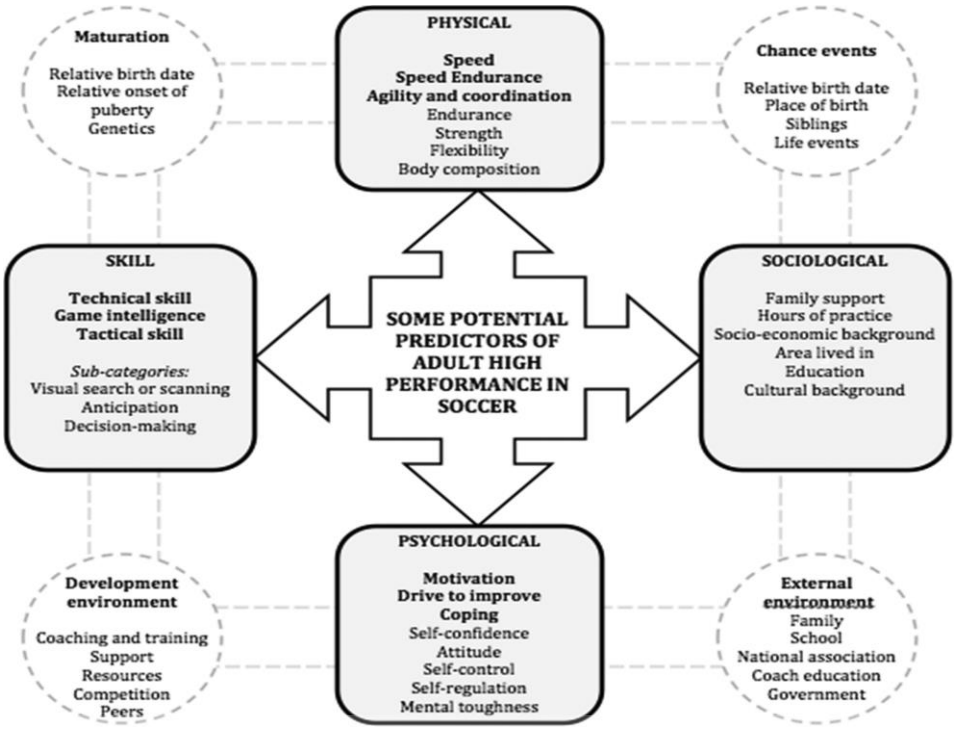

Figure 1.1 Potential predictors of adult high performance in youth soccer players from each sports science discipline, with mediating factors. **Bold** predictors denote those with at least some empirical evidence of predictive value from adolescence to adult performance level in soccer (Williams et al., 2020).

Talent Identification

Talent identification theory and practice in soccer remains obscure blending professional scouts or coaches' subjective assessment of key performance indicators with more recent sport science evaluation. Criteria used to predict footballers' future performance and expertise vary in terminology and methodology ranging from TABS (Technique, Attitude, Balance, Speed), SUPS (Speed, Understanding, Personality, Skill) and TIPS (Talent, Intelligence, Personality, Speed)

(Reilly et al., 2000; Williams & Reilly, 2000). The intuition of professional coaches and scouts to interpret such criteria and evaluate specific performance aptitudes for future success should not be discredited (Thomas, 1999). Recent studies have highlighted the benefit in coupling coaches' subjective assessment with objective measures, using multidisciplinary approach, in more accurately predicting future professional-level soccer players (Dugdale et al., 2020; Sieghartsleitner et al., 2019).

Physical and physiological predictors of performance have been extensively investigated in comparison to psycho-social categories. Together studies have shown soccer players' whose physical and physiological performance resembles that of older and adult professional-level players are more likely to ascend through a football club's structure and be identified for higher competitive-level teams (See Table 1.) The time-spread of biological maturation has been shown to significantly affect young soccer players' physical stature and performance (Figueiredo et al., 2009) (See Table 2.). Resulting in the relative age effect phenomenon, by which a greater representation of more mature footballers born in the first quarter of the year across youth club and national-level teams persists (Götze & Hoppe, 2021; W. F. Helsen et al., 2005)(See Figure 1.2).

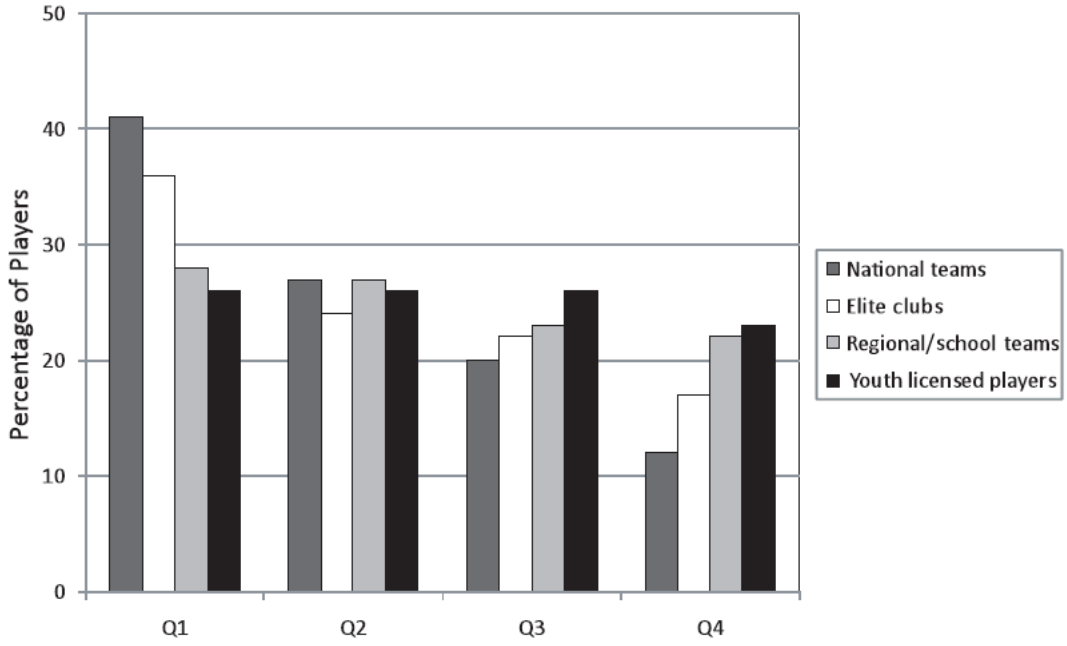

Figure 1.2 Summary of the Relative Age Effect in Youth Soccer Across Different levels of Play Presented in the Literature Since 2000 National teams players (U15-U21; n = 1,450), elite club level players (n = 5,506), regional and school level players (n = 12,316) and French youth licensed players (n = 1,116,464) birth date distribution are presented by quartile (Meylan et al., 2010)

Physical aptitude should be viewed as one potential predictor of soccer performance, as talented players' physical characteristics can remain underdeveloped yet compensated for with demonstration of advanced perceptual, tactical, and technical soccer skill (Huijgen et al., 2013; Unnithan et al., 2012; Ward & Williams, 2003). Psychological profiles, soccer-specific perceptual, and tactical awareness relative importance to achievement of superior performance is commonly noted by experienced coaches but remain largely unquantified. Most research to date has implemented cross-sectional measurement of anthropometrics and physiological

performance while informative, in scope are inherently limited. Multi-disciplinary longitudinal studies are needed to better understand the following: 1. Soccer players' sustainment of body stature, physiological, technical- skill performance, and game intelligence superiority across maturation. 2. Differentiation of talent in soccer players already selected to and exposed to professional club-level team training (Abarghoueinejad et al., 2021; Reilly et al., 2000).

References:

Abarghoueinejad, M. A.-O., Baxter-Jones, A. A.-O., Gomes, T. A.-O., Barreira, D. A.-O., & Maia, J. A.-O. (2021). Motor Performance in Male Youth Soccer Players: A Systematic Review of Longitudinal Studies. LID - 10.3390/sports9040053 [doi] LID - 53. (2075-4663 (Electronic)).

Allison, R., & Barranco, R. (2021). 'A rich white kid sport?' Hometown socioeconomic, racial, and geographic composition among U.S. women's professional soccer players. *Soccer & Society*, *22*(5), 457-469. https://doi.org/10.1080/14660970.2020.1827231

Andersson, H. A., Randers Mb Fau - Heiner-Møller, A., Heiner-Møller A Fau - Krustrup, P., Krustrup P Fau - Mohr, M., & Mohr, M. (2010). Elite female soccer players perform more high-intensity running when playing in international games compared with domestic league games. *Journal of Strength & Conditioning Research (Allen Press Publishing Services Inc.)*(1533-4287 (Electronic)), 912-919.

Baker, J., & Wattie, N. (2018). Innate talent in sport: Separating myth from reality. *Current Issues in Sport Science (CISS)*, *3*. https://doi.org/10.36950/2018ciss006

Benounis, O., Benabderrahman, A., Chamari, K., Ajmol, A., Benbrahim, M., Hammouda, A., Hammami, M.-A., & Zouhal, H. (2013). Association of Short-Passing Ability with Athletic Performances in Youth Soccer Players. *Asian Journal of Sports Medicine*, *4*(1), 41-48. http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=86025488&site=ehost-live&scope=site

Bergkamp, T. L. G., Frencken, W. G. P., Niessen, A. S. M., Meijer, R. R., & den Hartigh, R. J. R. (2022). How soccer scouts identify talented players. *European Journal of Sport Science*, *22*(7), 994-1004. https://doi.org/10.1080/17461391.2021.1916081

Buchheit, M. (2014). Monitoring training status with HR measures: do all roads lead to Rome? *Frontiers in Physiology*, *5*. https://doi.org/10.3389/fphys.2014.00073

Buchheit M Fau - Simpson, B. M., & Simpson, B. M. (2017). Player-Tracking Technology: Half-Full or Half-Empty Glass? (1555-0273 (Electronic)).

Buchheit, M., & Mendez-Villanueva, A. (2014). Effects of age, maturity and body dimensions on match running performance in highly trained under-15 soccer players. *Journal of Sports Sciences*(ahead-of-print), 1-8.

Buchheit M, S. M., Hader K, Tarascon A, McHugh D & Verheijen R. (2023). Know-your-own-league context: insights for player preparation and recruitment – Part 1: Team formations. *Sport Perf & Science Reports*, *1*(181).

Castagna, C., D'Ottavio, S., & ABT, G. (2003). Activity profile of young soccer players during actual match play. *The Journal of Strength & Conditioning Research*, *17*(4), 775-780.

Christensen, M. K. (2009). "An eye for talent": Talent identification and the "practical sense" of top-level soccer coaches. *Sociology of sport journal*, *26*(3), 365-382.

Cormack, S. J., Newton, R. U., McGuigan, M. R., & Doyle, T. L. (2008). Reliability of measures obtained during single and repeated countermovement jumps. *Int J Sports Physiol Perform*, *3*(2), 131-144. https://doi.org/10.1123/ijspp.3.2.131

De Dios-Álvarez, V., Lorenzo-Martínez, M., Padrón-Cabo, A., & Rey, E. (2022). Small-sided games in female soccer players: a systematic review. *Journal of sports medicine and physical fitness.*, *62*(11), 1474-1480. https://doi.org/10.23736/S0022-4707.21.12888-9

Dellal, A., Hill-Haas, S., Lago-Penas, C., & Chamari, K. (2011). Small-Sided Games in Soccer: Amateur vs. Professional Players' Physiological Responses, Physical, and Technical Activities. *The Journal of Strength & Conditioning Research*, *25*(9). https://journals.lww.com/nsca-jscr/Fulltext/2011/09000/Small_Sided_Games_in_Soccer__Amateur_vs_.4.aspx

Dellal, A., Owen A Fau - Wong, D. P., Wong Dp Fau - Krustrup, P., Krustrup P Fau - van Exsel, M., van Exsel M Fau - Mallo, J., & Mallo, J. (2012). Technical and physical demands of small vs. large sided games in relation to playing position in elite soccer. (1872-7646 (Electronic)).

Dellal, A., Varliette C Fau - Owen, A., Owen A Fau - Chirico, E. N., Chirico En Fau - Pialoux, V., & Pialoux, V. (2012). Small-sided games versus interval training in amateur soccer players: effects on the aerobic capacity and the ability to perform intermittent exercises with changes of direction. (1533-4287 (Electronic)).

Diaz-Seradilla, E. A.-O., Rodríguez-Fernández, A. A.-O., Rodríguez-Marroyo, J. A., Castillo, D. A.-O., Raya-González, J., & Villa Vicente, J. G. (2022). Inter- and intra-microcycle external load analysis in female professional soccer players: A playing position approach. (1932-6203 (Electronic)).

Dillern, T., Ingebrigtsen, J., & Shalfawi, S. A. I. (2012). AEROBIC CAPACITY AND ANTHROPOMETRIC CHARACTERISTICS OF ELITE-RECRUIT FEMALE SOCCER PLAYERS. *Serbian Journal of Sports Sciences*, *6*(2), 43-49. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=s3h&AN=77418968&site=ehost-live&scope=site&custid=gsu1

Doyle, B. A.-O., Browne, D., & Horan, D. (2022). Quantification of internal and external training load during a training camp in senior international female footballers. (2473-4446 (Electronic)).

Dugdale, J., Sanders, D., Myers, T., Williams, A., & Hunter, A. (2020). A case study comparison of objective and subjective evaluation methods of physical qualities in youth soccer players. *Journal of Sports Sciences*. https://doi.org/10.1080/02640414.2020.1766177

Figueiredo, A., Gonçalves, C., Coelho e Silva, M., & Malina, R. (2009). Characteristics of youth soccer players who drop out, persist or move up. *Journal of Sports Sciences*, *27*(9), 883-891. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=s3h&AN=43430394&site=ehost-live&scope=site&custid=gsu1

Ford, P. R., Bordonau, J. L. D., Bonanno, D., Tavares, J., Groenendijk, C., Fink, C., Gualtieri, D., Gregson, W. A.-O., Varley, M. A.-O. X., Weston, M. A.-O., Lolli, L. A.-O., Platt, D., & Di Salvo, V. (2020). A survey of talent identification and development processes in the youth academies of professional soccer clubs from around the world. *Journal of Sports Sciences*(1466-447X (Electronic)).

Ford, P. R., & Williams, A. M. (2017). Sport activity in childhood: Early specialization and diversification. *Routledge handbook of talent identification and development in sport*, 116-132.

Fransson, D., Nielsen, T. S., Olsson, K., Christensson, T., Bradley, P. S., Fatouros, I. G., Krustrup, P., Nordsborg, N. B., & Mohr, M. (2018). Skeletal muscle and performance adaptations to high-intensity training in elite male soccer players: speed endurance runs versus small-sided game training. (1439-6327 (Electronic)).

Gabbett, T. J., & Mulvey, M. J. (2008). Time-motion analysis of small-sided training games and competition in elite women soccer players. *Journal of Strength & Conditioning Research (Allen Press Publishing Services Inc.)*, *22*(1533-4287 (Electronic)), 543-552.

Götze, M., & Hoppe, M. W. (2021). Relative Age Effect in Elite German Soccer: Influence of Gender and Competition Level. (1664-1078 (Print)).

Gulbin, J., Oldenziel, K. E., Weissensteiner, J., & Gagné, F. (2010). A look through the rear view mirror: Developmental experiences and insights of high performance athletes. *Talent Development and Excellence*, *2*, 149-164.

Hastad, D. N., & Lacy, A. C. (1994). *Measurement and evaluation in physical education and exercise science*. Gorsuch Scarisbrick.

Haugen, T. A., Tønnessen E Fau - Hem, E., Hem E Fau - Leirstein, S., Leirstein S Fau - Seiler, S., & Seiler, S. (2014). VO2max characteristics of elite female soccer players, 1989-2007. (1555-0265 (Print)).

Haugen, T. A., Tønnessen E Fau - Seiler, S., & Seiler, S. Speed and countermovement-jump characteristics of elite female soccer players, 1995-2010. (1555-0265 (Print)).

Helsen, W., van Winckel, J., & Williams, A. M. (2005). The relative age effect in youth soccer across Europe. *Journal of Sports Sciences*, *23*(6), 629-636. http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=17267225&site=ehost-live&scope=site

Helsen, W. F., van Winckel, J., & Williams, A. M. (2005). The relative age effect in youth soccer across Europe. *Journal of Sports Sciences*, *23*(6), 629-636. https://doi.org/10.1080/02640410400021310

Hill-Haas, S. V., Coutts Aj Fau - Rowsell, G. J., Rowsell Gj Fau - Dawson, B. T., & Dawson, B. T. (2009). Generic versus small-sided game training in soccer. (1439-3964 (Electronic)).

Hill-Haas, S. V., Dawson B Fau - Impellizzeri, F. M., Impellizzeri Fm Fau - Coutts, A. J., & Coutts, A. J. (2011). Physiology of small-sided games training in football: a systematic review. (1179-2035 (Electronic)).

Howe, M. J., Davidson Jw Fau - Sloboda, J. A., & Sloboda, J. A. (1998). Innate talents: reality or myth? (0140-525X (Print)).

Huijgen, B. C. H., Elferink-Gemser, M. T., Ali, A., & Visscher, C. (2013). Soccer Skill Development in Talented Players. *International journal of sports medicine*, *34*(8), 720-726. http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=90079013&site=ehost-live&scope=site

THE INTERCHANGEABILITY OF GLOBAL POSITIONING SYSTEM AND SEMIAUTOMATED VIDEO-BASED PERFORMANCE DATA DURING ELITE SOCCER MATCH PLAY. (2011). *Journal of Strength & Conditioning Research (Lippincott Williams & Wilkins)*, *25*(8), 2334-2336. http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=64295367&site=ehost-live&scope=site

Jastrzębski, Z., & Radziminski, Ł. (2017). Default and individual comparison of physiological responses and time-motion analysis in male and female soccer players during small-sided games. https://doi.org/10.14198/jhse.2017.124.04

Jastrzębski, Z., Radziminski, Ł., & Stępień, P. (2016). Comparison of time-motion analysis and physiological responses during small-sided games in male and female soccer players. *Baltic Journal of Health and Physical Activity*, *8*, 42-50. https://doi.org/10.29359/BJHPA.08.1.05

Jokuschies, N., Gut, V., & Conzelmann, A. (2017). Systematizing coaches' 'eye for talent': Player assessments based on expert coaches' subjective talent criteria in top-level youth soccer. *International Journal of Sports Science & Coaching*, *12*, 565-576. https://doi.org/10.1177/1747954117727646

Kelly, D. M., & Drust, B. (2008). The effect of pitch dimensions on heart rate responses and technical demands of small-sided soccer games in elite players. (1878-1861 (Electronic)).

Lacome M Fau - Simpson, B. M., Simpson Bm Fau - Cholley, Y., Cholley Y Fau - Lambert, P., Lambert P Fau - Buchheit, M., & Buchheit, M. (2018). Small-Sided Games in Elite Soccer: Does One Size Fit All? (1555-0273 (Electronic)).

Lyons, M. J., Conlon, J., Perejmibida, A., Chivers, P., & Joyce, C. (2021). Sustained Passing Performance of Elite and Subelite Female Soccer Players Following a Female Match-Specific Exercise Protocol. *International Journal of Sports Physiology & Performance*, *16*(4), 504-510. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=s3h&AN=149393407&site=ehost-live&scope=site&custid=gsu1

Manuel Clemente, F. A.-O., Ramirez-Campillo, R. A.-O., Nakamura, F. A.-O., & Sarmento, H. A.-O. (2021). Effects of high-intensity interval training in men soccer player's physical fitness: A systematic review with meta-analysis of randomized-controlled and non-controlled trials. (1466-447X (Electronic)).

Mara Jk Fau - Thompson, K. G., Thompson Kg Fau - Pumpa, K. L., & Pumpa, K. L. (2016). Physical and Physiological Characteristics of Various-Sided Games in Elite Women's Soccer. (1555-0273 (Electronic)).

Mendez-Villanueva, A. (2012). Tactical Periodization: Mourinho's Best-kept secret? *Soccer NSCAA Journal*.

Meylan, C., Cronin, J., Oliver, J., & Hughes, M. (2010). Reviews: Talent Identification in Soccer: The Role of Maturity Status on Physical, Physiological and Technical Characteristics. *International Journal of Sports Science & Coaching*, *5*(4), 571-592. http://ezproxy.gsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=56630562&site=ehost-live&scope=site

Mohr, M., Krustrup, P., Andersson, H., Kirkendal, D., & Bangsbo, J. (2008). Match Activities of Elite Women Soccer Players at Different Performance Levels. *The Journal of Strength & Conditioning Research*, *22*(2), 341-349 310.1519/JSC.1510b1013e318165fef318166. http://journals.lww.com/nsca-jscr/Fulltext/2008/03000/Match_Activities_of_Elite_Women_Soccer_Players_at.4.aspx

Morris, R., Tod, D., & Oliver, E. (2015). An Analysis of Organizational Structure and Transition Outcomes in the Youth-to-Senior Professional Soccer Transition. *Journal of Applied Sport Psychology*, *27*(2), 216-234. https://doi.org/10.1080/10413200.2014.980015

Owen, A., Twist, C., & Ford, P. (2004). Small-sided games: The physiological and technical effect of altering pitch size and player numbers. *Insight*, *7*, 50-53.

Pedersen, A. V., LorÅS, H., Norvang, O. P., & Asplund, J. (2014). MEASURING SOCCER TECHNIQUE WITH EASY-TO-ADMINISTER FIELD TASKS IN FEMALE SOCCER PLAYERS FROM FOUR DIFFERENT COMPETITIVE LEVELS. *Perceptual & Motor Skills*, *119*(3), 961-970. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=s3h&AN=100191008&site=ehost-live&scope=site&custid=gsu1

Rampinini, E., Impellizzeri Fm Fau - Castagna, C., Castagna C Fau - Abt, G., Abt G Fau - Chamari, K., Chamari K Fau - Sassi, A., Sassi A Fau - Marcora, S. M., & Marcora, S. M. (2007). Factors influencing physiological responses to small-sided soccer games. (0264-0414 (Print)).

Randers, M. B., Nybo L Fau - Petersen, J., Petersen J Fau - Nielsen, J. J., Nielsen Jj Fau - Christiansen, L., Christiansen L Fau - Bendiksen, M., Bendiksen M Fau - Brito, J., Brito J Fau - Bangsbo, J., Bangsbo J Fau - Krustrup, P., & Krustrup, P. (2010). Activity profile and physiological response to football training for untrained males and females, elderly and youngsters: influence of the number of players. (1600-0838 (Electronic)).

Reilly, T., Williams Am Fau - Nevill, A., Nevill A Fau - Franks, A., & Franks, A. (2000). A multidisciplinary approach to talent identification in soccer. (0264-0414 (Print)).

Relvas, H., Littlewood, M., Nesti, M., Gilbourne, D., & Richardson, D. (2010). Organizational Structures and Working Practices in Elite European Professional Football Clubs: Understanding the Relationship between Youth and Professional Domains. *European Sport Management Quarterly*, *10*(2), 165-187. https://doi.org/10.1080/16184740903559891

Scott, D., Haigh, J., & Lovell, R. (2020). Physical characteristics and match performances in women's international versus domestic-level football players: a 2-year, league-wide study. *Science and Medicine in Football*, *4*(3), 211-215. https://doi.org/10.1080/24733938.2020.1745265

Sieghartsleitner, R., Zuber, C., Zibung, M., & Conzelmann, A. (2018). "The Early Specialised Bird Catches the Worm!" – A Specialised Sampling Model in the Development of Football Talents [Original Research]. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00188

Sieghartsleitner, R., Zuber, C., Zibung, M., & Conzelmann, A. (2019). Science or Coaches' Eye? - Both! Beneficial Collaboration of Multidimensional Measurements and Coach Assessments for Efficient Talent Selection in Elite Youth Football. *Journal of sports science & medicine*, *18*, 32-43.

Slimani, M., Znazen, H., Miarka, B., & Bragazzi, N. L. (2019). Maximum Oxygen Uptake of Male Soccer Players According to their Competitive Level, Playing Position and Age Group: Implication from a Network Meta-Analysis. *Journal of Human Kinetics*, *66*(1), 233-245. https://doi.org/doi:10.2478/hukin-2018-0060

Stevens, T. G., De Ruiter, C. J., Beek, P. J., & Savelsbergh, G. J. (2015). Validity and reliability of 6-a-side small-sided game locomotor performance in assessing physical fitness in football players. (1466-447X (Electronic)).

Thomas, K. T. a. T., J.R. . (1999). What squirrels in the trees predict about expert athletes. *International Journal of Sport Psychology*, *30*, 221-234.

Unnithan, V., White, J., Georgiou, A., Iga, J., & Drust, B. (2012). Talent identification in youth soccer. *Journal of Sports Sciences*, *30*. https://doi.org/10.1080/02640414.2012.731515

Vescovi, J. D., Rupf R Fau - Brown, T. D., Brown Td Fau - Marques, M. C., & Marques, M. C. (2009).

Physical performance characteristics of high-level female soccer players 12-21 years of age. (1600-0838 (Electronic)).

Ward, P., & Williams, A. M. (2003). Perceptual and Cognitive Skill Development in Soccer: The

Multidimensional Nature of Expert Performance. *Journal of Sport & Exercise Psychology*, *25*, 93-111.

Williams, A. M., Ford, P. R., & Drust, B. (2020). Talent identification and development in soccer since the millennium. *Journal of Sports Sciences*, *38*(11-12), 1199-1210. https://doi.org/10.1080/02640414.2020.1766647

Williams, A. M., & Reilly, T. (2000). Talent identification and development in soccer. *Journal of Sports Sciences*(0264-0414 (Print)).