup differ	6, $\tau^2 = 0.0492$ 6, $\tau^2 = 0.0515$	2 234 442340 268 65061 55 161655 4 1310 89 56575	0.1 0.51 2 10	0.83 [0.40; 1.73] 0.99 [0.58; 1.68] 0.59 [0.39; 0.91] 0.80 [0.40; 1.61] 1.24 [0.95; 1.63] 1.09 [0.83; 1.44] 0.62 [0.40; 0.95] 1.03 [0.26; 4.12] 0.84 [0.41; 1.74] 0.89 [0.71; 1.11]

Supplementary figure 21: Sensitivity analysis with only studies with lowest risk of bias (9 out of 9 stars in Newcastle-Ottawa Scale) included. Forest plot of the incidence of overall injuries on artificial turf compared to grass stratified by sex.

Δ	rtifical tu	ırf	Grass		Incidence Rate		
Study	Events	Time	Events	Time	Ratio	IRR	95%-CI
Meyers 2013b	272	11715	421	14586	—	0.80	[0.69; 0.94]
Meyers 2014	268	12540	454	12705	■	0.60	[0.51; 0.70]
Rössler 2017	166	115711	161	156011	- 	1.39	[1.12; 1.73]
Soligard 2010	206	6022	2248	56575	 _	0.86	[0.75; 0.99]
Heterogeneity:	$I^2 = 93\%$,	$\tau^2 = 0.11$	01				
					0.75 1 1.5		

Supplementary figure 22: A) Funnel plot assessing the publication bias for studies comparing artificial turf to grass. Eggers test intercept 0.6 (95% CI: -3.3 to 4.6) B) Funnel plot assessing the publication bias for studies comparing artificial turf to other playing surfaces. Eggers test intercept -4.0 (95% CI: -25.1 to 17.2). We did not find evidence supporting the presence of a publication bias in the included studies.

A)



B)

