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Effectiveness of perform+ training program for ankle injury at Academy Nazzaro Football Club Malang

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Abstract: One of the most common injuries in soccer is an ankle injury, which has a prevalence of injury of 41.1%. To prevent ankle injuries in soccer, a training program such as Performance+ Football Australia is needed because this program is effective in reducing the injury rate by around 40%. Therefore, the researchers aim to implement this training program in Indonesia to determine the effectiveness of preventing ankle injuries in Indonesia soccer players. The type of this research uses a pre-experimental design by using one-group pretest-posttest design research with one group given the perform+ training program treatment. The subjects used in this study are teenage male soccer players who are members of Nazzaro Football Club Academy Malang, with a sampling technique using purposive sampling based on inclusion criteria and obtained 15 research samples given the perform+ training program to present ankle injuries. The perform+ training program is carried out for 6 weeks with a frequency of 3 training sessions per week. to determine the effectiveness of the perform+ training program, the Y Balance Test is used. The analysis used in this study uses normality test analysis and hypothesis testing with the help of SPSS 21. The results show that the composite pretest value of the range of right and left legs obtained a Y Balance t-test result of 0,000 which means that the significance value is <0.05, indicating a significant effect. Based on the data analysis above with t-test results, it can be concluded that there is an effectiveness of the perform+ training program for the Nazzaro Football Club Academy Malang Players.

Keywords: perform+, ankle injuries, football.

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INTRODUCTION

Sports injuries are unavoidable for athletes in various sports. Sports injuries occur due to excessive physical pressure and technical errors when performing sports (Sumadi et al., 2018). Injuries can be caused because many people do not perform sports activities properly and correctly (Manik, Bisa, & Rahmansyah, 2021). One of them is a lack of understanding about the importance of warming up before exercise. By performing warm-up exercises, sports injuries can be prevented. Prevention can be defined as an effort to reduce or stop the effects and consequences of the risks that have occurred (Nasri & Leni, 2021). Warm-up exercises must have the appropriate duration. If warm-up exercises are performed with incorrect techniques and ineffective duration, injuries can occur. an athlete should perform warm-up exercises with optimal intensity and duration to improve their activity performance (Tsurubami et al., 2020).

Football is a sport that commonly experiences injuries. As a popular sport played by many people worldwide, football is associated with a high incidence of injuries. Football involves body contact, and the

fast movements in football can cause body contact with other players, which can trigger sports injuries (Sanusi, 2019). Football involves many movements in the lower extremities that can cause a high risk of injury (Fousekis, Tsepis, & Vagenas, 2012).

One of the joints in the lower extremities that has a high percentage value is the ankle joint, it serves as a mover and supports body weight, thus having a high incidence of injury cases (Ihsan, 2017). An ankle injury has the highest prevalence rate of 41,1% (Hakiki, 2016). Ankle joint causes tension on the supporting muscles and can result in the joint's inability to support body weight. Arovah (2009) stated that in ankle injury cases, there are often functional weaknesses such as decreased strength and limited range of motion. Painful movement and decreased ankle joint function are the results of an ankle injury, as there may be a tear in the ligament accompanied by ligament displacement or the ligament being out of its track, causing persistent pain and making the ligament (Jodi & Kushartanti, 2019).

To prevent ankle injuries in soccer, a training program like Performance+ Football Australia is required. This program includes the main injury prevention program for soccer in Australia. Football Australia Perform+ is the latest version of the 11+ program (Bizzini & Dvorak, 2015) with more flexibility for coaches and new training programs targeting the prevention of hip and thigh injuries (Whalan, 2021). Football Australia Perform+ is supported by extensive studies that show its effectiveness in reducing injury rates by around 40% (Whalan, 2019), and it provides an effective warm-up that can improve physical performance (Veith, 2021). Sports injuries are an important aspect that needs to be handled properly, especially in competitions. If injuries are not treated properly, they can result in decreased performance and even long-term disabilities that limit physical abilities (Artanayasa & Putra, 2014).

Based on the background of the problem, the author formulated the research question as follows "Is the Perform+ training program effective in preventing Ankle injuries at the Nazzaro Football Club Academy Malang?".

METHOD

The method used in this study is a pre-experimental design with a one-group pretest-posttest design. The one-group pretest-posttest design refers to the presence of a pretest (test before treatment) and posttest (test after treatment) in one group (Sugiyono, 2016). This research design produces more accurate data because it compares the conditions before and after treatment. The sampling technique used in this study is purposive sampling, which means that the sample is taken based on several inclusion criteria determined by the researcher (Sugiyono, 2016). Based on the inclusion criteria, a sample of 15 teenage soccer players from the Nazzaro Football Club Academy Malang was selected.

The treatment in this study was conducted for 6 weeks with 3 meetings per week. The obtained data were tested for normality using the Shapiro-Wilk test, and hypothesis testing was conducted using the Paired Sample T Test to determine the effect of the treatment. Data analysis was performed using IBM SPSS 21 software.

RESULTS AND DISCUSSION

In this study, the Y Balance Test (YBT) was used to assess the risk of lower extremity injury. The YBT is a tool used clinically to detect the risk of injury with abnormal movement patterns, dynamic balance, and asymmetry (Chimera et al., 2015). The data on the YBT results of the Nazzaro Football Club Academy Malang players were collected using a pre-experimental one-group pretest-posttest design to determine the effect of the applied treatment on the sample. The treatment applied was the Perform+ training program for preventing ankle injuries.

Data Description

Here are the results of the pretest and posttest data explanation presented in Table 1 using the Y Balance test instrument.

Table 1. Composite pretest and posttest values for Y Balance Test

No.	Name	Pretest Score (%)		Posttest Score (%)	
		Right	Left	Right	Left
1.	AR	162,3	167,9	187,1	183,3
2.	ASTS	163,3	168,7	178,6	176,9
3.	BAK	178,5	170,6	178,1	178,5
4.	DK	161,4	171,8	175,3	177,3
5.	DRP	160,4	172,8	174,0	172,8
6.	FMD	168,8	171,7	182,4	180,7
7.	HTAP	168,8	167,9	182,0	178,2
8.	JH	164,5	170,8	181,2	181,6
9.	MF	174,9	173,7	183,5	182,7
10.	MIH	154,0	169,1	166,2	165,8
11.	MRIP	175,2	173,0	190,1	188,0
12.	MAB	160,2	163,6	176,0	175,6
13.	MS	164,5	167,0	173,7	171,2
14.	RAP	171,8	171,1	177,5	173,4
15.	TSY	166,2	166,6	172,8	169,9
	Mean	**166,32**	**169,75**	**178,56**	**177,06**
	Combined average	**168,035**		**177,81**	

Table 1 shows the results of the pretest and posttest, which were measured using the Y Balance test. The data was collected to determine whether there was a difference between before and after the intervention, which was the Perform+ training program. As shown in the table, the pretest has an average of 168,035, while the posttest had an average of 177,81. Based on the averages and the explanation above, it can be concluded that the Perform+ training program was effective in preventing injury. The following is the result of the description of the pretest and posttest data, which is presented in the form of a Table 2.

Based on Table 2, the pretest results for right leg reach showed a minimum score range of 154,0 and a maximum score range of 178,5, with a mean of 166,320 and a Standard deviation (SD) of 6,673. Meanwhile, the posttest data for right-legh reach showed a minimum score of 166,2 and a maximum score of 190,1, with a mean of 178,567 and a Standard Deviation (SD) of 6,052.

Table 2. Composite score of right leg reach

Type of data	Total	Minimum	Maximum	Mean ± SD
Pretest	15	154,0	178,5	166,32 ± 6,673
Posttest	15	166,2	190,1	178,56 ± 6,052

Table 3. Composite score of left leg reach

Type of data	Total	Minimum	Maximum	Mean ± SD
Pretest	15	163,6	173,7	169,75 ± 2,813
Posttest	15	165,8	188,0	177,06 ± 5,817

Description:

SD = Standart Deviation

Mean = Mean score of Y Balance Test

Minimum = Lowest score from Y Balance Test results

Maximum = Highest score from Y Balance Test results

Based on Table 3, the pretest results for left leg reach showed a minimum score range of 163,6 and a maximum score range of 173,7, with a mean of 169,75 and a Standard Deviation (SD) of 2,813. Meanwhile, the posttest data for left leg reach showed a minimum score of 165,8 and a maximum score of 188,0, with a mean of 177,06 and a Standard Deviation (SD) of 5,817.

Table 4. Pretest scores for both right and left leg reach

No	Name	Lib length (cm)	Anterior (cm)		Posteromedial (cm)		Posterolateral (cm)		Difference/ gab (cm)		
			Right	Left	Right	Left	Right	Left	A	PM	PL
1.	AR	78	140	130	125	133	115	130	10	8	15
2.	ASTS	81	147	145	135	135	115	130	2	0	15
3.	BAK	84	150	140	150	150	150	140	10	0	10
4.	DK	77	127	130	126	135	120	132	3	9	12
5.	DRP	81	132	135	130	140	128	145	3	10	17
6.	FMD	78	132	133	133	135	130	134	1	2	4
7.	HTAP	78	130	143	125	125	140	120	13	0	20
8.	JH	80	150	145	120	130	125	135	5	10	10
9.	MF	85	160	138	150	160	136	145	22	10	9
10.	MIH	82	126	141	126	135	127	140	15	9	13
11.	MRIP	78	140	135	130	138	140	132	7	8	8
12.	MAB	78	130	123	120	125	125	135	7	5	10
13.	MS	80	135	133	130	133	130	135	2	3	5
14.	RAP	83	150	143	140	143	138	140	7	3	2
15.	TSY	81	135	135	140	134	129	136	0	6	7
Mean									7,1	5,5	10,4
Combined average										7,71	

Table 5. Posttest scores asymmetry for both right and left leg reach

No	Name	Lib length (cm)	Anterior (cm)		Posteromedial (cm)		Posterolateral (cm)		Difference/ gab (cm)		
			Right	Left	Right	Left	Right	Left	A	PM	PL
1.	AR	78	144	146	145	149	129	134	2	4	5
2.	ASTS	81	147	145	152	148	135	137	2	4	2
3.	BAK	84	149	151	150	150	150	149	2	0	1
4.	DK	77	145	141	130	135	130	135	1	5	5
5.	DRP	81	138	135	140	140	145	145	3	0	0
6.	FMD	78	140	140	144	144	143	139	0	0	4
7.	HTAP	78	143	143	143	139	140	135	0	4	5
8.	JH	80	155	155	140	136	140	145	0	4	5
9.	MF	85	165	160	158	161	145	145	5	3	0
10.	MIH	82	139	141	139	139	131	128	4	0	3
11.	MRIP	78	145	145	150	150	150	145	0	0	5
12.	MAB	78	135	135	138	135	139	136	0	3	3
13.	MS	80	150	148	132	130	135	133	2	2	2
14.	RAP	83	152	149	145	143	145	140	3	2	5
15.	TSY	81	150	145	140	138	130	130	5	2	0
Mean									1,9	2,2	3
Combined average										2,37	

Description:

A = Anterior

PM = Posteriomedial

PL = Posteriolateral

Based on Table 4 and Table 5, it is known that there is a decrease in the difference between the pretest and posttest of both right and left leg reach. The combined pretest mean was 7,71, while the combined posttest means was 2,37, with the Y Balance Test having a validity score for the anterior (A) both right and left leg reach not exceeding 4 cm. The posteromedial (PM) and posterolateral (PL) both right and left legs not exceeding 6 cm.

Normality Test

Table 6. Results of the normality test for the data

Variable		Sig.
Right leg reach	Pretest	0,846
	Posttest	0,991
Left leg reach	Pretest	0,634
	Postest	1

In Table 6, the normality test using the Shapiro-wilk technique showed that the normality test result for the pretest-posttest Y Balance Test data has a normal distribution. This is supported by the fact that the significance of the Y Balance Test for the right leg reach was 0,846 for the pretest and 0,991 for the posttest, both >0,05, indicating that the data had a normal distribution.

Hypothesis Test

Table 7. Results of Hypothesis Test

Paired Sample T-test	Df	Sig.
Range of Motion of The Right Foot	14	0,000
Range of Motion of The Left Foot	14	0,000

In Table 7, the paired sample t-test data resulted in 0,000 < 0,05. In this test, the effectiveness interpretation of ankle injury prevention is based on the significance value (2 - tailed) of 0,000. Therefore, the result of the paired sample t-test showed that the significance value (2 - tailed) is less than 0,05. It can be concluded that there is a significant difference between the pretest and posttest, indicating that the Perform+ training program is effective in preventing injuries in the players of the Nazzaro Football Club Academy.

Prevention of soccer injury is necessary because soccer involves many movements in the lower extremities such as walking, running, jumping, sprinting, shooting, and other movements. These movements are performed quickly and involve body contact with other movements. These movements are performed quickly and involve body contact with other players, resulting in a high risk of an ankle injury. This is in agreement with Sanusi (2019) who stated that the duration of the game and the rapid movements involved create a risk of ankle injury due to collisions or body contact between players. This is supported by the statement of Fousekis et al, (2012) that most injuries in soccer have a percentage value of 68% to 88% occurring in the lower extremities, with the ankle and thigh contributing the most, with ankle injuries accounting for almost 14% to 17% in soccer.

Players with ankle injuries experience balance problems due to changes in the physiological structure of the lower limb, as stated by Komarodin, (2018). This leads to a disruption of balance, making them more prone to falls and possible bone fractures. Therefore, assessing balance through tests such as the Y balance test (YBT) is necessary to identify the risk of ankle injuries in football players, as recommended by Chimera, Smith & Warren (2015) believe that Y Balence Test is a clinical screening tool that assesses the risk of injury based on abnormal movement patterns, asymmetry, and dynamic balance.

The result of this study shows an improvement based on data between the pretest and posttest. This is evidenced by the Y Balance Test (YBT) composite score, with a mean of 168,03 for the pretest and 177,81 for the posttest. The composite score in Y Balance Test should not be < 94%, as stated by Rozaq, Halimah, Wardoyo, & Pradita (2022) who obtained the highest composite score of 105%. The anterior reach distance (A) between the right and left leg should not be > 4, while the posteromedial (PM) and posterolateral (PL) reach distance between the right and left leg should not be > 6 (Cook & Plisky, 2015). After comparing the composite scores between the pretest and posttest, it was found that the reach distance increased, and the difference between the reach distance of the right and left leg decreased. Therefore, the Perform+ training program is effective in preventing ankle injuries.

The Perform+ training program is designed for injury prevention, particularly in the lower extremities. In this study, the Perform+ training program was effective in preventing ankle injuries in soccer players. The researchers agree with Whalan (2019) that Football Australia Perform+ is supported by extensive studies that show its effectiveness in reducing injury rates by around 40%. The Perform+ program is effective for preventing ankle injuries if applied for 6 weeks and 3 times per week. this is consistent with Hall & Hall (2020) that exercise given 3 times per week for 6 weeks with gradually increasing repetitions will result in physiological adaptation and sensory experience in the nervous system, as well as with Sumartiningsih et al. (2022) who found that training for that duration yields definite results because the body can adjust to the applied training and improve.

Mastery of basic techniques can reduce the risk of injury, especially ankle injuries. This agrees with Misbahuddin (2020), who found that soccer players can improve their basic technique abilities through regular training, which can reduce the risk of an ankle injury. One suitable exercise for preventing ankle injuries is implementing the Perform+ training program.

There is a similarity between the Perform+ program and FIFA 11+ with some of the same components such as agility, strength, balance, and endurance in soccer players. This is known because the movements in Perform+ include some of these components. This is supported by Swift et al., (2013) and Gatterer et al., (2018) who found that the FIFA 11+ program can improve the endurance, strength, agility, and balance of athletes. Movements in Perform+ that have agility components include plant and cut, hip in, hip out, quick forwards and backward, and circling partner. Movements that have strength components include straight ahead, building speed, the bench, sideways bench, hamstring, quadriceps, and groin/ adductors. Movements that have balance components include single leg stance, shoulder contact, sideways bench, jumping, hamstrings, groin/ adductors, and the bench. Finally, movements that have endurance components include building speed, straight ahead, the bench, hamstring, and quadriceps.

Perform+ was developed in 2020 as the primary injury prevention program for soccer in Australia. Football Australia Perform+ is the latest version of the FIFA 11+ program (Bizzini & Dvorak, 2015). The implementation of the Perform+ training program consists of warming up, performance, and cooling down. The warming-up consists of 9 running movements such as hip in, hip out, straight ahead, shoulder contact, circling partner, building speed, bounding, plant & cut, and quick forwards and backward. Warming-up is performed for 10 minutes before the performance. After warming up, the core movements (performance) are carried out for 5 minutes consisting of 4 movements (single leg stance, the bench, jumping, sideways bench) of levels 1, 2, and 3, which increase every 2 weeks or 6 sessions. After all, exercises are completed, cooling down is performed for 5 minutes consisting of 3 movements (hamstring, quadriceps, and groin/ adductors) of levels 1, 2, and 3, which also increase every 2 weeks or 6 sessions. The implementation of the Perform+ training program must be done regularly and progressively with accurate training principles to achieve the intended goal of preventing ankle injuries.

CONCLUSION

The contribution of this research is to determine the effectiveness of the perform+ training program in preventing ankle injuries, provide recommendations in this field, and suggest future research. Based on the results of the data analysis, it can be concluded that there is a significant improvement in the pretest and posttest with the provision of the perform+ training program. Therefore, future research is expected to add other variables, increase the sample size, and increase the intensity of the training, so that the research can be more widely identified.

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REFERENCES

Arovah, N. I. (2009). Diagnosis Dan Manajemen Cedera Olahraga dr. Novita Intan Arovah, MPH Dosen Jurusan Pendidikan Kesehatan dan Rekreasi FIK UNY. *Diagnosis Dan Manajemen Cedera Olahraga*, 1–11.

Artanayasa, I. W., & Putra, A. (2014). Cedera pada Pemain Sepakbola. *Seminar Nasional FMIPA UNDIKSHA IV*, 345–353.

Bizzini, M., & Dvorak, J. (2015). FIFA 11+: An effective programme to prevent football injuries in various player groups worldwide - A narrative review. *British Journal of Sports Medicine*, *49*(9), 577–579. https://doi.org/10.1136/bjsports-2015-094765

Chimera, N. J., Smith, C. A., & Warren, M. (2015). Injury history, sex, and performance on the functional movement screen and Y balance test. *Journal of athletic training*, *50*(5), 475-485. https://doi/org/10.4085/1062-6050-49.6.02

Cook, G., & Plisky, P. (2015). *Functional Movement System : YBT Module*. 1–30.

Fousekis, K., Tsepis, E., & Vagenas, G. (2012). Intrinsic risk factors of noncontact ankle sprains in soccer: a prospective study on 100 professional players. *The American journal of sports medicine*, *40*(8), 1842-1850. https://doi.org/10.1177/0363546512449602

Gatterer, H., Lorenzi, D., Ruedl, G., & Burtscher, M. (2018). The “FIFA 11+” injury prevention program improves body stability in child (10 year old) soccer players. *Biology of Sport*, *35*(2), 155–158. doi: https://doi.org/10.5114/biolsport.2018.71604

Hakiki, E. P. (2016). *Perbedaan Pengaruh Latihan Propioseptif Dan Theraband Exercise Terhadap Peningkatan Stabilitas Ankle Pada Pemain Sepak Bola Dengan Riwayat Sprain Ankle* (Doctoral dissertation, Universitas' Aisyiyah Yogyakarta).

Hall, J. E., & Hall, M. E. (2020). *Guyton and Hall textbook of medical physiology e-Book*. Elsevier Health Sciences.

Ihsan, M. (2017). Survey Cedera Olahraga Pada Atlet Cabang Olahraga Bola Basket Di Club Xyz Junior Medan Labuhan. *BMC Public Health*, *5*(1), 1–8. https://ejournal.poltektegal.ac.id/index.php/siklus/article/view/298%0Ahttp://repositorio.unan.edu.ni/2986/1/5624.pdf%0Ahttp://dx.doi.org/10.1016/j.jana.2015.10.005%0Ahttp://www.biomedcentral.com/1471-2458/12/58%0Ahttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&P

Jodi, S., & Kushartanti, B. M. W. (2019). Efektivitas Terapi Masase Terhadap Nyeri Gerak Dan Fungsi Gerak Sendi Ankle Pasca Cedera Ankle. *Medikora*, *18*(2), 92–99. https://doi.org/10.21831/medikora.v18i2.29202

Komarodin, M. I. (2018). Aspek Kebugaran Jasmani Kecepatan dan Hubungannya pada Beberapa Cabang Olahraga. *SATRIA: Journal of Sports Athleticism in Teaching and Recreation on Interdisciplinary Analysis*, *1*(1), 13-16.

Manik, J. W. H., Bisa, M., & Rahmansyah, B. (2021). Pencegahan Dan Penanganan Cedera Olahraga Pada Siswa Sekolah Menengah Kejuruan Negeri 10 Cawang. *Jurnal Fisioterapi Dan Rehabilitasi*, *5*(1), 69-75.

Misbahuddin, M. H., & Winarno, M. E. (2020). Studi kemampuan teknik dasar sepakbola pemain SSB Unibraw 82 Kota Malang kelompok usia 15-16 Tahun. *Sport Science and Health*, *2*(4), 215-223. http://journal2.um.ac.id/index.php/jfik/article/view/11649

Nasri, N., & Leni, A. S. M. (2021). Pengetahuan Siswa Ekstrakurikuler Sekolah Menegah Atas Sederajat Kota Surakarta Tentang Pencegahan, Perawatan, Dan Pertolongan Pertama Cedera Olahraga. *Jurnal MensSana*, *6*(1), 1–11. doi: https://doi.org/10.24036/menssana.06012021.13

Rozaq, B. A., Halimah, N., Wardoyo, P., & Pradita, A. (2022). Pengaruh Core Stability Excercise Terhadap Keseimbangan Dinamis Pemain Sepak Bola Syarekah Jaya Usia 12-15 Tahun. *Jurnal Keperawatan Muhammadiyah*, *7*(1), 152-158. https://doi.org/10.30651/jkm.v7i1.11001

Sanusi, R. (2019). Pemahaman Pelatih Futsal Terhadap Penanganan Cedera Engkel. *Jurnal Pendidikan Olah Raga*, *8*(2), 96-111. https://doi.org/10.31571/jpo.v8i2.1214

Sugiyono. (2016). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.

Sumadi, D., Hariyanto, T., & Candrawati, E. (2018). Analisis Faktor Risiko Injury pada Atlet Futsal di Champion Futsal Tlogomas Malang. *Nursing News*, *3*(1), 777–786.

Sumartiningsih, S., Risdiyanto, A., Yusof, A., Rahayu, S., Handoyo, E., Puspita, M. A., Sugiharto, Mukarromah, S. B., Hooi, L. B., Lubis, J., Hanief, Y. N., Festiawan, R., & Eiberger, J. (2022). The FIFA 11+ for kids warm-up program improved balance and leg muscle strength in children (9–12 years old). *Journal of Physical Education and Sport*, *22*(12), 3122-3127.

Swift, D. L., Lavie, C. J., Johannsen, N. M., Arena, R., Earnest, C. P., O'Keefe, J. H., Milani, R. V., Blair, S. N., & Church, T. S. (2013). Physical activity, cardiorespiratory fitness, and exercise training in primary and secondary coronary prevention. *Circulation Journal*, *77*(2), 281–292. https://doi.org/10.1253/circj.CJ-13-0007

Tsurubami, R., Oba, K., Samukawa, M., Takizawa, K., Chiba, I., Yamanaka, M., & Tohyama, H. (2020). Warm-up intensity and time course effects on jump performance. *Journal of Sports Science and Medicine*, *19*(4), 714–720.

Veith, S., Whalan, M., Williams, S., Colyer, S., & Sampson, J. A. (2021). Part 2 of the 11+ as an effective home-based exercise programme in elite academy football (soccer) players: a one-club matched-paired randomised controlled trial. *Science and Medicine in Football*, *5*(4), 339-346. https://doi.org/10.1080/24733938.2021.1874616

Whalan, M., Lovell, R., Steele, J. R., & Sampson, J. A. (2019). Rescheduling Part 2 of the 11+ reduces injury burden and increases compliance in semi-professional football. *Scandinavian journal of medicine & science in sports*, *29*(12), 1941-1951. https://doi.org/10.1111/sms.13532

Whalan, M., Lovell, R., Thorborg, K., & Sampson, J. A. (2021). The 11+ of the future: a primary injury prevention framework for sub-elite football. *British journal of sports medicine*, *55*(7), 351-352. https://doi.org/10.1136/bjsports-2020-102788