

**PERBEDAAN EFEK PEMANASAN STATIS VS. DINAMIS DAN DUKUNGAN
VO₂MAX TERHADAP OPTIMALISASI KEMAMPUAN *REPEATED SPRINT ABILITY*
(RSA) PADA ATLET FUTSAL**

SKRIPSI

Diajukan Untuk Memenuhi Sebagian Syarat Untuk Memperoleh Gelar Sarjana Olahraga
Program Studi Ilmu Keolahragaan



Oleh :

Muhamad Ali Maulidi

1906099

**PROGRAM STUDI ILMU KEOLAHRAGAAN
DEPARTEMEN PENDIDIKAN KESEHATAN DAN REKREASI
FAKULTAS PENDIDIKAN OLAHRAGA DAN KESEHATAN
UNIVERSITAS PENDIDIKAN INDONESIA**

2023

**PERBEDAAN EFEK PEMANASAN STATIS VS. DINAMIS DAN DUKUNGAN
VO₂MAX TERHADAP OPTIMALISASI KEMAMPUAN *REPEATED SPRINT
ABILITY (RSA)* PADA ATLET FUTSAL**

Oleh:

Muhamad Ali Maulidi

Sebuah skripsi yang di ajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Olahraga pada Fakultas Pendidikan Olahraga dan Kesehatan.

© Muhamad Ali Maulidi 2023

Universitas Pendidikan Indonesia

Januari 2023

Hak Cipta dilindungi undang-undang.

Skripsi ini tidak boleh diperbanyak seluruhnya atau sebagian,
Dengan di cetak ulang, difoto copy, atau cara lainnya tanpa ijin dari penulis

LEMBAR PENGESAHAN SKRIPSI

MUHAMAD ALI MAULIDI

1906099

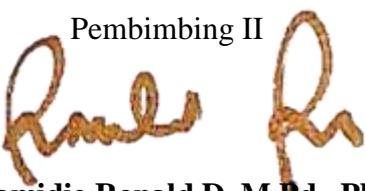
PERBEDAAN EFEK PEMANASAN STATIS VS. DINAMIS DAN DUKUNGAN
VO₂MAX TERHADAP OPTIMALISASI KEMAMPUAN *REPEATED SPRINT*
ABILITY (RSA) PADA ATLET FUTSAL

Diajukan dan disahkan oleh :

Pembimbing I

Iman Imanudin, S.Pd., M.Pd.

NIP : 19750810 200112 1 001

Pembimbing II

Dr. Hamidie Ronald D., M.Pd., Ph.D.

NIP : 19701102 200012 1 001

Mengetahui :

Ketua Program Studi Ilmu Keolahragaan UPI



Prof. Agus Rusdiana, S.Pd., M.A., Ph.D

NIP : 19760812 200112 1 001

ABSTRAK

PERBEDAAN EFEK PEMANASAN STATIS VS. DINAMIS DAN DUKUNGAN VO2MAX TERHADAP OPTIMALISASI KEMAMPUAN *REPEATED SPRINT ABILITY (RSA)* ATLET FUTSAL

Muhamad Ali Maulidi

1906099

**Fakultas Pendidikan Olahraga dan Kesehatan
Universitas Pendidikan Indonesia**

Pembimbing :

Iman Imanudin, S.Pd., M.Pd.

Dr. Hamidie Ronald D, M.Pd., Ph.D.

Futsal merupakan olahraga tim yang menuntut fisik, dimana gerakan yang mendominasi dilakukan pemain adalah berlari. Dengan kata lain salah penentu keberhasilan olahraga futsal didukung oleh kemampuan berlari pemainnya, termasuk kemampuan berlari berulang (*repeated sprint ability*). Selain itu, diyakini pemanasan yang tepat dapat memberikan efek optimal pada performa sprint pemain. Tujuan dari penelitian ini adalah untuk menguji efek yang diberikan dari protokol pemanasan statis *versus* dinamis terhadap performa *Repeated Sprint Ability (RSA)*. Digunakan metode studi deskriptif dengan pendekatan kuantitatif. Pengambilan sampel menggunakan teknik *non probability sampling*. Sepuluh atlet putra Mahasiswa Ilmu Keolahragaan angkatan 2022 (usia = 18.30 ± 0.48 ; massa tubuh (kg) = 63.84 ± 8.60 ; tinggi badan (cm) = 165.85 ± 6.15) direkrut sebagai partisipan. Ada tiga kali pengujian yaitu ; (1) pengujian kapasitas VO2Max dengan instrument *balke test*; (2) protokol pemanasan statis dan (3) protokol pemanasan dinamis diikuti instrument RSA-*Test*. Data dianalisis dengan menggunakan bantuan software SPSS versi 21, yaitu menggunakan *Paired Sample T-Test* dan *Pearson Correlation*. Hasinya menunjukkan bahwa terdapat perbedaan yang signifikan antara pemanasan statis dengan dinamis terhadap power rata-rata RSA, tidak terdapat perbedaan yang signifikan terhadap indeks kelelahan RSA dan untuk dukungan VO2Max ditemukan tidak terdapat pengaruh yang signifikan terhadap optimalisasi kemampuan RSA.

Kata Kunci : Futsal, Pemanasan Statis, Pemanasan Dinamis, *Repeated Sprint Ability (RSA)*, VO2Max

ABSTRACT

DIFFERENCES EFFECT OF STATIC VS. DYNAMIC WARM-UP AND VO2MAX SUPPORT TO THE OPTIMIZATION OF REPEATED SPRINT ABILITY (RSA) OF FUTSAL ATHLETES

Muhamad Ali Maulidi

1906099

Faculty of Sports and Health Education

Universitas Pendidikan Indonesia

Supervisor :

Iman Imanudin, S.Pd., M.Pd.

Dr. Hamidie Ronald D, M.Pd., Ph.D.

Futsal is a physically demanding team sport, where the movement that dominates the players is running. In other words, one of the determinants of the success of futsal is supported by the ability of the players to run, including the repeated sprint ability (RSA). In addition, it is believed that proper warm-up can have an optimal effect on a player's sprint performance. The purpose of this study was to examine the effect of static versus dynamic warm-up protocols on Repeated Sprint Ability (RSA) performance. Descriptive study method is used with a quantitative approach. Sampling using non-probability sampling technique. Ten male athletes of Sports Science Students class of 2022 (age = 18.30 ± 0.48 ; body mass (kg) = 63.84 ± 8.60 ; height (cm) = 165.85 ± 6.15) were recruited as participants. There are three times of testing ; (1) testing the VO2Max capacity with a balke test instrument; (2) static warm-up protocol and (3) dynamic warm-up protocol followed by the RSA-Test instrument. Data were analyzed using SPSS software version 21, using the Paired Sample T-Test and Pearson Correlation. The results show that there is a significant difference between static and dynamic warm-up on the average power of the RSA, there is no significant difference in the fatigue index of the RSA and for VO2Max support it is found that there is no significant effect on optimizing the ability of the RSA.

Keyword : Futsal, Static Warm-Up, Dynamic Warm-Up, Repeated Sprint Ability (RSA), VO2Max

DAFTAR ISI

LEMBAR PENGESAHAN SKRIPSI	ii
PERNYATAAN	iii
KATA PENGANTAR	iv
UCAPAN TERIMAKASIH.....	v
ABSTRAK.....	vii
ABSTRACT.....	viii
DAFTAR ISI.....	ix
DAFTAR TABEL.....	xi
DAFTAR GAMBAR	xii
DAFTAR LAMPIRAN.....	xiii
BAB I PENDAHULUAN	1
1.1. Latar Belakang Masalah	1
1.2. Rumusan Masalah.....	3
1.3. Tujuan Penelitian	3
1.4. Manfaat Penelitian	3
1.5. Struktur Organisasi	4
BAB II.....	5
TINJAUAN PUSTAKA	5
2.1.Olahraga Futsal	5
2.2.Komponen Kondisi Fisik Penunjang Kemampuan Atlet Futsal	5
2.2.1.Daya Tahan (Endurance)	6
2.2.2.Kekuatan (Power)	7
2.2.3.Kelincahan (Agility)	7
2.3.Pemanasan (Warming-Up).....	8
2.3.1.Pemanasan Statis.....	8
2.3.2.Pemanasan Dinamis	9
2.4.Repeated Sprint Ability (RSA)	9
2.5.Penelitian Yang Relevan.....	10
2.6.Kerangka Berpikir.....	13
2.7.Hipotesis Penelitian	14
BAB III	15
METODE PENELITIAN.....	15
3.1.Desain dan Metode Penelitian	15
3.2.Batasan Penelitian	16
3.3.Partisipan.....	16
3.4.Populasi dan Sample	17
3.5.Instrumen Penelitian	17
3.6.Prosedur Penelitian	22
3.7.Analisis Data.....	22
BAB IV	24
TEMUAN DAN BAHASAN	24
4.1.Temuhan dan Hasil Pembahasan	24
4.1.1.Deskripsi Data Temuan Penelitian.....	24
4.1.2.Uji Prasyarat.....	25

4.1.2.1.Uji Normalitas.....	26
4.1.3.Uji Hipotesis	27
4.1.3.1.Uji Hipotesis Repeated Sprint Ability (RSA) Atlet Futsal	27
4.1.3.2.Uji Hipotesis Tingkat VO ₂ Max Terhadap RSA Atlet Futsal	30
4.2.Pembahasan.....	31
 BAB V	35
SIMPULAN, IMPLIKASI DAN REKOMENDASI	35
5.1.Kesimpulan	35
5.2Implikasi	35
5.3.Rekomendasi.....	35
DAFTAR PUSTAKA	36
LAMPIRAN.....	40
RIWAYAT HIDUP	59

DAFTAR TABEL

Tabel 4.1 Deskripsi Data Statistik Power Rata-Rata	24
Tabel 4.2 Deskripsi Data Statistik Indeks Kelelahan.....	25
Tabel 4.3 Deskripsi Data Statistik Tingkat VO2Max	25
Tabel 4.4 Uji Normalitas Data Power Rata-Rata	26
Tabel 4.5 Uji Normalitas Data Indeks Kelelahan	26
Tabel 4.6 Uji Normalitas Data Tingkat VO2Max	27
Tabel 4.7 Uji Hipotesis Paired Sample T-Test Power Rata-Rata	28
Tabel 4.8 Uji Hipotesis Paired Sample T-Test Indeks Kelelahan	29
Tabel 4.9 Uji Hipotesis Person Correlation Tingkat VO2Max	30

DAFTAR GAMBAR

Gambar 2.1 Kerangka Berpikir Penelitian.....	14
Gambar 3.1 Desain Penelitian <i>One-Group A Post-Only Crossover</i>	15
Gambar 3.2 <i>Knee Hug Stretch</i>	18
Gambar 3.3 <i>Quadriceps Stretch</i>	18
Gambar 3.4 <i>Calf Stretch</i>	18
Gambar 3.5 <i>Lunge Stretch</i>	19
Gambar 3.6 <i>Toe Reach Stretch</i>	19
Gambar 3.7 <i>Hurdler Stretch</i>	19
Gambar 3.8 <i>Ankling</i>	20
Gambar 3.9 <i>High Knees</i>	20
Gambar 3.10 <i>Butt Kick</i>	20
Gambar 3.11 <i>Lunge Walk</i>	20
Gambar 3.12 <i>Straight Leg Kick</i>	20
Gambar 3.13 <i>Jumping Jack</i>	20
Gambar 3.14 Ilustrasi RSA-Tes	21

DAFTAR LAMPIRAN

Lampiran 1 Pernyataan Persetujuan Pembimbing	39
Lampiran 2 SK Penunjukan Pembimbing Skripsi	40
Lampiran 3 Kartu Bimbingan Skripsi	41
Lampiran 4 Surat Permohonan Izin Penelitian dan Peminjaman Sarpras	42
Lampiran 5 Hasil Pengolahan Data SPSS	43
Lampiran 6 Hasil <i>Balke Test</i> dan Nilai VO2Max	50
Lampiran 7 Hasil RSA- <i>Test</i> Pemanasan Statis dan Dinamis.....	51
Lampiran 8 Grafik VO2Max dan Hasil RSA- <i>Test</i>	54
Lampiran 9 Dokumentasi	56

DAFTAR PUSTAKA

- AGUILA, A. J., DISTEFANO, L. J., BROWN, C. N., HERMAN, D. C., GUSKIEWICZ, K. M., & PADUA, D. A. (2012). A DYNAMIC WARM-UP MODEL INCREASES QUADRICEPS STRENGTH AND HAMSTRING FLEXIBILITY. *Journal of Strength and Conditioning Research*, 6, 1130–1141.
- Alikhajeh, Y., Ramezanpour, M. R., & Moghaddam, A. (2011). The effect of different warm-up protocols on young soccer players' sprint. *Procedia - Social and Behavioral Sciences*, 30, 1588–1592. <https://doi.org/10.1016/j.sbspro.2011.10.308>
- Alizadeh, R., Fariborz, H., & Ali, M. S. (2010). The Relationship Between Aerobic Power And Repeated Sprint Ability In Young Soccer Players With Different Levels Of VO₂Max. *Journal of Physical Education and Sport*, 27, no 2.
- Amako, M., Oda, T., Masuoka, K., Yokoi, H., & Campisi, P. (2003). Effect of static stretching on prevention of injuries for military recruits. *Military Medicine*, 168(6), 442–446. <https://doi.org/10.1093/milmed/168.6.442>
- Ardianto, M. (2013). Kecemasan pada Pemain Futsal Dalam Menghadapi Turnamen. *Journal of Chemical Information and Modeling*, 53(9), 1689–1699.
- Aziz, A. R., Chia, M., & Teh, K. C. (2000). The relationship between maximal oxygen uptake and repeated sprint performance indices in field hockey and soccer players. In *Journal of Sports Medicine and Physical Fitness* (Vol. 40, Issue 3, pp. 195–200).
- Bandy, W. D., Irion, J. M., & Briggler, M. (1997). The effect of time and frequency of static stretching on flexibility of the hamstring muscles. *Physical Therapy*, 77(10), 1090–1096. <https://doi.org/10.1093/ptj/77.10.1090>
- Barbero-Alvarez, J. C., Soto, V. M., Barbero-Alvarez, V., & Granda-Vera, J. (2008). Match analysis and heart rate of futsal players during competition. *Journal of Sports Sciences*, 26(1), 63–73. <https://doi.org/10.1080/02640410701287289>
- Behm, D. G., Blazevich, A. J., Kay, A. D., & McHugh, M. (2015). Acute effects of muscle stretching on physical performance, range of motion, and injury incidence in healthy active individuals: A systematic review. *Applied Physiology, Nutrition and Metabolism*, 41(1), 1–11. <https://doi.org/10.1139/apnm-2015-0235>
- BİRİNÇİ, Y., ÖCAL, T., TOPÇU, H., & KESKİN, K. (2022). Dynamic vs. Static-stretching Warm-up Protocol: The Effect on Physical Performance. *Gaziantep Üniversitesi Spor Bilimleri Dergisi*, 27–38. <https://doi.org/10.31680/gaunjss.1084408>
- Bishop, D., Spencer, M., Duffield, R., & Lawrence, S. (2001). The validity of Repeatde Sprint Ability test. *Journal of Science and Medicine in Sport*, 4, 11.
- Castagna, C., D'Ottavio, S., Vera, J. G., & Álvarez, J. C. B. (2009). Match demands of professional Futsal: A case study. *Journal of Science and Medicine in Sport*, 12(4), 490–494. <https://doi.org/10.1016/j.jsams.2008.02.001>
- Castillo, M., Martínez-Sanz, J. M., Penichet-Tomás, A., Sellés, S., González-Rodríguez, E., Hurtado-Sánchez, J. A., & Sospedra, I. (2022). Relationship between Body Composition and Performance Profile Characteristics in Female Futsal Players. *Applied Sciences*, 12(22), 11492. <https://doi.org/10.3390/app122211492>
- Ceylan, H. I., Saygin, O., & Yildiz, M. (2014). Acute effects of different warm-up procedures on 30m sprint, slalom dribbling, vertical jump and flexibility performance in women futsal players. *Journal of Physical Education & Sports Science*, 8(1), 19–28. <http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=s3h&AN=32005588&site=ehost-live&scope=site>
- Corrêa, U. C., Alegre, F. A. M., Freudenheim, A. M., dos Santos, S., & Tani, G. (2012). The game of futsal as an adaptive process. *Nonlinear Dynamics, Psychology, and Life Sciences*, 16(2), 185–204.
- David, B. (2003). Warm up II: Performance changes following active warm up and how to

- structure the warm up. *Sports Medicine*, 33(7), 483–498. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed6&NEWS=N&A=N=2003241218>
- De Oliveira Bueno, M. J., Caetano, F. G., Pereira, T. J. C., De Souza, N. M., Moreira, G. D., Nakamura, F. Y., Cunha, S. A., & Moura, F. A. (2014). Analysis of the distance covered by Brazilian professional futsal players during official matches. *Sports Biomechanics*, 13(3), 230–240. <https://doi.org/10.1080/14763141.2014.958872>
- Dogramaci, S. N., Watsford, M. L., & Murphy, A. J. (2011). Time-motion analysis of international and national level futsal. *Journal of Strength and Conditioning Research*, 25(3), 646–651. <https://doi.org/10.1519/JSC.0b013e3181c6a02e>
- Fikri, Z., & Fahrizqi, E. B. (2021). Penerapan Model Latihan Variasi Passing Futsal Di Ekstrakulikuler Sman 1 Liwa. *Journal of Physical Education (JouPE)*, 2(2), 23–29. <http://jim.teknokrat.ac.id/index.php/pendidikanolahraga/index>
- Frank, H. (1994). *Obsession for Running Colin Davies Printers*. British Milers' Club.
- Gabbett, T. J., Sheppard, J. M., Pritchard-Peschek, K. R., Leveritt, M. D., & Aldred, M. J. (2008). Influence of Closed Skill and Open Skill Warm-ups on the Performance of Speed, Change of Direction Speed, Vertical Jump, and Reactive Agility in Team Sport Athletes. *Journal of Strength and Conditioning Research*, 22(May), 1413–1415.
- Girard, O., Mendez-Villanueva, A., & Bishop, D. (2011). Repeated-Sprint Ability – Part I. *Sports Medicine*, 41(8), 673–694. <http://www.ncbi.nlm.nih.gov/pubmed/21780851%5Cnhttp://link.springer.com/10.2165/11590550-00000000-00000>
- Harsono. (1988). *Coaching dan Aspek-Aspek Psikologis dalam Coaching*. CV. Tambak Kusuma. <http://kin.perpusnas.go.id/DisplayData.aspx?pId=16377&pRegionCode=JIUNMAL&pClientID=111>
- Harsono, H. (2008). *Coaching dan Aspek-aspek Psikologis dalam Coaching*.
- Hermans, V., Gdawietz, G., Engler, R., & Schwehm, W. (2010). Futsal (Technique – Tactics – Training). In *Angewandte Chemie International Edition* (Vol. 6, Issue 11).
- Hoff, J., Wisløff, U., Engen, L. C., Kemi, O. J., & Helgerud, J. (2002). Soccer specific aerobic endurance training. *British Journal of Sports Medicine*, 36(3), 218–221. <https://doi.org/10.1136/bjsm.36.3.218>
- Irawan, A., & Fitrianto, N. (2022). *Dampak Metode Pemanasan Neuromuscular Five+Terhadap Kemampuan Fleksibilitas Pemain Futsal Universitas Negeri Jakarta*. 3(7), 31–36.
- Jones, R. M., Cook, C. C., Kilduff, L. P., Milanović, Z., James, N., Sporiš, G., Fiorentini, B., Fiorentini, F., Turner, A., & Vučković, G. (2013). Relationship between repeated sprint ability and aerobic capacity in professional soccer players. *The Scientific World Journal*, 2013. <https://doi.org/10.1155/2013/952350>
- Kassiano, W., Andrade, A. D., Jesus, K. De, Lima, A. B., Simim, M. A., Medeiros, A. I. A., & Assumpção, C. D. O. (2019). Neuromuscular parameters and anaerobic power of U-20 futsal players. *Journal of Human Sport and Exercise*, 14(1), 207–214. <https://doi.org/10.14198/jhse.2019.141.17>
- Kharisma, Y., & Mubarok, M. Z. (2020). Analisis Tingkat Daya Tahan Aerobik Pada Atlet Futsal Putri AFKAB Indramayu. *Physical Activity Journal*, 1(2), 125. <https://doi.org/10.20884/1.paju.2020.1.2.2349>
- Kusumawati, M. (2013). Pengaruh Circuit Training Terhadap Daya Tahan Atlet Futsal Swap Jakarta Dalam Indonesia Futsal League (IFL) 2013. *Journal Pendidikan Olahraga*, 27–34.
- Lahaba, M. A. (2019). Analisis Indeks Massa Tubuh Terhadap Daya Tahan Aerobik Pada

- Siswa SMA Negeri 8 Makassar. *Jurnal Fakultas Ilmu Keolahragaan Universitas Negeri Makassar*, 627, 1–8.
- Lhaksana, J. (2011). *Taktik & Strategi Futsal Modern* (Be A Champ).
- Lhaksana, J., & Pardosi, I. H. (2008). *Inspirasi dan Spirit Futsal* (B. NS (ed.)). Jakarta Raih Asa Sukses.
https://books.google.co.id/books?hl=en&lr=&id=I_wiDAAAQBAJ&oi=fnd&pg=PT86&dq=Inspirasi+dan+Spirit+Futsal&ots=6ieGApUCOh&sig=tpmW0FISAvdgXmeMySaHhC4Ciw&redir_esc=y#v=onepage&q&f=false
- Lúcio F., F. Y. S.-C., Eberton A., de S., Victor H., de F., Solange M.F., de M., Anthony S., L., & Nakamura. (2014). Effects of Additional Repeated Sprint Training During Preseason on Performance, Heart Rate Variability, and Stress Symptoms in Futsal Players. *Journal of Strength and Conditioning Research*, 21(1), 77–85.
- Lupescu, I. (2017). UEFA Futsal Coaching Manual. In *UEFA Futsal Coaching Manual*.
- Makaje, N., Ruangthai, R., Arkarapanthu, A., & Yoopat, P. (2012). *Physiological demands and activity profiles during futsal match play according to competitive level*.
- McMillian, D. J., Moore, J. H., Hatler, B. S., & Taylor, D. C. (2006). *DYNAMIC VS. STATIC-STRETCHING WARM UP: THE EFFECT ON POWER AND AGILITY PERFORMANCE*. 20(3), 492–499.
- Moore, R., Bullough, S., Goldsmith, S., & Edmondson, L. (2014). A Systematic Review of Futsal Literature. *American Journal of Sports Science and Medicine*, 2(3), 108–116. <https://doi.org/10.12691/ajssm-2-3-8>
- Mukholid, A. (2007). *Pendidikan Jasmani Olahraga & Kesehatan* (S. Anwarudin (ed.)). Yudhistira.
<https://books.google.co.id/books?id=nxEHROzQDGUC&pg=PA35&dq=kelincahan&hl=id&sa=X&ei=25AuVKCNI8ywUATIkIAo&ved=0CEkQuwUwCQ#v=onepage&q=kelincahan&f=false>
- Naser, N., Ali, A., & Macadam, P. (2017). Physical and physiological demands of futsal. *Journal of Exercise Science and Fitness*, 15(2), 76–80. <https://doi.org/10.1016/j.jesf.2017.09.001>
- Pallant, J. (2010). Survival Manual. In *McGraw-Hill Education*.
- Rebelo, A. N., Ascensão, A. A., Magalhães, J. F., Bischoff, R., Bendiksen, M., & Krstrup, P. (2011). Elite Futsal Refereeing: Activity Profile and Physiological Demands. *Journal of Strength and Conditioning Research*, 25(4), 980–987.
- Rosita, T., Hernawan, & Fahmy, F. (2019). Pengaruh Keseimbangan, Kekuatan Otot Tungkai dan Koordinasi Terhadap Ketepatan Shooting Futsal. *Jurnal Terapan Ilmu Keolahragaan*, 4(2), 117–126. <http://ejournal.upi.edu/index.php/JTIKOR/>
- Sahlin, K., & Henriksson, J. (1984). *Buffer capacity and lactate accumulation in skeletal muscle of trained and untrained men.pdf*.
- Sajoto, M. (1990). *Peningkatan dan Pembinaan Kekuatan Kondisi Fisik Dalam Olahraga*. Dahara Prize.
- Sajoto, M. (1995). *Pembinaan Kondisi Fisik Olahraga*. Depdikbud PPLPTK, Dirjen Dikti.
- Sugiyono. (2009a). *Metode Penelitian Kuantitatif, Kualitatif dan R&D* (Alfabeta (ed.)). Alfabeta.
- Sugiyono. (2009b). Research and Development (R&D) Sebagai Salah Satu Model Penelitian dalam Bidang Pendidikan. *Research And Development (R&D) Sebagai Salah Satu Model Penelitian Dalam Bidang Pendidikan*, 37(1), 11–26.
- 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.
- Syahda, I. A., Damayanti, I., & Imanudin, I. (2016). Hubungan Kapasitas Vital Paru-Paru Dengan Daya Tahan Cardiorespiratory Pada Cabang Olahraga Sepak Bola. *Jurnal*

- Terapan Ilmu Keolahragaan*, 1(1), 24. <https://doi.org/10.17509/jtikor.v1i1.1549>
- Tomsovsky, L., Reid, D., Whatman, C., Borotkanics, R., & Fulcher, M. (2021). The effect of a neuromuscular warm-up on the injury rates in New Zealand amateur futsal players. *Physical Therapy in Sport*, 48, 128–135. <https://doi.org/10.1016/j.ptsp.2020.12.015>
- Turner, A. N., & Stewart, P. F. (2013). Repeat sprint ability. *Strength and Conditioning Journal*, 35(1), 37–41. <https://doi.org/10.1519/SSC.0b013e3182824ea4>
- Wood, R. (2008). *Balke 15-minute run*. Topend Sports Website. <https://www.topendsports.com/testing/tests/balke-15min.htm>
- Wood, R. J. (2019). *Repeat Sprint Ability Test*. Topend Sports. <https://www.topendsports.com/testing/tests/sprint-repeat.htm>
- Zmijewski, P., Lipinska, P., Czajkowska, A., Mróz, A., Kapuściński, P., & Mazurek, K. (2020). Acute Effects of a Static vs. a Dynamic Stretching Warm-up on Repeated-Sprint Performance in Female Handball Players. *Journal of Human Kinetics*, 72(1), 161–172. <https://doi.org/10.2478/hukin-2019-0043>