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The strength and conditioning practices and perspectives of soccer coaches and players

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Strength and conditioning (S&C) is implemented across various sports and levels, but there is limited understanding of the personnel responsible for this, including their S&C practices and perspectives. Whereas recent evidence has shown that coaches and players are often tasked with the responsibility. Therefore, this study aimed to investigate: 1) the personnel responsible for delivering S&C across different levels of soccer, 2) the practices and perspectives of soccer coaches and players, and 3) to ascertain whether the practices employed align with contemporary evidence and guidelines. Forty-two soccer coaches and 30 soccer players completed an online survey with six sections: (a) informed consent, (b) background information, (c) education, qualifications, and prescription, (d) views on S&C, (e) exercise selection and preferences, and (f) issues and improvements. Frequency analysis was used to report responses to fixed-response questions and thematic analysis for open-ended questions. Most respondents reported S&C to be 'important' to 'very important' for all soccer, physical fitness, and injury parameters, with perspectives being predominantly aligned with S&C guidelines and research in soccer. Although S&C coaches were mostly responsible for delivering S&C sessions, over 60% of respondents disclosed S&C sessions were delivered independently or by support staff. This is problematic given only four coaches held S&C qualifications, and issues and improvements were mostly regarding a lack of S&C expertise and education. This study provides valuable information for S&C and soccer organizations. Particularly regarding the additional support required to ensure those responsible for delivering S&C in soccer have the appropriate knowledge and qualifications.

Keywords

Association football, injury rehabilitation, plyometrics, power, resistance training, sport-specific fitness

Introduction

To be successful as a soccer player, a range of technical, tactical, psychological, physical, and physiological attributes are required.¹ Recently, there has been growing interest in the physical and physiological demands of soccer, which is characterized as a high-intensity intermittent contact sport.² Consequently, possessing strong aerobic and anaerobic conditioning, speed, agility, strength, and power, are considered advantageous

for soccer performance.² To appropriately develop such attributes, personnel responsible for the implementation of strength and conditioning (S&C) are encouraged to use relevant guide- lines and evidence-informed recommendations.^{2,3} For example, repeated sprint ability and change of direction drills, in conjunction with small-sided games can enhance players' aerobic and anaerobic capacities, while resistance training and plyometric exercises can improve strength, power, and agility.^{2,4}

To effectively train and compete as a soccer player, remaining injury-free is also of great importance and a collective concern for coaches, players, and support staff.^{5,6} Due to the competitiveness of match play, injury incidence in competition is more prevalent than training across youth and adult populations.⁵ A recent systematic review demonstrated that youth soccer players sustained 9.5 to 48.7 injuries per 1000 h of exposure in competition, and 3.7 to 11.14 injuries per 1000 h of exposure in training, while adult professional soccer players sustained 8.7 to 65.9 injuries per 1000 h of exposure in competition and 1.37 to 5.8 injuries per 1000 h of exposure in training.⁵ Whereas, to reduce the likelihood of injury, players are recommended to undertake evidence-informed injury prevention programs (e.g. FIFA 11 +), implement comprehensive S&C programs that include strength training, and manage training load.⁶

Yet, the application of such recommendations may be problematic for coaches and players, who do not possess the required knowledge or experience.⁷ This issue was recently emphasized in volleyball, where coaches and players considered S&C to be 'highly important,' but due to various constraints (e.g. finances, resources, availability of S&C coaches), S&C provisions were predominantly delivered independently, despite a lack of expertise or expertise in this field.⁷ Conversely, research suggests at the elite level S&C coaches are commonly employed in various sports,⁸ inclusive of soccer.^{4,9} Whether this is also the case at sub-elite levels of soccer or in regions where S&C is still being established within mainstream sport,⁷ remains uncertain. Developing this understanding is important as it will provide national sports associations and S&C governing bodies, with the relevant information to best support the safe (e.g. reduction of injuries) and effective (e.g. improving performance) implementation of S&C within soccer. Furthermore, to help upskill those delivering S&C to obtain relevant education and qualifications. Therefore, this study aims to investigate the S&C practices and perspectives of soccer coaches and players. To the authors' knowledge, this is the first study to specifically address this. Results from this study will help ascertain whether coaches' and players' practices align with current guidelines and evidence in S&C, and support the further development of S&C education, practice, and research in soccer.

Methods

Measurements

This study used an anonymous online survey to investigate the S&C practices and perspectives of soccer coaches and players. The survey was adapted from previous research⁷ and developed using the open-access survey application, Google Forms. All information within the survey was presented in English and Chinese for clarity and understanding for the surveyed population. The survey comprised of six sections, (a) written informed consent; (b) background information; (c) education; qualifications and prescription; (d) views on S&C; (e) exercise selection and preferences; and (f) issues and improvements. The coaches' survey included 26 fixed-responses and 26 open-ended questions, and the players' survey included 24 fixed responses and 26 open-ended questions (see appendix). The coaches' additional questions were regarding the age range of soccer players coached and their predominant role in coaching (i.e. head coach, assistant coach). Some questions allowed the selection of multiple responses, meaning some questions had more responses than others. The survey was reviewed for content validity and pilot tested by each member of the research team, three soccer coaches, and three soccer players, for three rounds before the survey was finalized. This led to

slight modifications to the wording and structure of the survey to ensure its validity for use with this population.

Participants

Forty-two soccer coaches and (n = 38 male, n = 3 female, n = 1 non-disclosed; mean age 40 ± 11 yrs; mean coaching experience 19 ± 14 yrs) and 30 soccer players (n = 17 male, n = 13 female; mean age 27 ± 7 yrs and playing experience 12 ± 5 yrs) participated in this study. A survey instrument was distributed via email to all coaches and players registered with the Hong Kong Football Association (HKFA). All participants were explained the inclusion criteria, purpose, aims, required time-commitment, and confidentiality of information, before providing consent and completing the survey. The inclusion criteria for coaches were, 1) currently coaching in competitive level soccer in Hong Kong, and 2) players coached currently perform resistance training practices. For players, the inclusion criteria were, 1) currently playing in competitive level soccer in Hong Kong, and 2) currently performing resistance training practices. The study was approved by the Human Subjects Ethics Sub-Committee of The Technological and Higher Education Institute of Hong Kong (THEi).

Statistical analyses

All responses from Google Forms were downloaded into a Microsoft Excel Spreadsheet. Fixed-response questions were assessed using frequency analysis. Open-ended response questions were assessed using a thematic analysis approach,¹⁰ using the following six-stage process, (a) familiarization with the data; (b) generating initial codes; (c) searching for themes; (d) reviewing themes; (e) defining and naming themes; and (f) producing the report. This method of thematic analysis has been previously used in studies surveying sports coaches, athletes, and S&C coaches.^{4,7,9,11,12} Thereafter, overarching clear and identifiably distinct themes, representing the main ideas or patterns emerging from the raw data were generated for each question. Some responses provided sufficient information where more than one overarching theme could be identified.

Results

Participant information

The highest level of competition coaches and players had been involved in is presented in Figure 1.

The current roles of coaches consisted of head coach (48%), assistant coach (40%), and trainer (5%), with other (7%) responses including team director, team manager, and goalkeeper coach. The age groups coached were below 12 years (41%), above 18 years (27%), 12–14 years (17%), and 15–17 years (15%). Players' predominant positions were defender (47%), attacker (30%), midfielder (13%), and goalkeeper (10%).

Education, qualifications, and prescription

Coaches' highest level of education were bachelor's degree (48%), secondary school (21%), associate degree/higher diploma (19%), and master's degree (12%), with 52% of qualifications being in a sports-related field. Players' highest level of education were bachelor's degree (63%), secondary school (20%), and higher diploma/associate degree (17%), with 23% of qualifications being in a sport-related field.

Overall, only four coaches (10%) held recognized S&C qualifications, with the United Kingdom Strength and Conditioning Association (UKSCA) (5%) or the National Strength and Conditioning Association (NSCA) (5%).

Soccer coaching qualifications were held by 95% of coaches, with the highest level of qualification obtained with the following organizations, Hong Kong Football Association (HKFA) C Coaching Certification (31%), HKFA D Coaching Certification (31%), Asian Football Confederation (AFC) Professional Diploma (9%), HKFA B Coaching Certification (7%), Union of European Football Associations (UEFA) Pro Licence (5%), UEFA A Licence (2%), UEFA B Licence (2%), AFC A Coaching Diploma (2%), AFC B Coaching Diploma (2%), AFC C Coaching Diploma (2%), and Bank of China Hong Kong (BOCHK) Grassroots Football Planner Other (2%). For players, 52% held coaching qualifications, with the highest level of qualification obtained with the following organizations, HKFA C Coaching Certification (13%), HKFA D Coaching Certification (13%), HKFA Youth Leader Award (13%), BOCHK Grassroots Football Planner Other (7%), HKFA B Coaching Certification (3%), and English Football Association (FA) Level One (3%). The percentage of coaches and players reporting where they predominantly source S&C information and personnel responsible for prescribing S&C exercises are presented in Figures 2 and 3, respectively. The percentage of coaches and players reporting how important S&C is for different soccer skills, physical fitness, and injury parameters is presented in Tables 1 and 2, respectively.

Views on strength and conditioning

The perceived areas that S&C is important for regarding soccer skills is presented in Table 3, and for physical fitness and injury parameters is presented in Table 4.

Coaches reported the effectiveness of their current S&C programs used with players to be: 'moderately effective' (47%),

Exercise selection and preferences

The exercise preferences of coaches and players to develop different physical fitness, soccer skills, and injury parameters are presented in Table 5.

Issues and improvements

Issues, disadvantages, and desired improvements coaches and players reported concerning the delivery of S&C programs are presented in Table 6.

Discussion

To the authors' knowledge, this is the first study to address the S&C practices and perspectives of soccer coaches and players. A key finding was that coaches and players predominantly source S&C information from S&C coaches and that S&C coaches are the main personnel responsible for prescribing S&C training. Contrastingly, research in volleyball showed coaches were the main source of S&C information, and coaches and players were mostly responsible for independently delivering S&C training.⁷ Although this finding appears to be positive, still, 64% of coaches and 60% of players did not employ or have access to a S&C coach, with S&C training being mostly conducted independently or by head coaches. This is problematic given the high importance placed on S&C, and the role S&C coaches play in optimizing physical and sports performance while reducing the likelihood of injuries.^{13,14} Furthermore, only four coaches held recognized S&C qualifications, demonstrating a disparity between the requirements of coaches and players to conduct S&C training and their

level of education to do so. As such, the main reported issues preventing the quality delivery of S&C was a lack of available expertise, time, facilities, and equipment. In turn, approximately half of coaches and players deemed their S&C provisions to only be 'moderately effective.'

Most coaches and players believed S&C to be 'important' to 'very important' for the performance of various soccer skills. Winning of duels (e.g. a player attempting to dispossess an opponent) and protecting the ball, was considered areas S&C training was most beneficial, primarily through improving players' resilience to injury and developing strength and stability. A two-season epidemiological study of 6038 youth soccer players aged 7–12 years old, revealed that 57.3% of injuries sustained were as a result of contact.¹⁵ Whereas, it has been reported that 38% of training time in youth soccer practice is in situations where duels may occur, resulting in players being involved in one duel every 6.4 min.¹⁶ Similarly, in adult football, it is estimated that 50% of all injuries are due to contact or foul play.^{17,18} Although injuries resulting from contact cannot be prevented, research suggests that improving strength and stability will increase players' resilience to injuries across youth and adult populations.¹⁷ In this study, the squat (including variations) and core training were seen as key exercises for strength development and soccer performance. Research recommendations also support including such exercises within S&C programs for soccer players.^{4,9} Specifically in elite youth soccer players, predicted one-repetition maximum squat strength has been significantly correlated ($r = 0.61$) with winning of duels and tackling success.¹⁹ Whereas, the inclusion of core training (e.g. plank and bridging exercises) in conjunction with regular soccer training, has demonstrated improved core muscle strength, athletic performance, and reduction of contact and non-contact injuries.^{20–22} Therefore in support of the responses by coaches and players in this survey, it is recommended that players in all positions should conduct appropriate training to prepare for the physicality of duels when protecting or attempting to win the ball.²³

Strength and conditioning was deemed 'important' to 'very important' for developing passing and shooting skills, with strength/power and conditioning/endurance being perceived as the most essential areas for physical development. Research has demonstrated that a six-week weightlifting and plyometric programme can improve the strength, power, and subsequent kicking velocity of adult recreational players, determined via maximal knee extension velocity during a soccer kicking task.²⁴ Furthermore, the development of core strength using a nine-week core

training programme on stable and unstable surfaces demonstrated significantly improved ($p < 0.01$) shooting velocity from the penalty spot in elite youth soccer players.²² Although kicking velocity may be improved through relevant physical training, recent literature in elite youth soccer players revealed no significant relationship between strength and power scores and the accuracy of passing and shooting performance.¹⁹ It was suggested that technical ability, cognitive function, and sensory awareness were more important for soccer performance.¹⁹ Another important factor to consider is fatigue, where simulated and competitive match play, has been associated with reduced kicking performance (i.e. accuracy).^{25–27} Furthermore, soccer players with inferior aerobic ability determined through intermittent yoyo recovery test scores demonstrated a significant correlation with lower performance in the Loughborough Soccer Passing Test ($r = -0.51$ to -0.65).²⁶ So it is logical that coaches and players in this study believe conditioning/endurance to be of high importance for passing and shooting performance, but also that fitness (e.g. aerobic training) to be the most specific mode of training for soccer players.

Similarly, for goalkeepers (e.g. blocking, diving and catching), S&C was seen as 'important' to 'very important,' with the main component to be improved through S&C from the coaches' perspective being power, and from the players' perspective being reaction time. From a developmental viewpoint, research has shown that various measures of power determined through a range of cycle ergometer and vertical jump assessments, significantly increases in goalkeepers from under 16, to 16–19, and over 19 age groups.²⁸ It is further suggested that goalkeepers should develop above-average power characteristics to perform faster blocks, dives, and catches.²⁸ In professional soccer players, goalkeepers have demonstrated significantly higher

vertical jumping ability compared to outfield players, except for attackers.²⁹ Whereas, in addition to power development, it has been determined to be highly relevant for goalkeepers

to also train reaction time.²⁸ Regarding reaction time ability, goalkeepers tend to have quicker reaction times than outfield players and is something that can be systematically improved through neuromuscular training.²⁹ Therefore, although coaches and players in this study have varied opinions on the importance of different S&C training methods for goal-keeping performance, these are collectively in line with research recommendations.

The physical capacities of speed and power, which include sub-components of acceleration, deceleration, change of direction, jumping, and landing were all deemed 'important' to 'very important' for soccer players, that can be enhanced through S&C training. The development of such attributes are all considered essential for soccer performance and can be improved through a range of general and specific S&C training methods.² Recent research on professional soccer players has shown the inter-relationship between various speed and power characteristics.³⁰ For example, those players who had superior maximum acceleration rates were faster over short distance sprints, achieved greater change of direction velocities, and could jump higher.³⁰ Particularly for coaches in this study, S&C was seen as 'very important' to develop the technical ability of movements associated with speed and power (e.g. sprinting, jumping), which is in line with the exercises preferred to develop these characteristics being sprinting, running, and plyometrics (e.g. jumping). It is stressed within S&C guidelines that technical instructions and demonstrations should be used to support athletes in learning key skills and movements, with athletes being able to meet certain pre-requisites or competencies before an exercise can be introduced or progressed, to improve subsequent performance, and reduce the likelihood of injuries.³¹ But given the lack of education and expertise of a large proportion of the personnel responsible for delivering S&C provisions within this study, it is uncertain whether such recommendations are appropriately applied.

When injuries do occur, coaches believed S&C was most important to assist in accelerating the recovery process, whereas players believed it was to improve muscular strength to pre-injury levels and to prevent future occurrence of injury. The integral role of S&C in rehabilitating injuries is well documented, particularly in assisting physicians and physiotherapists in the recovery process, rebuilding strength, and supporting players in restoring general and sport-specific functions.³² Similar to prior research,³³ although there was some consensus between coaches and players in this study regarding the importance of S&C for injury reduction and rehabilitation/return to play strategies in soccer, there were still some areas where this was not the case (i.e. strength). It was interesting that coaches placed less importance on strength concerning injuries when compared to players, given the wealth of evidence from governing body initiatives (e.g. FIFA 11+) and research across different soccer populations.^{34–36}

The importance of S&C from the perspective of coaches and players in this study was prevalent. Whereas perceived issues from a coach's perspective were related to the additional time requirements to implement S&C, and that this may reduce the time afforded to soccer practice. While this is problematic, careful planning and integration of soccer practices that promote the concurrent development of physical fitness and sport skills such as small-sided games may be a viable option.³⁷ However, regarding potential improvements, only 10% of coaches and 3% of players suggested integrating S&C within soccer training. Players in this study were primarily concerned with an increased injury risk when S&C practices were poorly applied, exercise techniques were taught incorrectly, or additional physical training leading to overtraining/fatigue. This is a valid concern, particularly with the high number of coaches and players administering their own S&C training, most of which are without the relevant expertise. Although qualitative answers in this study generally allowed the production of relevant themes, the depth of knowledge and understanding expressed was sometimes limited or

ambiguous. For example, “Quality S&C will prevent players getting injured” and “Jumping includes many technical elements that S&C training can fulfill.” Nonetheless, it was reassuring to see that the main area for improvement related to the delivery of S&C was education. This demonstrates that although coaches and players may not be able to hire a S&C coach due to various constraints (e.g. finances, availability of S&C coaches), they are eager to develop their knowledge. These findings are similar to those reported by volleyball coaches in Hong Kong, where a lack of formal education led to misconceptions regarding S&C (e.g. increased injury risk), with coaches and players also reporting that a major improvement to their S&C provisions would be self-education.⁷ Therefore, similar to the recommendations from Weldon and colleagues⁷ in volleyball, there is a need for general and sport-specific S&C education and accreditation opportunities, in countries such as Hong Kong, to develop the practices and implementation of S&C.

Conclusion

Soccer coaches and players predominantly deemed S&C to be ‘important’ to ‘very important’ for various soccer, physical fitness, and injury parameters. It was observed that perspectives were mostly in line with guidelines and research in S&C and soccer. Strength and conditioning coaches were reported as the main personnel responsible for delivering S&C sessions, but still, more than 60% of respondents, conducted their own S&C sessions. This was despite a lack of formal education and experience in doing so. However, it was promising to see that respondents were willing to undertake S&C education if sporting and S&C governing bodies made this more relevant and accessible.

Practical applications

It is advised to employ or consult with a qualified S&C coach, who can design and implement S&C programs, aligned with appropriate guidelines and research. If this is not feasible (e.g. lack of accessibility or financial constraints), coaches, players, and support staff responsible for delivering S&C should undertake relevant education and professional development. But it is important that local (i.e. Hong Kong) and international governing bodies in S&C and soccer, provide appropriate opportunities for education. In turn, this will likely increase the safety and efficacy of S&C programs delivered in soccer, mainly through optimizing sports performance and reducing injuries of players.

Limitations

The sample size for this study is reasonable for the level of coaches and players surveyed in Hong Kong, but it may not be representative of all coaches and players in this region or be extrapolated to those in other countries. The required number of surveys needed for valid analysis was not determined before data collection, it was aimed to obtain as many responses as possible within this purposive sample. Overall, 73% of coaches reported coaching players below 18 years old, which may have influenced their perspectives and implementation of S&C.

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Appendix

Coach Survey

- Refers to questions with multiple choice answers
 - Refers to questions with single choice answers A) Informed Consent
 - Agree
 - Disagree
- B) Background Information Q1. Gender?

- Male
- Female
- Prefer not to say

Q2. How old are you? (must be over 18 years old to enter this survey)

Q3. Number of years' experience as a soccer coach?

Q4. What is the highest level of competition that you have coached?

- Federation Internationale de Football Association (FIFA) International Competition
- International Asian Football Confederation (AFC) Competition (Country)
- Continental Asian Football Confederation (AFC) Competition (Club)
- Hong Kong FA Premier League (Men's)
- Hong Kong FA Division 1-3 (Men's)
- Hong Kong FA First Division (Women's)
- Hong Kong FA Division 2 (Women's)
- The University Sports Federation of Hong Kong, (USFHK) Competition
- The Hong Kong Schools Sports Federation (HKSSF) Competition
- Other

Q5. Refer to Q4, what was your role?

- Head Coach
- Assistant Coach
- Trainer
- Other:

Q6. What is the current level of competition that you coach?

- Federation Internationale de Football Association (FIFA) International Competition
- International Asian Football Confederation (AFC) Competition (Country)
- Continental Asian Football Confederation (AFC) Competition (Club)
- Hong Kong FA Premier League (Men's)
- Hong Kong FA Division 1-3 (Men's)
- Hong Kong FA First Division (Women's)
- Hong Kong FA Division 2 (Women's)
- The University Sports Federation of Hong Kong, (USFHK) Competition
- The Hong Kong Schools Sports Federation (HKSSF) Competition

- Other

Q7. Refer to Q6, what is your role?

- Head Coach
- Assistant Coach
- Trainer
- Other:

Q8. What age range do you predominantly coach?

- Below 12 years old
- 12-14 years old
- 15–17 years old
- Above 18 years old

C) Education, Qualifications and Prescription Q9. What is your highest level of education?

- Secondary School
- Higher Diploma/Associate Degree
- Bachelor's Degree
- Master's degree
- Doctor of Philosophy (PhD)
- Other

Q10. What was the subject area of your highest level of education?

Q11. Do you possess a strength and conditioning qualification with any of the below organizations or any other related fitness qualification?

- Australian Strength and Conditioning Association (ASCA)
- National Strength and Conditioning Association (NSCA)
- Collegiate Strength and Conditioning Coaches Association (CSCCa)
- United Kingdom Strength and Conditioning Association (UKSCA)
- None
- Other

Q12. What professional soccer coaching qualification(s) do you hold?

- UEFA Pro Licence
- UEFA A Licence
- UEFA B Licence

- AFC Professional Diploma
- AFC A Coaching Diploma
- AFC B Coaching Diploma
- AFC C Coaching Diploma
- HKFA B Coaching Certification
- HKFA C Coaching Certification
- HKFA D Coaching Certification
- HKFA Youth Leader Award
- BOCHK Grassroots Football Planner Other
- Other

Q13. Where do you predominantly source strength and conditioning information? Rank the following in order of importance. (1 will be your 1st source; 10 will be your last source)

- Soccer Coaches
- Soccer Players
- Strength and Conditioning Coaches
- Sports Therapists
- Physiotherapists
- Coaching Courses
- Research Articles
- Social Media
- Books and Magazines
- Other

Q14. Who is mainly responsible for prescribing strength and conditioning exercises for you?

- Manager
- Head Coach
- Assistant Coach
- Independently (Yourself)
- Trainer
- Strength and Conditioning Coach
- Sports Therapist
- Physiotherapist
- Other:

D) Views on Strength and Conditioning

Q15. How important is strength and conditioning for passing or shooting a ball?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q15a. Refer to your previous answer, please explain why?

•

Q16. How important is strength and conditioning for strength in duels (the winning of or protection of the ball)

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q16a. Refer to your previous answer, please explain why?

•

Q17. How important is strength and conditioning for running speed?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q17a. Refer to your previous answer, please explain why?

•

Q18. How important is strength and conditioning for acceleration/deceleration/change of direction?

- Not Important

- Slightly Important
- Moderately Important
- Important
- Very Important

Q18a. Refer to your previous answer, please explain why?

-

Q19. How important is strength and conditioning for jumping and landing?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q19a. Refer to your previous answer, please explain why?

-

Q20. How important is strength and conditioning for goal-keeping specific tasks (blocking, diving, distribution, catching, etc)

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q20a. Refer to your previous answer, please explain why?

-

Q21. How important is strength and conditioning for strength development?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q21a. Refer to your previous answer, please explain why?

-

Q22. How important is strength and conditioning for speed and power development?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q22a. Refer to your previous answer, please explain why?

-

Q23. How important is strength and conditioning for soccer-specific fitness?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q23a. Refer to your previous answer, please explain why?

-

Q24. How important is strength and conditioning for reducing the likelihood of injuries?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q24a. Refer to your previous answer, please explain why?

-

Q25. How important is strength and conditioning for injury rehabilitation/return to play?

- Not Important
- Slightly Important
- Moderately Important

- Important
- Very Important

Q25a. Refer to your previous answer, please explain why?

-

Q26. How effective is your current strength and conditioning program?

- Not Effective
- Slightly Effective
- Moderately Effective
- Effective
- Very Effective

Q26a. Refer to your previous answer, please explain why?

-

Q27. Do you have any other views on strength and conditioning in soccer?

-

E) Exercise Selection

Q28. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for strength development?

1.

2.

3.

Q28a. Explain why you have listed the 'FIRST' exercise most important?

Q29a. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for speed and power development?

1.

2.

3.

Q29a. Why have you listed the 'FIRST' exercise most important?

Q30. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for soccer-specific fitness?

- 1.
- 2.
- 3.

Q30a. Explain why you have listed the 'FIRST' exercise most important?

Q31. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for reducing the likelihood of soccer-related injuries?

- 1.
- 2.
- 3.

Q31a. Explain why you have listed the 'FIRST' exercise most important?

Q32. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for soccer performance?

- 1.
- 2.
- 3.

Q32a. Explain why you have listed the 'FIRST' exercise most important?

F) Issues and Improvements

Q33. Explain the biggest issues you face when implementing strength and conditioning?

Q34. Explain any disadvantages associated with strength and conditioning?

Q35. Given unlimited time and resources, how would you change or improve your current strength and conditioning provisions?

Player Survey

- Refers to questions with multiple choice answers
- Refers to questions with single choice answers

A) Informed Consent

- Agree
- Disagree

B) Background Information

Q1. Gender?

- Male
- Female
- Prefer not to say

Q2. How old are you? (must be over 18 years old to enter this survey)

Q3. Number of years' experience as a soccer player? Q4. What is your predominant position?

- Goalkeeper
- Defender
- Midfielder
- Attacker
- Other

Q5. What is the highest level of competition that you have played in?

- Federation Internationale de Football Association (FIFA) International Competition
- International Asian Football Confederation (AFC) Competition (Country)
- Continental Asian Football Confederation (AFC) Competition (Club)
- Hong Kong FA Premier League (Men's)
- Hong Kong FA Division 1-3 (Men's)
- Hong Kong FA First Division (Women's)
- Hong Kong FA Division 2 (Women's)
- The University Sports Federation of Hong Kong, (USFHK) Competition
- The Hong Kong Schools Sports Federation (HKSSF) Competition
- Other

Q6. What is your current level of competition that you play in?

- Federation Internationale de Football Association (FIFA) International Competition
- International Asian Football Confederation (AFC) Competition (Country)
- Continental Asian Football Confederation (AFC) Competition (Club)
- Hong Kong FA Premier League (Men's)

- Hong Kong FA Division 1-3 (Men's)
- Hong Kong FA First Division (Women's)
- Hong Kong FA Division 2 (Women's)
- The University Sports Federation of Hong Kong, (USFHK) Competition
- The Hong Kong Schools Sports Federation (HKSSF) Competition
- Other

C) Education, Qualifications and Prescription Q7. What is your highest level of education?

- Secondary School
- Higher Diploma/Associate Degree
- Bachelor's Degree
- Master's degree
- Doctor of Philosophy (PhD)
- Other

Q8. What was the subject area of your highest level of education?

Q9. Do you possess a strength and conditioning qualification with any of the below organizations or any other related fitness qualification?

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- Collegiate Strength and Conditioning Coaches Association (CSCCa)
- United Kingdom Strength and Conditioning Association (UKSCA)
- None
- Other

Q10. What professional soccer coaching qualification(s) do you hold?

- UEFA Pro Licence
- UEFA A Licence
- UEFA B Licence
- AFC Professional Diploma
- AFC A Coaching Diploma
- AFC B Coaching Diploma
- AFC C Coaching Diploma
- HKFA B Coaching Certification
- HKFA C Coaching Certification

- HKFA D Coaching Certification
- HKFA Youth Leader Award
- BOCHK Grassroots Football Planner Other
- Other

Q11. Where do you predominantly source strength and conditioning information? Rank the following in order of importance. (1 will be your 1st source; 10 will be your last source)

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- Soccer Players
- Strength and Conditioning Coaches
- Sports Therapists
- Physiotherapists
- Coaching Courses
- Research Articles
- Social Media
- Books and Magazines
- Other

Q12. Who is mainly responsible for prescribing strength and conditioning exercises for you?

- Manager
- Head Coach
- Assistant Coach
- Independently (Yourself)
- Trainer

- Strength and Conditioning Coach
- Sports Therapist
- Physiotherapist
- Other:

D) Views on Strength and Conditioning

Q13. How important is strength and conditioning for passing or shooting a ball?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q13a. Refer to your previous answer, please explain why?

•

Q14. How important is strength and conditioning for strength in duels (the winning of or protection of the ball)

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q14a. Refer to your previous answer, please explain why?

•

Q15. How important is strength and conditioning for running speed?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q15a. Refer to your previous answer, please explain why?

•

Q16. How important is strength and conditioning for acceleration/deceleration/change of direction?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q16a. Refer to your previous answer, please explain why?

-

Q17. How important is strength and conditioning for jumping and landing?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q17a. Refer to your previous answer, please explain why?

-

Q18. How important is strength and conditioning for goal-keeping specific tasks (blocking, diving, distribution, catching, etc)

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q18a. Refer to your previous answer, please explain why?

-

Q19. How important is strength and conditioning for strength development?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q19a. Refer to your previous answer, please explain why?

-

Q20. How important is strength and conditioning for speed and power development?

- Not Important
- Slightly Important

- Moderately Important
- Important
- Very Important

Q20a. Refer to your previous answer, please explain why?

-

Q21. How important is strength and conditioning for soccer-specific fitness?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q21a. Refer to your previous answer, please explain why?

-

Q22. How important is strength and conditioning for reducing the likelihood of injuries?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q22a. Refer to your previous answer, please explain why?

-

Q23. How important is strength and conditioning for injury rehabilitation/return to play?

- Not Important
- Slightly Important
- Moderately Important
- Important
- Very Important

Q23a. Refer to your previous answer, please explain why?

-

Q24. How effective is your current strength and conditioning programme?

- Not Effective
- Slightly Effective
- Moderately Effective
- Effective
- Very Effective

Q24a. Refer to your previous answer, please explain why?

-

Q25. Do you have any other views on strength and conditioning in soccer?

-

E) Exercise Selection

Q26. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for strength development?

- 1.
- 2.
- 3.

Q26a. Explain why you have listed the 'FIRST' exercise most important?

Q27a. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for speed and power development?

- 1.
- 2.
- 3.

Q27a. Explain why you have listed the 'FIRST' exercise most important?

Q28. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for soccer-specific fitness?

- 1.
- 2.
- 3.

Q28a. Explain why you have listed the 'FIRST' exercise most important?

Q29. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for reducing the likelihood of soccer-related injuries?

- 1.
- 2.
- 3.

Q29a. Explain why you have listed the 'FIRST' exercise most important?

Q30. Name up to 'THREE' strength and conditioning exercises in order, you consider most important for soccer performance?

- 1.
- 2.
- 3.

Q30a. Explain why you have listed the 'FIRST' exercise most important?

F) Issues and Improvements

Q31. Explain the biggest issues you face when implementing strength and conditioning?

Q32. Explain any disadvantages associated with strength and conditioning?

Q33. Given unlimited time and resources, how would you change or improve your current strength and conditioning provisions?

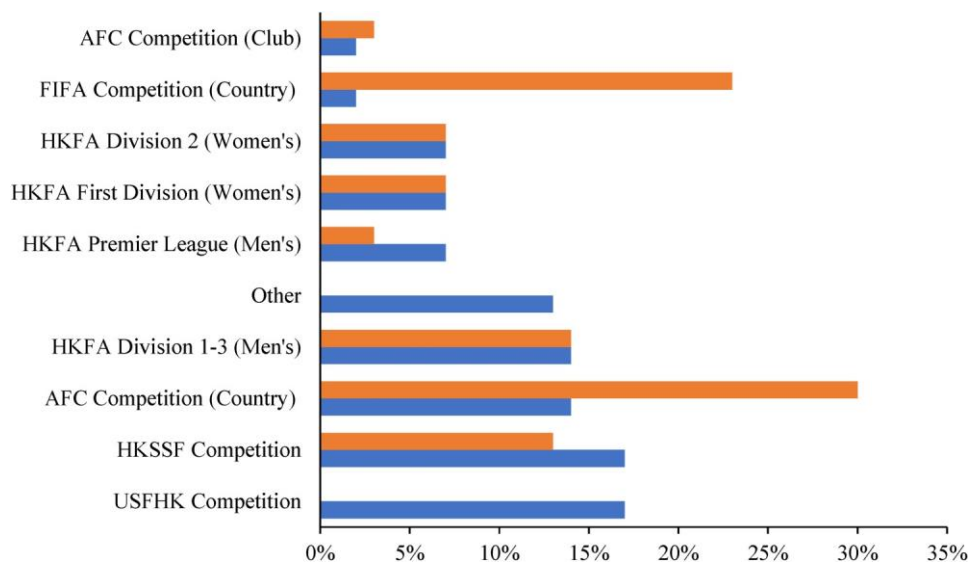


Figure 1. The highest level of competition that coaches (blue) and players (orange) had been involved in. The University Sports Federation of Hong Kong (USFHK); The Hong Kong Schools Sports Federation (HKSSF); Asian Football Confederation (AFC); The Hong Kong Football Association (HKFA); Federation Internationale de Football Association (FIFA).

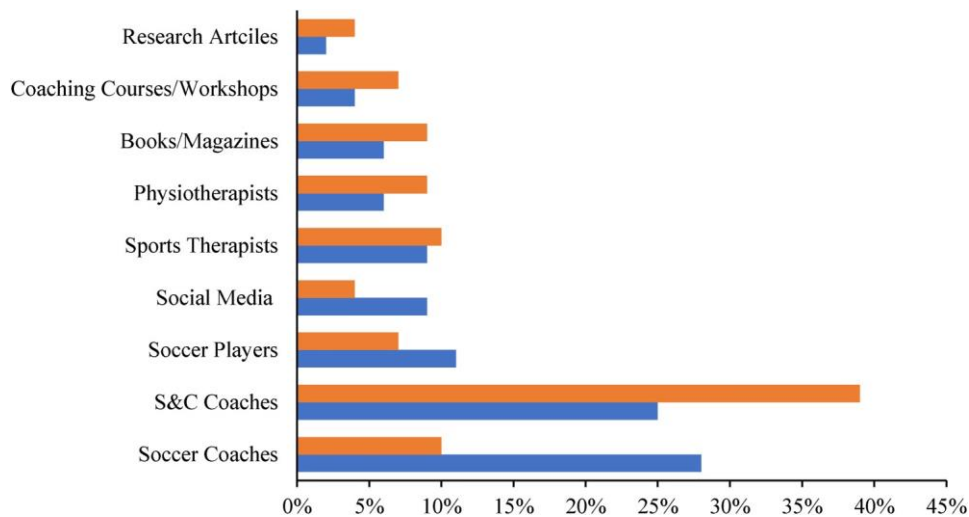


Figure 2. Percentage of coaches (blue) and players (orange) who obtain strength and conditioning information from different sources.

'effective' (29%), or 'very effective' (24%). Players reported the effectiveness of their current S&C programs to be: 'moderately effective' (50%), 'effective' (43%), or 'very effective' (7%).

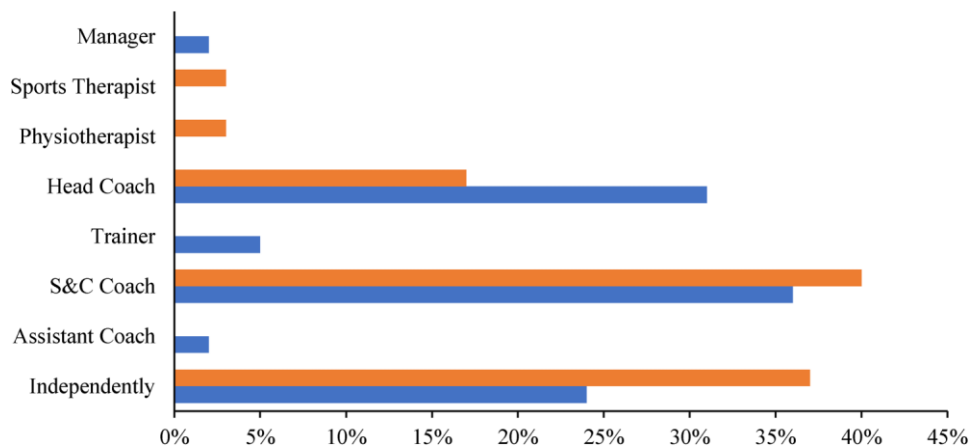


Figure 3. Percentage of coaches (blue) and players (orange) reporting the personnel responsible for prescribing and conditioning exercises.

Table 1. The importance of strength and conditioning training for soccer skills reported by coaches and players.

		Not Important (%)	Slightly Important (%)	Moderately Important (%)	Important (%)	Very Important (%)
Passing/Shooting	Coach	0	0	5	35	60
	Player	0	3	7	43	47
Duels/Ball Protection	Coach	0	0	0	24	76
	Player	0	0	0	33	67
Running Speed	Coach	0	0	2	29	69
	Player	0	0	10	43	47
Acceleration/Deceleration/ Change of Direction	Coach	0	0	0	29	71
	Player	0	0	0	33	67
Jumping/Landing	Coach	0	0	0	29	71
	Player	0	0	0	43	57
Goalkeeping (Blocking/ Diving/Catching)	Coach	0	0	2	36	62
	Player	0	7	0	43	50

Table 2. The importance of strength and conditioning training for different physical fitness and injury parameters, reported by coaches and players.

		Not Important (%)	Slightly Important (%)	Moderately Important (%)	Important (%)	Very Important (%)
Strength	Coach	0	0	5	26	69
	Player	0	0	13	30	60
Power/Speed	Coach	5	0	2	21	71
	Player	0	0	0	33	67
Soccer-Specific Fitness	Coach	0	0	2	24	74
	Player	0	0	7	30	63
Reducing Injuries	Coach	0	0	2	26	72
	Player	0	0	6	27	67
Injury Rehabilitation/ Return to Play	Coach	0	2	2	41	55
	Player	3	0	0	43	54

Table 3. Perceived areas that strength and conditioning is important for different soccer skills, reported by coaches and players.

Soccer Skill	Rank	Theme	Exemplar Response	Coaches (%)	Players (%)
Passing/Shooting	1	Strength/Power	"Kicking power is underpinned by muscular strength and power"	71	47
	2	Conditioning/ Endurance	"Conditioning maintains passing/shooting ability under fatigue"	24	10
	3	Balance/Coordination	"Good balance stabilizes the centre of gravity when kicking the ball"	19	23
	4	Injury Reduction	"Decreases the chance of getting an injury"	12	17
	5	Miscellaneous	"Passing/shooting are more about technique than S&C"	12	27
Duels/Ball Protection	1	Strength/Power	"Greater muscle mass and strength will help protect the ball"	62	60
	2	Stability/Balance	"Balance is essential to withstand pressure from opponents"	33	17
	3	Resilience to Contact/ Injury Reduction	"Protect yourself and resist body contact, which will decrease injuries"	21	37
	4	Miscellaneous	"Position and timing is probably most important"	12	3
	5	Acceleration/Speed	"Good acceleration is required to react to situations"	7	3
	6	Conditioning/ Endurance	"Physical fitness is essential for duels throughout a game"	5	10
Running Speed	1	Technical	"Improve stride frequency and decrease ground contact time"	26	17
	2	Power	"Develop lower body power"	26	33

	3	Conditioning/ Endurance	"Speed endurance to perform repeated sprints"	21	13
	4	Strength	"Train strength of key muscles for sprinting"	19	47
	5	Acceleration/Speed	"Can work on acceleration to reach maximal speed quicker"	17	17
	6	Miscellaneous	"Speed can be improved outside of S&C sessions"	14	23
	7	Injury Reduction	"Prevents muscles such as the hamstrings getting injured"	2	7
Acceleration/	1	Technical	"S&C develops the technical elements of	36	27

(continued)

Table 3. (continued)

Soccer Skill	Rank	Theme	Exemplar Response	Coaches (%)	Players (%)
Deceleration/ Change of Direction	2	Strength	acceleration, deceleration, and change of direction, such as posture"	33	30
	3	Power	"Core, quadriceps and hamstring strength is required for effective performance"	19	20
	4	Injury Reduction	"Prevents injury occurrence"	17	23
	5	Miscellaneous	"S&C improves jumping coordination and balance"	12	17
	6	Conditioning/ Endurance	"The ability to perform repeated changes of direction requires a base level of fitness"	5	10
	Jumping/Landing	1	Power	"Explosive power helps improve jumping height and ability"	38
2		Injury Reduction	"Minimizes injury risk, particularly when landing"	33	33
3		Technical	"Jumping has many technical elements that S&C training can fulfill"	29	10
4		Strength	"With a lack of strength, it is difficult to produce power"	29	20
5		Balance/Coordination	"S&C improves jumping coordination and balance"	19	7
6		Miscellaneous	"Genetics play an important role in jumping ability"	7	13
7		Conditioning/ Endurance	"Sufficient muscular endurance improves consistent jumping and landing during match play"	0	3
Goalkeeping -Blocking/Diving/ Catching	1	Power	"Goalkeepers use their whole body to perform powerful jumps/dives to save the ball"	40	27
	2	Injury Reduction	"It can prevent injuries associated with repeated landing/blocking"	24	17
	3	Strength	"Strength is required for goalkeeping tasks, such as aerial duels"	24	17
	4	Balance/Coordination	"Improve hand-foot coordination and balance when landing"	14	3
	5	Reaction Time	"S&C can be used to optimize reactions and therefore performance"	12	30
	6	Conditioning/ Endurance	"Endurance is important when saving multiple shots in short periods"	12	7
	7	Miscellaneous	"Can train specific muscles used for this position"	12	20
	8	Technical	"Saving and diving can be performed more effectively when similar movements practiced in S&C"	7	10
	9	Flexibility	"Improves flexibility of muscles"	5	0

S&C: Strength and Conditioning.

Note: Some answers detailed more than one response, which was further sub-divided amongst the themes created

Table 4. Perceived benefits of strength and conditioning for training different physical fitness and injury parameters, reported by coaches and players.

Physical Fitness, and Injury Parameters	Rank	Theme	Exemplar Response	Coaches (%)	Players (%)
Strength	1	Strength	"Strength training through S&C is important and should be conducted systematically"	40	37
	2	Miscellaneous	"Ensure basic S&C principles are applied for physical development"	21	30
	3	Improve Soccer Performance	"Greater strength helps perform more powerful passing and shooting"	19	10
	4	Fitness	"Can help improve overall physical fitness"	12	3
	5	Injury Reduction	"Reduces the occurrence of injuries"	10	3
	6	Coordination/ Endurance	"Is used to develop certain physical and	10	3

Speed/Power	7	Movement Quality	technical movements"	10	13
	1	Power	"Enhances players power"	57	57
		Speed/Power	"Improve the rate of force development to develop speed and power"	17	17
	2	Strength	"Stronger muscles are required before power work"	17	13
	3	Miscellaneous	"Training should be individualized for each player"	10	10
	4	Improve Soccer Performance	"Helps players get around/past opponents"	10	3
	5	Fitness	"Through intense power training, we can improve cardiovascular fitness"	5	3
Soccer-Specific Fitness	6	Injury Reduction	"Power training that is performed with correct technique, reduces injuries"	2	7
	7	Coordination/ Movement Quality	"Being able to perform coordinative skills powerfully is important"	36	17
	1	Fitness	"Need to develop aerobic and anaerobic capacity"	31	27
	2	Strength	"Soccer is confrontational, therefore physical strength is indispensable"	31	17
	3	Miscellaneous	"A collaborative approach between S&C and coaching staff is required"	26	33
	4	Improve Soccer Performance	"Appropriate S&C training helps develop soccer skills"	21	0
	5	Speed/Power	"Running speed is an important attribute to develop in soccer players"	7	3
Injury Reduction	6	Injury Reduction	"Supports players to complete a competitive season injury-free"	5	3
	7	Agility/Change of Direction	"Soccer requires linear speed but also the ability to change direction quickly"	5	3
	8	Coordination/ Movement Quality	"There are few other ways to improve coordinative movements"	0	10
	9	Training Specificity	"S&C training should be specific to prevent time wasted on irrelevant aspects"	52	37
	1	Injury Reduction	"Quality S&C will prevent players getting injured"	31	47
	2	Strength	"Strength is one of the biggest factors for reducing injuries"	26	23
	3	Miscellaneous	"Training should be progressively structured and not excessive"	21	3
	4	Stability/Postural Control	"S&C improves body posture/control, and reduces unplanned movements turning into injuries"	10	20
	5	Robustness/Durability			

(continued)

Table 4. (continued)

Injury Parameters	Rank	ThemeTheme	Exemplar Response	Coaches (%)	Players (%)
Physical Fitness, and Injury Rehabilitation/ Return to Play			"Increases the resilience to body contacts with opposing players"		
	6	Fitness	"Helps gradually increase training load to prepare for worst-case scenarios"	10	3
	7	Flexibility	"To reduce injuries; mobility, range of motion and flexibility are needed"	5	3
	1	Accelerate Recovery Process	"Reduce recovery time and allow players to train/play as soon as possible"	36	20
	2	Miscellaneous	"We should be patient and progressive with training and return to play"	24	17
	3	Decrease Re-Injury Risk	"S&C helps prevent re-injury through repairing and protecting injured areas"	17	17
	4	Strength	"Need to undertake S&C to obtain full muscular strength post-injury"	14	43
5	Improve Muscle Function	"Ensures muscles have full function before returning to training"	7	3	
6	Multidisciplinary Approach	"It's a collaborative approach between the medical department and S&C"	5	7	

S&C: Strength and Conditioning.

Note: Some answers detailed more than one response, which was further sub-divided amongst the themes created.

Table 5. Preferred exercises of coaches and players for developing different physical fitness, soccer skill, and injury parameters.

Areas for Exercise Selection	Rank	Most Important Exercise	Coaches (%)	Players (%)
Strength	1	Squat and Variations	62	47
	2	Core (e.g. Plank)	43	37
	3	Lunge and Variations	26	13
	4	Bench Press/Push Up	24	27
	5	Sprinting/Running	24	7
	6	Deadlift and Variations	21	40
	7	Miscellaneous (e.g. Lower Body Push)	12	33
	8	Plyometrics (e.g. Box Jump)	12	7
	9	Pull Up	10	13
	10	Balance/Coordination (e.g. Balance Training)	10	0
	11	Burpee	7	3
	12	Hip Thrust/Glute Bridge	2	10
	13	Olympic Weightlifting	0	7
Speed/Power	1	Sprinting/Running	57	50
	2	Plyometrics (e.g. Depth Jump)	52	40
	3	Miscellaneous (e.g. Resistant Band Training)	26	30
	4	Squat and Variations	19	30
	5	Lunge and Variations	17	3
	6	Core (e.g. Sit Up)	14	13
	7	Olympic Weightlifting	10	0
	8	Hip Thrust	5	13
	9	Bench Press/Push Up	2	17
	10	Deadlift	2	3
	11	Burpee	0	3
Soccer-Specific Fitness	1	Squat and Variations	38	40
	2	Anaerobic (e.g. Sprinting)	29	3
	3	Aerobic (e.g. Moderate Intensity Running)	24	20
	4	Soccer Movement/Game (e.g. Ball Control Circuit)	19	13
	5	Core (e.g. Leg Raises)	17	20
	6	Miscellaneous (e.g. Flexibility Training)	17	20
	7	Lunge and Variations	17	7
	8	Plyometrics (e.g. Jumping and Landing)	14	20
	9	Agility/Change of Direction (e.g. Agility T-Test)	12	13
	10	Deadlift and Variations	5	17
	11	Hip Thrust	5	10
	12	Bench Press/Push Up	5	0
	13	Olympic Weightlifting	5	0
	14	Pull Up	2	10
Injury Reduction	1	Core (e.g. Deadbug)	36	33
	2	Plyometrics (e.g. Standing Jump)	26	10
	3	Squat and Variations	21	27
	4	Sprinting/Running	19	0
	5	Nordic/Reverse Nordic	14	0
	6	Miscellaneous (e.g. Abductor Strengthening)	17	23
	7	Flexibility/Mobility (e.g. T-Spine Rotations)	14	3
	8	Lunge and Variations	7	13
	9	Deadlift and Variations	7	7
	10	Balance (e.g. Single Leg Bosu Ball Balance)	7	3
	11	Push Up	7	0
	12	Agility/Change of Direction (e.g. Sprint to Change of Direction)	5	10
	13	Copenhagen Hip Adduction	5	0
	14	Hip Thrust/Glute Bridge	0	17

(continued)

Table 5. (continued)

Areas for Exercise Selection	Rank	Most Important Exercise	Coaches (%)	Players (%)
Soccer Performance	1	Squat and Variations	43	27
	2	Sprinting/Running	36	20
	3	Core (e.g. Various Planks)	31	37
	4	Miscellaneous (e.g. Load and Recovery Strategies)	31	33
	5	Agility/Change of Direction (e.g. Reactive Agility Drills)	21	30
	6	Plyometrics (e.g. Squat Jump)	21	7
	7	Lunge and Variations	14	7
	8	Flexibility/Mobility (e.g. Stretching Key Muscles)	7	0
	9	Bench Press/Push Up	2	3
	10	Deadlift	2	3
	11	Hip Thrust/Glute Bridge	2	3
	12	Olympic Weightlifting	0	7

Note: Some answers detailed more than one response, which was further sub-divided amongst the themes created.

Table 6. Coaches and players' responses to issues, disadvantages, and desired improvements for strength and conditioning provisions.

	Rank	Theme	Exemplar Response	Coaches (%)	Players (%)
Issues	1	Expertise	"There are better ways to do things, but we use traditional approaches due to limited understanding"	24	40
	2	Time	"We already have limited soccer training, additional S&C training will further take up this time"	24	17
	3	Facilities/Equipment	"Lack of equipment and space"	17	13
	4	Motivation	"Some players lack the interest to do S&C training"	17	7
	5	None	"Currently no issues"	10	13
	6	Programme Design	"Difficult to create programs that optimize load for each individual, particularly during group work"	10	10
	7	Education	"Players sometimes lack education/knowledge regarding S&C, this should be taught early on"	7	0
Disadvantages	8	Miscellaneous	"Started well but performance didn't improve"	5	10
	1	None	"I don't see any disadvantages"	43	43
	2	Additional Time Requirements	"Too much S&C will take away from skill and tactical practice"	17	3
	3	Increased Injury Risk	"Incorrect exercise execution may increase injuries"	12	20
	4	Decrease Sports Performance	"Too much strength training hinders agility and flexibility, which are important in soccer"	10	7
	5	Overtraining/Fatigue	"S&C and soccer training may cause excessive fatigue"	7	17
Improvements	6	Miscellaneous	"There is sometimes a gap between S&C training and its application to soccer"	7	10
	7	Lack of Motivation	"Players think it's boring and don't see the benefits"	5	3
	1	Education	"Learn more about S&C, from online resources and S&C coaches"	26	23
	2	None	"I'm satisfied with our provisions and wouldn't change anything"	14	13
	3	Personnel	"We need an S&C coach to design and deliver training sessions"	14	10
	4	Periodization	"Arrange training in specific cycles for players to improve performance"	12	17
	5	Miscellaneous	"Make players more physically balanced"	10	7
	6	S&C within Soccer Training	"Can perform S&C training within soccer practice, to be specific"	10	3

7	Testing/Monitoring	"Track fitness over time to see players progression"	7	10
8	Time	"S&C increases the time commitments of players, they will have to come to practice earlier"	7	7
9	Individualized Programing	"Provide specific and individual training for each player"	7	0
10	Facilities/Equipment	"Rent for on-field and off-field venues and equipment, to deliver S&C sessions"	5	17

S&C: Strength and Conditioning.

Note: Some answers detailed more than one response, which was further sub-divided amongst the themes created.