Perez-Arroniz, M, Calleja-González, J, Fernández-Navarro, J and Zubillaga-Zubiaga, A

Criteria for the selection and development of academy soccer goalkeepers: Experts opinion

International Journal of Sports Science & Coaching

Original research article

International Journal of Sports Science & Coaching
1–12


Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/17479541251370186
journals.sagepub.com/home/spo


Criteria for the selection and development of academy soccer goalkeepers: Experts opinion

Markel Perez-Arroniz[1], Julio Calleja-González[1], Javier Fernández-Navarro[2], and Asier Zubillaga-Zubiaga[1]

Abstract

Objective: The main aim of this study was to provide a comprehensive view of effective strategies, offering the soccer community informed tools that will optimize the process of developing the next generation of goalkeepers through the experiences and perspectives of experienced goalkeeper coaches.

Method: The opinion of 14 professional goalkeeper coaches was gathered using a semi-structured interview. Following transcription, a thematic content analysis was conducted to identify and analyse patterns within the data.

Results: From all the data obtained authors structured the results in the following sections: most important attributes for the goalkeeper, talent identification, specific goalkeeper training, individualisation, conditioning training, psychology, periodisation and evolution of the goalkeeper position.

Conclusions: There is no single way to develop goalkeepers, however, certain patterns can be observed in both selection and training processes. 1) Identify promising young players with strong anthropometric, coordination and emotional profiles, 2) Coach must structure the learning process by periodising the acquisition of various techniques and situational awareness based on the demands of the competition, 3) Continuously adapt to the individual development of each player.

Keywords

Association football, periodisation, physical conditioning, player development, psychology, talent identification

Introduction

The role of the goalkeeper (GK) in soccer is characterised by its high degree of specialisation. Given the significant influence a GK´s actions –whether successful or unsuccessful- can have on the outcome of a match, this playing position is particularly relevant for the team.[1] Moreover, GKs possess the exclusive privilege of using their hands within a designated area, adding a unique dynamic to his role within the game.[2] This particular aspect not only requires exceptional manual dexterity but also demands advanced footwork skills, thereby needing a training program that is substantially different from that of outfield players, due to the different physical, technical and tactical demands in comparison with other playing positions.[3] This is facilitated by specialized GK coaches, who adapt training to the position specific game demands.[4]

Previous studies have explored the profile of the GK from different perspectives,[3] including anthropometric factors,[5–7] analysing differences in the physical attributes between GKs and outfield players,[8] reviewing key demands for GKs,[9] and even identifying the most common injuries specific to GKs.[2,10–12] Recently, there has been a growing body of research documenting the training practices of professional GKs from a scientific standpoint. For instance, Otte et al.,[4] present insights from elite coaches regarding the most critical attributes for GKs, alongside the structure of their training sessions. The structure used in the cited study is the one we have used in the present one, dividing technical-tactical, psychological, physical and decision-making as the most critical attributes.

Reviewer: Julia West (University of Worcester, UK)

[1]Department of Physical Education and Sports, Faculty of Education and Sports, University of the Basque Country, UPV/EHU, Vitoria-Gasteiz, Spain
[2]Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK

Corresponding author:
Markel Perez-Arroniz, Department of Physical Education and Sports, Faculty of Education and Sports, University of the Basque Country, UPV/EHU, Vitoria-Gasteiz, Spain.
Email: mperez205@ikasle.ehu.eus

Table 1. Participants´accumulated experience.

Position	Clubs	Seasons
GK Coach in La Liga clubs academies	11	40
GK Coach in Premier League clubs academies	2	6
GK Coach in national federations	2	7
GK coordinator in La Liga	11	41
GK coordinator in Premier League	4	18
GK coordinator in international federations	1	7

Similarly, Bastial et al.[13] focused on improving GK actions analyzing 13 different training tasks during 57 preseason days.

In recent years, several studies have dealt with the use of nonlinear pedagogy as a method for teaching sports.[14–17] Deuker et al.[18] analysed the improvement in passing and ball handling of young soccer players by comparing traditional teaching, where exercises decontextualized from the game are used to repeat technical gestures, and nonlinear methodology, where the aim is to create a freer environment where participants must solve the problems generated by the game. Along the same lines, Otte et al.[19] demonstrates a nonlinear educational proposal aimed at soccer goalkeepers, where they show how to design a season using this method.

However, to the best of the author's knowledge, there are no previous studies that show which methods are used in professional academies with young GKs. Therefore, the main objective of this study is to explore the specific strategies used by professional GK coaches in the context of academy-level player development. By conducting semi-structured interviews with top coaches with extensive experience in professional academies, this study seeks to provide information on the techniques employed in the selection, recruitment and development of young GKs, in order to identify best practices and the main challenges faced by both coaches and players.

Additionally, this study aims to contribute significantly to the existing body of knowledge on soccer player development, particularly, on the early development of GKs. Through the experiences and perspectives of experienced GK coaches, it is hoped that this analysis will provide a comprehensive view of effective strategies, offering the soccer community informed tools that will optimise the process of developing the next generation of GKs.

Methods

Participants

Soccer GK coaches (N = 14) were interviewed based on the following inclusion criteria: (1) having coached academy age GKs at professional clubs from the five major European leagues (i.e., Spanish La Liga, English Premier League, Italian Serie A, German Bundesliga, and French Ligue 1) or federations for a minimum of three seasons and (2) being actively employed as a GK coach at the time of the interview or within the previous season. Nine of the GK coaches have also held the role of academy GK coordinator (Table 1) in a professional academy at some point in their career, taking on the highest level of responsibility for the development and training of GKs within their clubś academy system. All the coaches are Spanish (male) ranging in age from 28–69 years ($M = 47.4 \pm 10.1$ years) and experience 6–17 in academy coaching (m = 8.5).

Instruments

A semi-structured interview was used to gather the opinions of the coaches. This approach allowed the coaches to provide diverse perspectives on a common framework while ensuring a systematic data collection process with each coach.[20] The initial version of the interview script was created by M.P-A and A.Z-Z, followed by three pilot interviews conducted with goalkeeping coaches from professional academies (these interviews were not included in the study). The pilot interviews ensured that the research objectives were met and provided an opportunity to refine the interview script, and minimal changes where needed. The script was completed by 9 questions, which can be divided into 4 parts, those that provide basic information about the participant, those that provide information about the identification of talent, those that give rise to talk about the training of different capabilities and those that ask about periodization.

Procedure

Coaches were contacted through the clubs they worked for or directly via personal email if their contact information was available. The email included the following details: the studýs objective, methodology, benefits, participant risks, and information about the permissions obtained. Following this process, 18 coaches were approached, of whom 14 agreed to participate. Once responses were received, no further coaches were contacted, as per the guidelines of Roller and Lavrakas,[21] which suggest that a sample of 6 to 12 participants is sufficient given the limited accessibility of the target population. After confirming their participation, the coaches were offered two options for interview: (1) at a private location of their own choice where the interviewer would travel to meet them, or (2) via video-call at a time convenient for the interviewee. All interviews were conducted and recorded between June 2023 and January 2024 (6 were made by video call). On average, the interviews lasted 37 min, with the longest being 48 min and the shortest 26 min.

Data analysis and reliability

Following transcription, a thematic content analysis was conducted to identify and analyse patterns within the data.[22] The process involved six key steps: (1) familiarisation, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. Qualitative data analysis was carried out using Nvivo software (QSR International, Melbourne, Australia). To ensure the validity of the data, two of the authors (M.P-A and A.Z-Z) independently coded the themes and collaborated to reach a consensus on their organisation.[23] A high level of agreement was achieved between the researchers, with only minor adjustments required the reorganisation process. Finally, an independent collaborator with extensive experience in qualitative research reviewed the data collection process, analysis, and theme identification to ensure the rigor of the methodology employed.[24]

Results

To facilitate readability, the results are structured into different sections (Figure 1).

Most important attributes for the goalkeeper

When asking for the most critical attribute for GKs (technical-tactical, psychological, physical or decision-making), all participants agreed that every aspect is essential to reach a professional level.

> "*I couldn't tell you which is the most important. In the end, you are limited by the weakest link. If you have a low level in any attribute, you can't become a professional, and in ultimately, some goalkeepers succeed with certain strengths and other with different ones.*" Coach 1

Following this response, coaches were asked to imagine a scenario where they would need to choose an attribute supposing that a GK possessed good abilities in all areas. This time, six coaches emphasised the importance of psychological qualities, offering several reasons for their choice. First, the coaches argued that psychological attributes are the most challenging to develop. While physical and technical-tactical skills can be improved significantly through training, psychological improvements are often less pronounced. Secondly, they highlighted the intense pressure GKs face, both during competition and throughout their progression in academy systems, underscoring the importance of a GK´s ability to remain calm under pressure.

Decision-making is addressed in this section, as it was identified by six participants as the most important quality. However, it also generated the most debate during the interviews. Coaches offered two main arguments to support their view. First, decision-making was seen as crucial from a team perspective. GKs must provide solutions to the challenges their team faces, and these solutions should align with the collective game plan. Second, strong decision-making skills increase the likelihood of success in the GK´s actions. The better a GK understands the team´s needs at any given moment, the better their positioning and the quicker their reaction, the higher the chances of achieving a successful outcome. Conversely, two participants challenged the conventional understanding of decision-making. They argued that it ultimately boils down to rehearsed patterns, which, through repetition and feedback, become almost automatic in execution.

Finally, single coach highlighted the importance of technique, prompting reflection with the following statement:

> "*Let's consider the same situation executed in two different ways. In the first, the GK makes a good decision but lacks the technique, resulting in a dropped ball. In the second, the decision is not the best, and their positioning is poor, but they manage to save the shot. Which do you think is the better option?*" Coach 8 (quote moved)

Talent identification

Most coaches agreed on two criteria when selecting players for a professional academy (Figure 2). The first is the GK's anthropometric profile, which included height, wingspan and physical structure anticipated after physical maturity. The second is the playeŕs current level of coordinative ability. Seven participants explicitly stated their preference for a minimum height exceeding 186 cm, justifying this requirement with data from professional GKs in top leagues, where the average height among GKs is over 190 cm. The decision to set the limit at 186 cm comes from the need to select tall goalkeepers, but taking into account the scarce population that reaches 190 cm or more. However, three other participants acknowledged the importance of height but did not consider it a definitive factor. They argued that talent and performance can still be found in shorter GKs, citing examples of success players, such as Iker Casillas, who, despite not meeting the minimum height requirements of some academies, became a prominent figure in major leagues and achieved significant success. Since GKs under consideration are typically young and not yet physically mature, coaches often evaluate the height and build of close family members to ensure their requirements will likely be met. Additionally, four coaches reported using hand and wrist X-rays to accurately predict the future height of goalkeepers before bringing them into the academy. Regarding coordinative ability, the consensus among coaches was unanimous. A young athlete must demonstrate effortless and fluid movement, as this is essential for optimally learning the specific movement patterns required for the position.

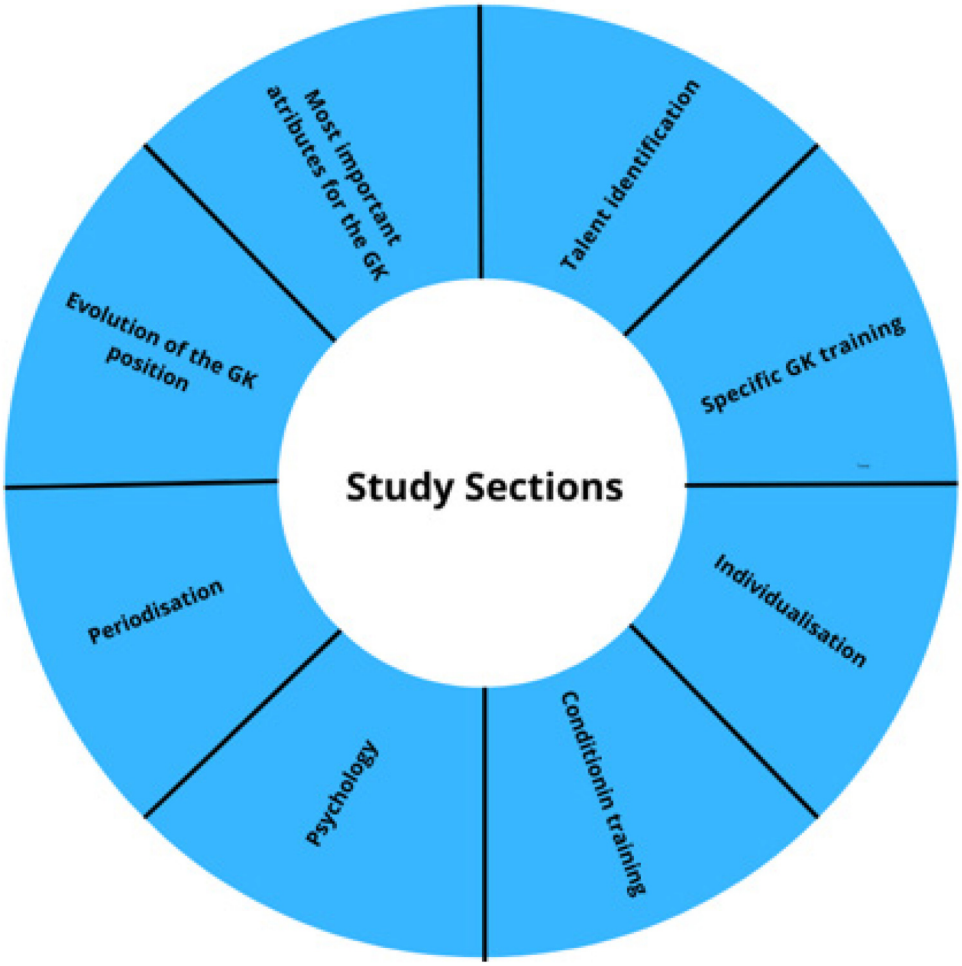

Figure 1. Visual summary of the sections used on result.

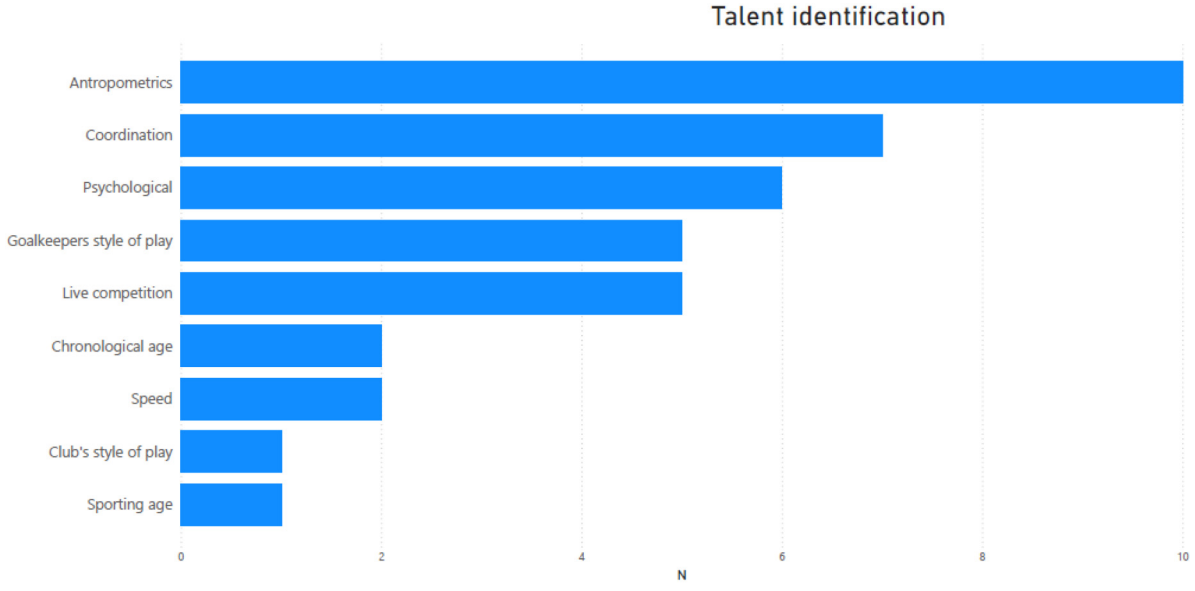

Figure 2. Visual summary of the number of responses received on talent identification.

"*We give a lot of importance to the potential size the goalkeeper may reach in the future, for which we look at the parents'physical trait and whether the player is coordinated, meaning they possess good qualities for learning movements"* Coach 7

Continuing with physical-motor characteristics sought in GKs, two coaches emphasised the importance of speed, highlighting the need for GKs to possess a high proportion of fast-twitch muscle fibers, as these are critical for improving explosiveness. It was not explained how the proportion of fast fibers was measured in the interviews.

Another recurring theme among participants was the psychological characteristics of GKs and their playing style. Coaches look for players with strong personalities, proactivity, leadership qualities, and the mental resilience to handle mistakes and pressure. Regarding their playing style, coaches focus on GK´s ease of movement, interaction with teammates, and game-reading ability. They assess whether the player stands out from their peers and two coaches specifically emphasised the importance of the athlete enjoying the GK position.

"*We pay close attention to whether the child enjoys playing as a GK, because, although less common now, it still happens that young players abandon the position early on because they find the low level of involvement boring."* Coach 3

Age is another important consideration in the selection process. As the potential recruit´s age increase, so does the expectation for a higher level of positional mastery. This means that older players are required to demonstrate greater technical and tactical proficiency to be considered for academy inclusion. In contrast, younger players are evaluated for their general potential and natural qualities, with the aim of shaping their development over time. Participant 7 highlighted the importance of understanding the playeŕs "sporting age", or the amount of time they have spent training for the position, as this provides insight into their progression.

Only one coach mentioned selecting players based on the club's style of play, emphasising the importance of being skilled with their feet and having strong aerial ability. Additionally, two of the coaches stressed the importance of possessing solid goalkeeping fundamentals, such as the ability to block shots, make good deflections, have a good dive technique, possess good timing in aerial play and master the different 1v1 situations.

Finally, five coaches agreed on the importance of observing the GK live competition. They emphasised the value of visiting fields where the player competes to ensure no critical details are overlooked, which might otherwise be missed through indirect observation methods.

Specific goalkeeper training

When discussing specific training methods for GKs, two opposing methodological approaches emerged. The first approach, supported by 11 of the participants, emphasised starting with a high volume of analytical training, where more use is made of simplified tasks as compared to game situations. This method focuses on providing GKs with numerous repetitions of specific actions to improve technique. As GKs internalise these actions, the complexity and uncertainty of drills are gradually increased, transitioning to more game-context training. These coaches highlighted that while technique alone is not sufficient, decision-making is primarily addressed when GKs train with the team. In the early stages, GKs typically engage in a significant volume of analytical work (technique) during individual session with the GK coach (not exclusively), and tactical and decision-making aspects are developed during group training sessions, but the tasks gradually become more complicated as the GKs' technical ability increases. Conversely, three participants expressed concern that analytical training has been declining in recent years or has been unfairly criticised. They argued that for younger players, frequent repetition of actions is crucial, as it provides a foundation of confidence that will benefit them.

"*I believe that during developmental stages it is essential to establish certain technical-tactical guidelines, so even if we introduce drills with a connection to the collective game, I think solidifying individual technique is fundamental."* Coach 11

Two coaches supported the second approach, which emphasised incorporating decision-making training from the early stages of a GK´s development. They explain that uncertainty in drills can be adjusted based on the GK's skill level, but that it is very important for GKs to get used to making decisions during training. This way, their actions in competition become more intuitive.

"*It seems to me that we often underestimate childreńs ability to understand. I think that by adapting the language, the spaces and the physical load we can teach them from a young age to solve situations through the game itself, because ultimately, technique should serve the game."* Coach 13

One of the coaches addressed both approaches, explaining that his method incorporates elements of both depending on the GK´s stress level at the time. When GKs experience high levels of stress –whether due to sport-related or external factors (e.g., studies, family) - he prefers to use the simplified task method to maintain a low cognitive load. Conversely, when GKs are mentally fresh, he increased the cognitive demands by introducing more complex and uncertain drills.

Individualisation

From the time children start playing until around the age of 10, two participants suggested that there should be no individualisation or specificity in GKs training. Instead, they believe it is more beneficial for children to play as outfield players, improving their footwork technique and participating in other sports to develop a broader range of movement patterns, especially considering the demands of modern soccer, where GKs must feel comfortable with the ball at their feet and playing at a considerable distance from the goal, and knowing that future goalkeepers with good motor skills will have time to learn the specific techniques of goalkeeping.

The first category where coaches show different opinions regarding individualisation is at the U-12 level. By this age, all coaches agreed on the importance of training for the specific role of the GK, but their approaches varied. Six of the participants argued that this is the age to begin individualised training, creating personalised development plans based on the actions GKs are expected to master at their age. They emphasised focusing on areas where the player demonstrates weaknesses. In contrast, four coaches believed that, at this stage, most GKs possess only a limited technical-tactical foundation, meaning their training should largely be uniform. Their goal is to expose GKs to a wide variety of situations during training. However, they also clarified that if a GK shows significant deficiencies in a specific area, they introduce tailored exercises to address and improve that weakness.

> "*You have to individualize from the moment you start training with them, given that every child is different, and you need to prepare them to use the same techniques within the same system of play.*" Coach 4

> "*I prefer a more holistic teaching approach because you never know how a child will develop.*" Coach 9

Where all coaches agreed was that once GK´s reach the U-16 level, the degree of individualisation increases significantly. At this stage, GKs are only a few seasons away from potentially joining the reserve team or even the first team, and they generally have the physical development necessary to handle a higher level of demand, but the biological maturation of the goalkeeper is always taken into account, and the increase of the load is dependent on it.

When it comes to individualisation methods, two approaches were most frequently mentioned by participants. The first and most used is individualisation through corrections. In this approach, all GKs train in a similar manner, but the GK coach identifies the specific areas where each GK struggles and provides targeted corrections. This means that in the same exercise, two or more GKs might receive entirely different feedback based on their individual needs. The other method is to individualise through technical drills. In this method, the GK coach sets aside time and space to work one-on-one (or in small groups) with GKs, focusing specifically on the skills or techniques they find most challenging. These sessions can take place during or after regular training. However, this method requires more resources and investment, as in many cases, a single GK coach may be responsible for multiple teams.

Conditioning training

One of the most recurrent ideas in this section is that the academý́s physical preparation team is responsible for designing and guiding players in their physical conditioning. However, participants emphasised the importance of creating a working group with the physical trainers whereby combining expertise in physical conditioning and understanding of the demands of the GK position. This approach aims to better support the athletes. In terms of how they work, we divide it by age.

For players up to the U-14 category, the primary focus is on coordination, agility and flexibility. In terms of coordination and agility, the emphasis is on improving laterality (ensuring precision with both hands and feet), performing different types of movements (frontal, lateral, changes of direction, etc), and starting to jump and land with the proper technique. These skills are practiced both generally and specifically for the GK position, aiming for fluid movements and gradually increasing execution speed. Flexibility is also a key focus during this stage for two reasons. First, certain technical actions specific to the position, such as reducing space in one-on-one situations using the spread technique, require significant flexibility. Second, this prepubertal stage offers an ideal opportunity to work on flexibility, as it is naturally better than it will be in the future if left untrained. Two additional considerations are highlighted for this age group. First, careful attention must be paid to the volume of training, given the young age of the players. Second, as noted by two coaches, the final year in this category is used to introduce players to the technical movements they will need to perform in the gym in later stages.

> "*In the early stages, we focus heavily on psychomotor skills, and coordination tasks through the game. We aim for GKs to develop proper movement coordination, spatial awareness, and lay the foundations for the physical growth that we will seek in the future.*" Coach 2

In the next stage, the U-16 category, the focus remains on the previously mentioned aspects, but there is an increase in training load. Most coaches agreed that this is the stage when GKs begin attending the gym. Initially, the goal is to learn proper technique for various exercises using gym equipment. As players master these movements,

external resistance is gradually introduced, including weights, resistance bands, or weighted vests. Another new element at this stage is the incorporation of core routines and injury prevention exercises. Additionally, two coaches mentioned that they begin introducing sport-specific strength training on the field during this stage.

> "*At the beginning, they work with very light weights or even no weight at all, using polystyrene bars. As their technique improves, we increase the load. Once they can handle the weight properly we take the next step, moving from general exercises to sport-specific ones.*" Coach 10

Finally, in the U-19 stage, the training load increases significantly, and the focus shifts toward structural improvement and enhancing speed in specific movements. At this stage, it is common for GKs to have two to three weekly gym sessions targeting both upper and lower body strength, supplemented by an additional on-field session dedicated to sport-specific strength. Training becomes highly individualised at this level.

Psychology

Within the psychological work carried out with young players, part of it is handled by professionals such as psychologists or coaches, while another part is managed by the different coaches within the club. The majority of this responsibility falls on the GK coaches due to the amount of time they spend with the players.

The work of these professionals in academy stages is typically a second-line role, where they oversee the psychological efforts with the players and conduct group dynamics with specific objectives. Two coaches noted that for a psychologist or coach to meet individually with the GK, there must be a very clear need. Often, psychologists intervene indirectly by advising coaches, providing them with strategies and guidance to apply with players who may require additional support.

> "*Professionals in this field can assist in many situations beyond our expertise. We can try to educate ourselves by reading books, attending courses, and drawing on personal experiences, but we should always rely on those who have dedicated their careers to addressing these challenges*". Coach 4

According to seven participants, the support of the GK coach is fundamental in this process. All of them highlighted the close relationship that develops between coaches and GKs and emphasised the importance of leveraging this bond. They stressed the value of understanding each GK on a personal level—knowing their background, motivations, fears, and, most importantly, their needs. Communication between the GK coach and the player is seen as critical, including providing effective feedback, demanding the best from the GK, and fostering their growth. To achieve this, three participants underscored the importance of the coach being a resourceful individual.

Two key themes emerged consistently across the interviews: helping GKs manage mistakes and regulate their emotions. Participants noted that learning to handle mistakes involves two key strategies. First, de-dramatize mistakes to reduce their emotional impact. Second, GKs must take responsibility for their mistakes, understanding that errors are an inevitable part of the game and permissible, but also recognizing the consequences of their actions. To do this, coaches regularly discuss mistakes with GKs, encouraging them to learn from these experiences. As GKs mature, coaches also introduce more stress into training exercises to better prepare them for competitive environments.

> "*In both, competition and training, the GKs will inevitably face mistakes. It´s part of the position. This gives us the opportunity to address it, demanding that GKs stay focused, helping them understand that mistakes have consequences, and having frequent individual conversations to review errors and learn how to act in different situations.*" Coach 1

Regarding emotional regulation, this is something coaches work on from the moment GKs join the academy. The focus is placed on managing frustration, fear, joy, and relationships with teammates, with the aim of developing emotionally stable GKs in the future. Emotional stability is seen as indispensable in player development. The most commonly used strategy is to train GKs to gather information from the game and adjust their focus (broad or narrow) depending on the situation. Participant 13 explained that if a GK can consistently gather information from the game, they are less likely to become distracted or entertain unhelpful thoughts. This ability to process game-related information should start with simple tasks and progressively increase in complexity as the GK matures.

Periodisation

The most commonly shared idea among coaches regarding periodisation in academies is the importance of ensuring that young GKs have the opportunity to train and develop all the technical-tactical skills required for the position (Figure 3). To achieve this, coaches follow three principles: 1) Training should start with simple tasks and gradually increase in complexity based on the GK's improvement. To teach highly complex actions or scenarios, these must first be broken down into smaller phases, which are practiced individually with the aim of integrating them later, 2) Periodisation must be tailored to the demands of each age category, recognizing that the nature of the game differs significantly between U-14, U-16, and U-19 levels,

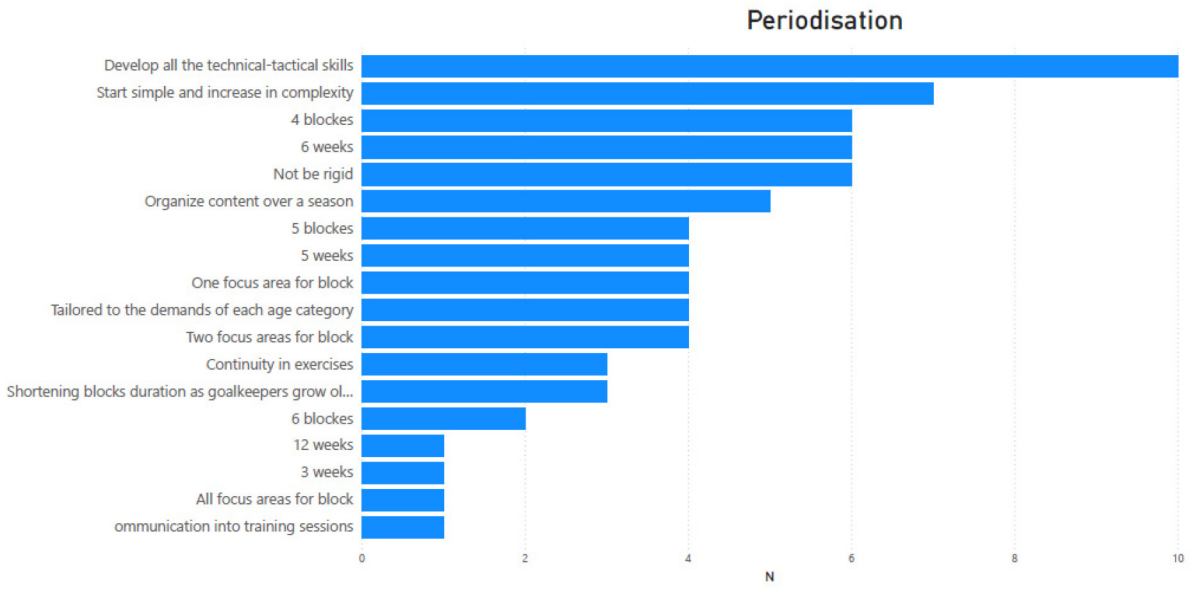

Figure 3. Visual summary of the number of responses received on periodization.

3) Periodisation should serve as a tool to help GK coaches organize their content over the course of a season but should not be rigid. Continuous assessment of the GKs learning and development is essential, allowing coaches to allocate more or less time to certain concepts as needed.

Another point of consensus among coaches is the use of concept grouping, or "block training" as the preferred method for structuring sessions. This approach involves categorizing the various demands of the game into blocks, such as shots, which include techniques, angles, surfaces, and distances, or crosses, which follow a similar pattern. However, there is variation among participants regarding the number of blocks they use. Some focus on four blocks (shots, crosses, 1v1 situations, and footwork), others include a fifth block (physical training), and some add a sixth (psychological training). The approaches to using blocks also differ. Some coaches dedicate an entire block exclusively to one focus area, while others combine two blocks, or even integrate all blocks simultaneously. Similarly, there is no consensus on block duration, with responses ranging from two to six weeks per block.

> "*At the beginning we made the mistake of focusing on one block per day. After a year, we realized it was better to extend the block over an entire week to consolidate learning. And the third year, we saw that this approach worked, but that we could achieve even more. With U-14 GKs, we extended blocks to two weeks, and with U-12 s, we stretched them to three weeks.*" Coach 6

From the information previously provided, each coach shared details about specific elements they like to introduce in their periodisation plans. Among the most frequently mentioned practices are tracking each GK´s progression to tailor exercises to their individual level; shortening the duration of blocks as GKs grow older and their technical-tactical proficiency improves; introducing a week within a block to focus on a different concept, allowing coaches to revisit the original block the following week to reinforce learning; ensuring continuity in exercises so GKs become accustomed to transitioning between offensive and defensive phases; and integrating communication into training sessions to help GKs develop proper communication patterns

Evolution of the goalkeeper position

According to five participants, the evolution of the GK position will depend on the changes that may occur in the laws of the game. They noted that, historically, regulatory changes (such as the back-pass rule introduced in 1992) have had the most significant impact on the role of the GK. They believe future changes will similarly be driven by adjustments to the rules. One participant shared the following perspective:

> "*I think GKs are entering a period of stability. I would be surprised if there are further changes, because, ultimately, all the recent changes have already significantly affected GKs.*" Coach 11

Three other frequently mentioned factors (highlighted by three participants each) that could shape the future of the position are physical preparation, game understanding and footwork. Regarding physical conditioning, participants emphasized that training is becoming increasingly specific and

individualised, which will lead to an improvement in GKs overall capabilities. As for the game understanding, they noted that GKs are playing a progressively larger role in team dynamic, and mastering this knowledge will elevate their performance to the next level. And in the case of footwork, the three coaches who addressed this agreed that it will soon become a mandatory skill for GKs to perform at a high level.

> "*The GK is now almost like an additional outfield player within the team's structure. We are increasingly asking them to defend more space, and play further forward. In the past, we focused on maximizing technical and conditional perspectives, but now the emphasis is shifting toward optimizing situational awareness and game understanding.*" Coach 14

Another change GKs will need to adapt to, according to the participants, is the increasing speed of the game.[25] They noted that soccer is evolving in this aspect, which will require improvements in movement, pre-shot activation, and both defensive and offensive decision-making.

Four coaches highlighted the potential impact of advancements in football technology, suggesting that these innovations could alter training methods. They emphasised that technology should be directed toward enhancing the understanding of the situations GKs face during competition.

Finally, three coaches agreed that GKs are being tasked with an increasing number of responsibilities. They must not only understand the game well but also serve as key contributors to offensive play. However, they stressed that a GK's primary role remains preventing goals, and this core responsibility must not be overshadowed by additional duties. A fourth participant added that greater emphasis should be placed on catching the ball, arguing that this fundamental skill is being neglected.

Discussion

By conducting, transcribing, and analysing the 14 interviews, the objective of this study is to make a meaningful contribution to the existing body of knowledge on the development of youth football GKs through the experiences and perspectives of the participating coaches.

As highlighted in the study by Otte et al.,[4] interviewed coaches emphasised the importance of GKs mastering both the defensive and offensive phases of the game. This includes strong skills in goal defense, covering the space behind the defensive line, and effective footwork. Similarly, Obetko et al.[26] concluded that the demands on GKs have increased, requiring them to handle defensive situations while also providing options in offensive play.

It becomes evident that there is no single way to develop GKs, as each interviewed coach has their methodology, and all have trained GKs who have reached the elite level. However, certain patterns can be observed in both selection and training processes. The one point on which all the coaches agreed was in response to the question of which ability is most important for GK. All participants stated that, to reach the highest level, a GK must excel in every aspect. They must be physically and mentally strong, technically skilled, and possess exceptional decision-making abilities. This aligned with the findings by Sarmento et al.,[27] who concluded that the most talented soccer players are typically heavier, taller, and achieve better scores in physical aptitude tests such as strength, speed, and coordination. Psychologically, they exhibit higher levels of motivation, confidence, concentration, discipline, and resilience. Furthermore, both the participants in this study, and the coaches interviewed in Otte et al.[4] emphasized that psychological qualities and decision-making abilities are what differentiate good GKs from the best. On the other hand, as Spielmann et al.[28] conclude, the evaluation of personality profiles should not be used as a (de)selection criterion, but its usefulness should be directed to find the most appropriate settings and provide a basis for sport psychological counseling. It should even be taken into account that in this study they oppose the existence of an idealized emotional profile for professional performance.

Height and wingspan appear to be critical characteristics to consider when training GKs, as 10 coaches mentioned their importance during the interviews. The objective of professional academies is to develop athletes capable of competing at the highest level, and several studies align with our findings, emphasising that GKs are generally the tallest players on their teams.[29–33] Some coaches highlighted the use of x-ray examinations to determine the bone age of young athletes as part of the selection process. This method is highly accurate, as detailed by Thodberg et al.,[34] who concluded that the Greulich-Pyle method, both manual and automatic, provides more consistent data than the Tanner-Whitehouse method 3. As Otte et al.[35] stated, height should not be a exclusive criteria for GK selection.

In terms of training, 11 coaches agreed on the importance of developing and refining specific movement patterns in young GKs through analytical exercises with low uncertainty. This method, ensures a high volume of repetitions during each session, gradually introducing scenarios with greater uncertainty GKs internalize technical movements. Contrary to these 11 coaches, the study by Deuker et al.[18] suggests that the use of nonlinear pedagogy, which attempts to create a dynamic learning environment where there is a large scale of variability, is more helpful for learning technique and skill acquisition than the use of tasks where importance is given to repeating actions in reduced degrees of freedom, even when participants in the second method repeat 2.4 times more actions to work on. Carlos et al.[36] emphasised that continuously measuring participant´s improvement and

adapting training to address their needs is the most effective approach, regardless of the method applied.

Following this last paragraph, it seems of vital importance to challenge the goalkeepers in the training sessions, and as Otte et al.[35] point out, this demand, apart from existing in the physical section, must also exist in the psychological and perceptive section through the complexity of the tasks. An integrated approach may be more beneficial in developing technical, physical and psychological skills rather than trying to improve each discipline separately.[9] To better understand this last sentence, we recommend reading the study conducted by Otte et al.[19] where they make a non-linear educational proposal (Periodisztion of Skill Taining) around the teaching of soccer goalkeepers.

Another area where most coaches agreed was the emphasis on enhancing coordinative ability throughout goalkeeper's career, particularly during the early stages. To achieve this, coaches incorporate a large volume of both general and specific coordination work in large volumes during the first academy years. As observed by Gatti et al.,[37] the difference between elite and sub-elite U-12 athletes lies in their agility when performing sport-specific movements, which aligns with the affirmations of the interviewed coaches.

Finally, regarding periodisation, the participants identified three key principles that every GK coach should follow. 1) Address all the concepts and situations that GKs will need to face, structured by developmental stages 2) Divide these concepts into blocks to organise the content effectively over time 3) Ensure a progression in the learning process by starting with simple exercises and gradually increasing the complexity and difficulty based on the GKś improvement. To all this information provided by the interviewed coaches, we can add the information provided by Otte et al.[19] in their study, where they place great importance on the supervision of all sessions by a structured, highly integrated, and multidisciplinary Department of Methodology.

Conclusion

The primary objective of any academy-level coach should be to identify promising young players with strong anthropometric, coordination and emotional profiles. Once identified, the coach must structure the learning process by periodising the acquisition of various techniques and situational awareness based on the demands of the competition they will face, continuously adapting to the individual development of each player. This learning process should be progressive, meaning the difficulty of tasks should increase in line with each GK´s progress in the skills being developed. Coaches are free to employ their preferred methods, provided that they adhere to this principle of increasing complexity, but it appears that creating dynamic learning environments where participants have a large range of variability offers better results in skill acquisition. The same approach applies to the physical preparation, where an increase in training load and exercise difficulty is recommended as GKs advance through the academy system. Finally, the participants emphasised the importance of properly addressing emotions such as fear, mistakes, and pressure, both on the field and through individual discussions with coaches and support from mental health professionals. This is critical for preparing GKs to handle high-pressure and stressful situations they will face in the future.

Strengths of the study

We identify two key strengths of this work. First, it to the authorś knowledge, this is the first study that collects and compares the perspectives of GK coaches from such a broad standpoint, without focusing on a specific aspect. This approach allowed participants share their insight on the most important facets of coaching GKs at the academy level. The second strength lies in the number and level of participants, including coaches working in some of the top clubs and federations in the world.

Study limitations and future research

We acknowledge as a limitation the lack of in-depth exploration of each section addressed in the study, as we chose to follow a more holistic approach rather than analysing each aspect in detail. On the other hand, this approach facilitates the development of future studies with a more specific focus.

Acknowledgements

The authors thank all the GK coaches who participated in this study, generously sharing their time and expertise. We also thank the external researcher who has reviewed the process of data collection, analysis, and issue identification ensuring the accuracy and rigor of each step undertaken in this research.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Markel Perez-Arroniz https://orcid.org/0009-0009-9283-0573
Julio Calleja-González https://orcid.org/0000-0003-2575-7168
Javier Fernández-Navarro https://orcid.org/0000-0002-5367-1575

Asier Zubillaga-Zubiaga https://orcid.org/0000-0003-0660-4545

References

1. Moreno-Pérez V, Malone S, Sala-Pérez L, et al. Activity monitoring in professional soccer goalkeepers during training and match play. *Int J Perform Anal Sport* 2020; 20: 19–30.
2. Letiexhe A, Delvaux F, Schwartz C, et al. Gardiens de but en football: caractéristiques et pathologies spécifiques. *J Traumatol Sport* 2021; 38: 28–36.
3. Perez-Arroniz M, Calleja-González J, Zabala-Lili J, et al. The soccer goalkeeper profile: bibliographic review. *Phys Sportsmed* 2023; 51: 193–202.
4. Otte FW, Millar SK and Klatt S. How does the modern football goalkeeper train? An exploration of expert goalkeeper coaches' skill training approaches. *J Sports Sci* 2023; 38: 269–277.
5. Towlson C, Cobley S, Midgley AW, et al. Relative age, maturation and physical biases on position allocation in elite-youth soccer. *Int J Sports Med* 2017; 38: 201–209.
6. Rebelo-Gonçalves R, Coelho-e-Silva MJ, Valente-dos-Santos J, et al. Longitudinal study of aerobic performance and soccer-specific skills in male goalkeepers aged 11–18 years. *Sci Med Football* 2017; 1: 40–47.
7. Rebelo A, Brito J, Maia J, et al. Anthropometric characteristics, physical fitness and technical performance of under-19 soccer players by competitive level and field position. *Int J Sports Med* 2013; 34: 312–317.
8. Nikolaidis P, Ziv G, Arnon M, et al. Physical and physiological attributes of soccer goalkeepers-should we rely only on means and standard deviations? *J Hum Sport Exerc* 2015; 10: 602–614.
9. West J. A review of the key demands for a football goalkeeper. *Int J Sports Sci Coach* 2018; 13: 1215–1222.
10. Lee I, Jeong HS and Lee SY. Injury profiles in Korean youth soccer. *Int J Environ Res Public Health* 2020; 17: 5125.
11. Hwang-Bo K and Joo CH. Analysis of injury incidences in the Korea national men's soccer teams. *J Exerc Rehabil* 2019; 15: 861–866.
12. Błażkiewicz A, Grygorowicz M, Białostocki A, et al. Characteristics of goalkeeping injuries: a retrospective, self-reported study in adolescent soccer players. *J Sports Med Phys Fitness* 2018; 58: 1823–1830.
13. Bastias E, Otte FW, Vaughan J, et al. An ecological approach for skill development and performance in soccer goalkeeper training: Empirical evidence and coaching applications. *J Sports Sci* 2024 Feb 1; 71–82.
14. Valverde T. Practical implications of the non-linear pedagogy in future physical education teachers training during a body expression session: towards the edge of chaos. *Retos: Nuevas Tendencias en Educación Física, Deporte y Recreación* 2021; 40: 231–240.
15. Nathan S, Salimin N and Shahril MI. A comparative analysis of badminton game instructions effect of non-linear pedagogy and linear pedagogy. *J Fundam Appl Sci* 2018; 9: 1258–1285.
16. Gómez-Criado C and Valverde-Esteve T. Nonlinear pedagogy and its application in a volleyball didactic unit: a practical approach (La pedagogía no lineal y su aplicación en una unidad didáctica de voleibol: un enfoque práctico). *Retos* 2021; 39: 805–810.
17. Roberts SJ, Rudd JR and Reeves MJ. Efficacy of using non linear pedagogy to support attacking players' individual learning objectives in elite youth football: A randomised cross over trial. In: Williams AM (ed) . *Science and Football: Identifying and Developing Talent*. Abingdon: Routledge; 2023. pp.253–264.
18. Deuker A, Braunstein B, Chow JY, et al. "Train as you play": improving effectiveness of training in youth soccer players. *Int J Sports Sci Coach* 2024; 19: 677–686.
19. Otte FW, Davids K, Millar SK, et al. Specialist role coaching and skill training periodisation: a football goalkeeping case study. *Int J Sports Sci Coach* 2020; 15: 562–575.
20. Patton MQ. *Qualitative research & evaluation methods*. Thousand Oaks, CA: Sage, 2002.
21. Roller MR and Lavrakas PJ. *Applied qualitative research design: A total quality framework approach*. New York: Guilford Publications, 2015.
22. Braun V and Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006; 3: 77–101.
23. Auerbach C and Silverstein LB. *Qualitative data: An introduction to coding and analysis*. New York: NYU Press, 2003.
24. Sparkes AC and Smith B. *Qualitative research methods in sport, exercise and health: from process to product*. London.: Routledge, 2013.
25. BDFL Bundesliga-Trainertagung in Mainz. Bund Deutscher Fußball-Lehrer, https: https://www.bdfl.de/bdfl-aktuelles/nachrichten/332-25-bdfl-bundesliga-trainertagung-in-mainz.html (2018).
26. Obetko M, Peráček P, Mikulič M, et al. Technical–tactical profile of an elite soccer goalkeeper. *J Phys Educ Sport* 2022; 22: 38–46.
27. Sarmento H, Anguera MT, Pereira A, et al. Talent identification and development in male football: a systematic review. *Sports Med* 2018; 48: 907–931.
28. Spielmann J, Otte F, Schumacher T, et al. Searching for the perfect goalkeeping personality. Myth or reality? *Front Psychol* 2024; 15: 1418004.
29. Boone J, Vaeyens R, Steyaert A, et al. Physical fitness of elite Belgian soccer players by player position. *J Strenght Cond Res* 2012; 26: 2051–2057.
30. Sporis G, Jukic I, Ostojic SM, et al. Fitness profiling in soccer: physical and physiologic characteristics of elite players. *J Strenght Cond Res* 2009; 23: 1947–1953.
31. Jadczak Ł, Grygorowicz M, Wieczorek A, et al. Analysis of static balance performance and dynamic postural priority according to playing position in elite soccer players. *Gait Posture* 2019; 74: 148–153.
32. Arnason A, Sigurdsson SB, Gudmundsson A, et al. Physical fitness, injuries, and team performance in soccer. *Med Sci Sports Exerc* 2004; 36: 278–285.
33. Wik EH, Auliffe SM and Read PJ. Examination of physical characteristics and positional differences in professional soccer players in Qatar. *Sports (Basel)* 2019; 7: 9.
34. Thodberg HH, Neuhof J, Ranke MB, et al. Validation of bone age methods by their ability to predict adult height. *Horm Res Paediatr* 2010; 74: 15–22.
35. Otte F, Dittmer T and West J. Goalkeeping in modern football: current positional demands and research insights. *Int Sport Coach J* 2023; 10: 112–120.

36. Carlos F, Alfonso S, Olga M, et al. How does training methodology influence the tactical knowledge of football in stages of formation?. *MOJ Sports Med* 2018; 2: 88–94.

37. Gatti A, Azzali G, Tornaghi M, et al. "Who's got talent?" change of direction, anthropometric characteristics and maturity offset differences between elite and sub-elite young soccer player. *Res Q Exerc Sport* 2024 Sep; 12: 1–6.