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ORIGINAL INVESTIGATION



Perspectives of the barriers and enablers to nutritional adherence in professional male academy football players

Jennie L. Carter, David J. Lee, Mayur K. Ranchordas and Matthew Cole

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ABSTRACT

Background: Nutritional intake is important for young football players; however, little is known about the factors that influence their nutritional adherence.

Purpose: The aim of this study was to investigate players', sports nutritionists', and coaches' perspectives of the barriers and enablers to adhering to nutritional recommendations within a professional football club.

Method: Individual interviews, based on the Capability, Opportunity, Motivation – Behaviour (COM-B) model and Theoretical Domains Framework (TDF), were conducted with 13 players (18 ± 1.3 years), 12 sports nutritionists, and 10 coaches from 2, 12, and 10 professional football clubs, respectively. Thematic analysis was used to interpret the data.

Results: Seven key themes were generated relating to the players' barriers and enablers to nutritional adherence: (1) Capability: (a) Nutritional Knowledge; (b) Cooking Skills; (2) Opportunity: (c) Training Venue Food Provision; (d) Nutritionist Accessibility and Approachability; (e) Living Status; (3) Motivation: (f) Performance Implications; and (g) Role Modelling.

Conclusion: Inadequate food provision within the training and home environment, and limited time with the sports nutritionist were key barriers to nutritional adherence in youth football players. Football clubs should allocate more time for sports nutritionists to deliver nutrition support and sports nutritionists should aim to control the players environment to support optimal nutritional intake.

KEYWORDS

Soccer; COM-B; TDF; nutritional adherence; nutrition behaviour

Introduction

The objectives of sports nutrition guidelines for academy football players are to enhance performance during training and matches, optimise recovery and reduce the risk of injury and illness (Garcia-Roves et al. 2014). However, research suggests professional academy football players exhibit inadequate dietary practices to sustain the demands of training and competition, particularly insufficient energy (Russell and Pennock 2011, Briggs et al. 2015) and carbohydrate intake (Granja et al. 2017), highlighting the need for effective nutrition support programmes. It is therefore important to investigate what factors play a role in a player's nutritional adherence to sport nutrition recommendations.

A small number of studies have investigated the factors that influence athletes' dietary behaviours (Smart and Bisogni 2001, Heaney et al. 2008, Long et al. 2011, Stokes et al. 2018, Sharples et al. 2021). This research suggests athletes' dietary behaviours can be influenced by factors such as: performance expectations; body composition concerns (Birkenhead and Slater 2015); parent attitudes/beliefs (Rozin 1996); time (Sharples et al. 2021) and the taste (Smart & Bisogni, 2001); cost; convenience; and availability of food (Stokes et al. 2018). Bentley et al. (2021) investigated the barriers and enablers of elite athletes' adherence to nutritional guidance, which included a small number of professional football players. Key findings

highlighted the importance of food planning skills and a good working relationship between the athlete and the sports nutritionist. A desire to enhance performance was a key motivator for athletes, and they highlighted the importance of an appearance that matched up to athletic persona (Bentley et al. 2021). To the authors knowledge, no research has investigated the factors influencing nutritional adherence specifically in professional academy football players. Therefore, it would be valuable to investigate what factors influence football players nutritional adherence to support the development of effective nutrition programmes within these populations.

The sports nutritionist plays an important role in supporting players' dietary practices (Wenger 2021), however limited research has explored sports nutritionists' perspectives of the dietary behaviours of athletes. Bentley et al. (2019) suggested that sports nutritionists should aim to modify the athlete's environment, e.g., the food provision, which has been shown to be a facilitator to athlete nutritional adherence. Additionally, it is suggested that sports nutrition should be integrated into a multidisciplinary support team (Wenger 2021), therefore it is of interest to seek understanding from other performance-support members on their perspectives of factors that influence an athlete's nutrition behaviour. Given the amount of time that football coaches spend with players, and thus the significant role they could potentially play in reinforcing nutrition

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behaviours, it is of value to investigate coaches' perspectives of the factors that may influence a player's nutritional adherence, which to date no research has yet established.

Understanding the key influencers of an athlete's behaviour enables us to identify which aspects require change to allow positive dietary behaviour to arise. To help explore this, Michie et al. (2011) developed a behaviour change model, known as the Capability, Opportunity, Motivation – Behaviour (COM-B). The COM-B is a meta-theory that deviates our focus from individual blame to shared responsibility for behaviour change, in comparison to pre-existing behaviour change theories which tend to focus solely on the individual. The COM-B model is deemed the most appropriate for assessing key influencers of an athletes' behaviour as it is suggested that other models (i.e., the Social Cognitive Theory and Health Belief Model) inadequately explain variations in complex human behaviour (Coulson et al. 2016). Unlike these other theories, the COM-B incorporates the impact of the social and physical environment, which have been highlighted as important influencers of athlete behaviour due to the complex environments within which athletes typically operate (Bentley et al. 2019, Costello et al. 2018). It is suggested that capability, opportunity, and motivation interact to generate behaviour change. 'Capability' is defined as the individuals' psychological and physical capacity to engage in an activity; 'Opportunity' incorporates all the factors besides the individual which make the behaviour possible or prompt it such as social or physical factors; and 'Motivation' is defined as all the brain processes that direct behaviour (Michie et al. 2011). If more detail is required to interpret the behaviour, the Theoretical Domains Framework (TDF) can be used to elaborate on the COM-B components which is composed of 14 domains combined from 128 theoretical constructs taken from 33 theories of behaviour change (Cane et al. 2012). Figure 1 highlights how domains of the TDF link to each COM-B component. Whilst the scope of this paper is to use these models as a framework to understand the key influencers of dietary behaviours in professional footballers, the reader is directed to Davis et al. (2015) for a deeper understanding of the key contentions of a range of behavioural science theories.

Understanding the factors that may influence players' adherence to nutritional recommendations will underpin the development of effective, theory-driven programmes to

positively change the dietary behaviours of players. Therefore, the purpose of this study was to investigate the perspectives of professional football players, sports nutritionists, and football coaches as to the potential enablers and barriers of players' adherence to nutritional recommendations. The rationale for understanding the perspectives of sports nutritionists and coaches is to investigate whether they are aligned to that of players. Clearly, if there is disparity in the views of enablers and barriers then this is likely to hinder optimal nutrition practice.

Methods

Research philosophy and positionality

A relativist ontology and constructivist epistemology methodological approach were adopted by the researchers. This is based on the perspective that reality is subjective (Ormston et al., 2014) and one must explore how people understand and perceive their social world, in order for us to learn about reality (Willis et al., 2007). Therefore, the researcher's role is to work with the participants to support them in understanding their subjective realities, and subsequently interpret and communicate these. As reflexive researcher-practitioners we have been shaped and enriched by our previous involvement in professional soccer, which may influence how we co-create knowledge with participants (Bourke, 2014). The first author's approach to understanding the research question may have been affected by her background as a sports nutritionist within professional soccer. These experiences equipped her with an understanding of the culture and helped her to engage participants in deep conversations about their experiences.

Participants and recruitment

Following institutional ethical approval, 18 football players, 17 sports nutritionists and 19 football coaches within English Premier League and English Football League Championship football club academies were initially contacted to participate in this study using a purposive sampling strategy. Of which, 13 male players (mean age = 18 ± 1.3 years), 12 sports nutritionists (9 males: mean age = 29 ± 7 years; 3 females: mean age = 35 ± 7 years) and 10 male coaches (mean age = 44 ± 7.9 years) from

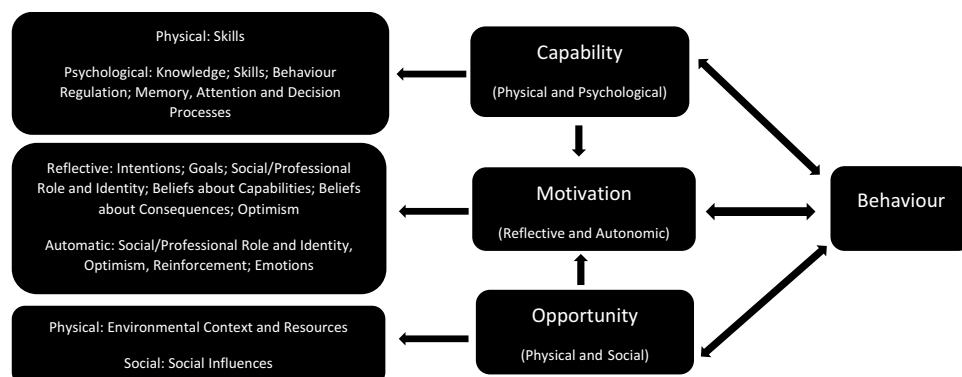


Figure 1. The COM-B model mapped to the theoretical constructs of the TDF (adapted from Cane et al. 2012, Michie et al. 2011).

2, 12, and 10 professional football clubs in the UK, respectively, responded and completed all aspects of the investigation. All players had been playing for the club and receiving nutrition support for a least 6 months. All sports nutritionists had been in their current role for at least six months (mean = 7 ± 4 years' experience) whilst seven of these participants were registrants of the Sport and Exercise Nutrition Register (SENr). All coaches had been in their role for at least 6 months (mean = 13 ± 6 years' experience).

Procedures

A qualitative descriptive design was utilised to conduct semi-structured interviews with the players, sports nutritionists, and coaches based on the COM-B model (Michie et al. 2011) for understanding behaviour, which is in accordance with previous research (Bentley et al. 2019, Bentley et al. 2021). These interviews included open-ended questions, and were based on the players' capability, opportunity, and motivation to nutritional adherence. Using semi-structured interviews allows participants flexibility to discuss their own experiences which enables any areas of interest to be elaborated upon (Gratton and Jones 2015).

Four questions per domain were designed, and additional prompts were used, where required, to probe information from the participants. As examples, player questions included: '*Do you feel you have the skills required to follow nutrition recommendations?*' (Capability); '*How does your environment influence your ability to follow nutrition recommendations?*' (Opportunity); '*Are you motivated to follow nutrition recommendations, and what motivates/demotivates you?*' (Motivation). Examples of the sports nutritionist and coach questions included: '*Do you feel your players have the skills required to follow nutrition recommendations?*' (Capability); '*What environmental factors do you think influence players' ability to follow nutrition recommendations?*' (Opportunity); '*Do you think players are motivated to follow nutrition recommendations, and what motivates/demotivates a player?*' (Motivation).

All the player, sports nutritionist and football coach interviews were conducted by one researcher (JC). All interviews took place online via video-conferencing software (Microsoft Teams, Microsoft, Redmond, USA) with only the researcher and participant present throughout. The average duration of these interviews varied (players: 25 ± 6 min; sports nutritionists: 38 ± 8 min; football coaches: 34 ± 7 min). After participants gave consent, all interviews were recorded and took place between September and December 2020. Prior to any data collection, each interview was pilot tested with players ($n = 4$), sports nutritionists ($n = 3$), and football coaches ($n = 3$), who were not included within the final sample. This allowed questions to be revised where necessary, particularly to ensure appropriate terminology and structure (Sparkes and Smith 2014).

Data analysis

A reflexive thematic analysis approach was adopted (Braun and Clarke 2019), using the six-stage thematic analysis by Braun and Clarke (2006). These stages included 1) immersion; 2) generating initial codes; 3) generating themes; 4) reviewing themes; 5)

defining and naming themes; and 6) writing the report. JC listened to and transcribed verbatim the audio recordings to get familiar with the data, including frequently listening again and re-reading the transcripts to ensure full immersion in the data (stage 1). The transcripts were then imported into NVivo 12 (QSR International, Melbourne, Australia) and initial codes were generated inductively by JC (stage 2). The codes were then placed into themes by JC. These themes were then discussed with MC who questioned the assumptions made when interpreting the data, demonstrating a collaborative and reflexive approach (Smith and McGannon 2017) (stage 4). Prior to finalising the themes, they were reviewed by the third author (DL) and all themes were defined and named collectively, following which an additional theme was added ('Living Status') (phase 5), further reinforcing the reflexive approach taken to data analysis. Inductive codes and themes were deductively mapped onto the TDF and classified across six elements of the COM-B model: psychological and physical capability; social and physical opportunity; and reflective and automatic motivation. JC discussed these themes for a final time with MC & DL in which all were in agreement.

Data was collected until such a point where any additional data did not contribute to the identification of any new themes about the barriers and facilitators influencing the implementation problem (Atkins et al. 2017). An analytic narrative was then presented within this manuscript (phase 6). To protect participant identity, pseudonyms have been used throughout.

Criteria for judging the trustworthiness and rigor of the research

As a relativist approach was adopted, the trustworthiness of the data was built by drawing upon appropriate characteristic traits of the research process. As an example of this, the worthiness of the topic was well justified given the clear gap between knowledge and practice in relation to barriers and enablers of professional football players dietary intake (Russell and Pennock 2011, Briggs et al. 2015, Granja et al. 2017). The clear data analysis process demonstrates high rigor, and an adequate sample of participants was used to serve the aims of the study and generate a rich and diverse set of perspectives. As noted above, the data analysis was collaborative and reflexive throughout (Smith and McGannon 2017) with all authors engaging in open and challenging discussions throughout the analysis process in order to reach rigorous interpretations.

Results

It was evident there were several common themes across the players, sports nutritionists, and coaches within the COM-B framework, relating to barriers and enablers to nutritional adherence. These consisted of: (1) *Capability*: (a) Nutritional Knowledge; (b) Cooking Skills; (2) *Opportunity*: (c) Training Venue Food Provision; (d) Nutritionist Accessibility and Approachability; (e) Living Status; (3) *Motivation*: (f) Performance Implications; and (g) Role Modelling.

Capability to adhere to nutritional recommendations

Nutritional knowledge

The interview discussions identified the influence of a player's sports nutrition knowledge in nutritional adherence (Table 1). Players discussed that having good sports nutrition knowledge enables them to make the right food choices and to be more independent. Although several players mentioned they felt that they had sufficient nutritional knowledge, they felt this could be improved. Sports nutritionists and coaches also discussed how nutritional knowledge may impact nutritional adherence and highlighted the importance of educating players from a young age, and ensuring they are prepared for lower league clubs. They also highlighted the influence that players' parents and host families have and the importance of educating these stakeholders too.

Cooking skills

Players discussed having control, independence, and ownership if they possessed adequate cooking skills to enable nutritional adherence. Conversely, if players had limited cooking skill this was perceived as a barrier to nutritional adherence (Table 1). Sports nutritionists and coaches highlighted the importance of players having the necessary cooking skills, particularly where food provision may be limited, such as during loan transfers as it is common for players to go to lower league clubs where food provision is limited. A sense of enjoyment influenced players desire to cook, which links to the motivation element of the COM-B model and acts as an enabler. However, many players highlighted that at times they may feel

demotivated to cook and perceive this as an 'effort', which was viewed as a barrier.

Opportunity to adhere to nutritional recommendations

Training venue food provision

Many players expressed the food provided by the club to be an enabler to nutritional adherence, highlighting it as 'easy' as it was readily available (Table 2). They discussed having trust in the quality of the food provided, and the chefs. The importance of the food taste was also highlighted. Players discussed how it would be 'more difficult' if they had to prepare their own meals, and that it may lead to unhealthy food choices due to the perception of effort to cook a healthy meal. Sports nutritionists and coaches also highlighted that good-quality food provision and controlling what players eat whilst at the training venue helps to positively impact players' nutrition behaviours and stated how the chef plays a key role in the quality of food. However, some players noted food provision to be a barrier, particularly if there was no food provision, or limited food choices and portion sizes.

Nutritionist availability and approachability

Players highlighted that a supportive, approachable, accessible sports nutritionist who is embedded within the training environment to be an enabler to nutritional intake (Table 2). Sports nutritionists and coaches highlighted the importance of a good working relationship between the player and sports nutritionist. However, insufficient time spent with players was perceived as being a key barrier to this as nutritionists felt they were 'out

Table 1. Perspectives of the capability to nutritional adherence within a professional football club.

COM-B	TDF	Themes	Sample Quotations
Capability	Knowledge (Psychological)	(a) Nutritional knowledge	<p>Players</p> <p>Charlie: "I think it helps if you have a good knowledge about the food and especially what's in there in terms of protein, fat and stuff like that, and if you've got a decent knowledge of that I think it helps and you can choose the right thing".</p> <p>Cameron: "I have enough knowledge to make good choices, but I still feel like that area can improve".</p> <p>Ryan: "If you know what you need to eat then it makes it a lot easier and you're not relying on anyone else".</p> <p>Sports Nutritionists</p> <p>Luke: "Players have had some shocks when they've gone on loan, to maybe a lower league club, and they haven't had the facilities they've taken for granted at a premier league club. That is kind of almost when it's too late then if the player is out on loan and they give you a call and say "I don't know how to do this, or that".</p> <p>Coaches</p> <p>David: "Starting education from a young age is important, I think the earlier the better. If you can get them doing it at 7, 8, 9 years old, if you can change your diet then it's just normal by the time your 18 or 23 years old".</p> <p>Leo: "Parents who have possibly grown up with no nutritional advice or knowledge have nothing to pass on to their children. I think subject knowledge is a massive hindrance".</p>
	Skills (Physical)	(b) Cooking skills	<p>Players</p> <p>Aaron: "Yeah, I love cooking, my dad has always been like a really good cook and I think that's helped me because I used to cook with him a lot".</p> <p>Cameron: "I think it's very important to be able to cook by yourself because then you can control everything that you're putting into your meals, so you're not relying on someone else".</p> <p>Adrian: "If I come home and I've had a rough day, the last thing I want to do is spend an hour downstairs cooking up a stir-fry".</p> <p>George: "When you have to make it yourself, I think it's harder because I think you get lazy, if it's there it's just easy".</p> <p>Gavin: "Cooking skills is a barrier because I can't cook".</p> <p>Sports nutritionists</p> <p>Luke: "That player might go on loan then and actually struggle with certain things like cooking, but you haven't had that time to put that work in with that player, so it's a bit of a double-edged sword".</p> <p>Coaches</p> <p>Joseph: "Players may be living by themselves, so they need to know how to cook and do things for themselves, that's really important".</p>

of sight, out of mind'. Additionally, sports nutritionists and coaches perceived limited nutrition support as a barrier to changing players' nutritional behaviours, and that limited support was associated with limited club finances. A full-time sports nutritionist within the club was discussed to be more effective in supporting players' nutritional adherence.

Living status

Players expressed that living with parents or host families enabled them to adopt a healthy diet and made it easier, particularly if they provide healthy meals, possess good nutritional knowledge, and highly value the importance of nutrition (Table 2). However, some players felt that this could make nutritional adherence more challenging and therefore be a barrier due to the perception of having to eat what is cooked for the family, limiting freedom of choice, and therefore preferring to live independently. The sports nutritionists and coaches expressed some challenges with host families and parents providing optimal food, particularly in relation to their receptiveness to nutrition advice and nutritional knowledge. They highlighted the importance of having some form of 'control' and educating parents and host families on providing optimal nutrition provision.

Motivation to adhere to nutritional recommendations

Performance implications

Players discussed how their experience of adopting a good diet positively effects their performance, acting as an enabler, which motivates them to adhere to nutritional recommendations (Table 3). Sports nutritionists and coaches found that linking nutrition to performance, and supporting this with data, was helpful to generate players interest and motivation. Body composition and the perception of 'being in shape', was also a key motivator for players. Sports nutritionists and coaches discussed that an absence of performance or body composition goals can act as a barrier to nutritional adherence. This was most common in 'naturally talented/gifted' players who are harder to impact due to their perception that they do not require nutrition advice to be top performers. On the contrary, it was noted how players motivation could be a barrier to nutritional adherence, particularly if they experience poor performance, are unable to play due to injury, do not see positive results in body composition, or if they do not have regular matches.

Role modelling

Youth players perceived the influence of the first-team players' dietary habits, and first-team environment within the club, in addition to world-class football players, to be an enabler by positively influencing their motivation towards good nutrition behaviours (Table 3). This is linked with the opportunity component of the COM-B as it is the social influence impacting upon the players motivation. It was also noted that progressing towards the first-team is a huge motivator for youth players to adopt better nutritional behaviours. It was apparent that nutritional messages from the first-team players inspire younger players, and sports nutritionists and coaches purposely utilise first-team players to communicate these key messages to add value to the importance of nutritional intake.

Discussion

The purpose of this study was to investigate players', sports nutritionists' and coaches' perspectives of the barriers and enablers of football players' adherence to nutritional recommendations. Behavioural analysis was used to explore these barriers and enablers using the TDF and COM-B model. The findings established a range of factors influencing the players' capability, opportunity, and motivation and it was clear that the players', sports nutritionists', and coaches' discussions generated a series of common themes. The seven key themes for the barriers and enablers of youth players nutritional adherence within a professional football club were: (1) *Capability*: (a) Nutritional Knowledge; (b) Cooking Skills; (2) *Opportunity*: (c) Training Venue Food Provision; (d) Nutritionist Accessibility and Approachability; (e) Living Status; (3) *Motivation*: (f) Performance Implications; and (g) Role Modelling.

The importance of players possessing sufficient nutritional knowledge in order to improve behaviour change was repeatedly highlighted by football players, coaches, and sports nutritionists in relation to capability. Previous research has demonstrated the level of nutritional knowledge in football players can be improved (Andrews and Itsiopoulos 2015, Devlin et al. 2017), therefore, nutritional interventions should focus on improving football players nutritional knowledge. Interestingly, good nutritional knowledge in football players has been demonstrated to be positively correlated to body composition and fat-free mass in particular (Devlin et al. 2017). Despite this, it is important to acknowledge that although nutritional knowledge is important, a weak relationship still exists between knowledge and healthy food choices (Heaney et al. 2011). This highlights the notion that good nutritional knowledge does not always translate into positive nutritional practices, thus it is important to understand any additional factors that may influence a player's dietary behaviour. In this regard, the outcomes of our study suggest that a player's ability to cook is also an important component of a player's capability to elicit positive behaviour change. This finding is supported by other studies which have demonstrated that poor cooking skills can be a barrier for athletes to achieve adequate nutritional intakes (Heaney et al. 2008). The importance of players' enjoyment in cooking was highlighted in our study, which has been shown to be the most important correlate for good cooking skills (Hartmann et al. 2013). However, in our research, players demonstrated a lack of motivation to cook on occasions, which supports the findings by Bentley et al. (2021), who investigated enablers and barriers to nutritional guidelines in a similar group of high-performance athletes. This may demonstrate the requirement for optimal food provision within the football club to support players, particularly if some players lack motivation to cook for themselves.

The volume of nutrition support players received, alongside the amount of time spent with the sports nutritionist, were identified as key influencers in players' nutritional adherence. Interestingly, the importance of regular accessibility to a sports nutritionist has previously been demonstrated to be an important factor in athlete nutritional adherence (Tsoufi et al. 2017). Aside from accessibility, our findings also showed that a positive relationship between the player and sports

Table 2. Perspectives of the opportunity to nutritional adherence within a professional football club.

COM-B	Themes		Sample Quotations
	Opportunity	TDF	
Environmental context and resource (Physical)	(c) Training venue food provision	(d) Nutritionist Accessibility and Approachability	Players Nathan: "I think what helps is we have food provided for us at the training ground everyday which is like the correct food because obviously the nutritionist speaks to the chef about what types of food to be there. When you have got to make it yourself I think it's harder sometimes because I think you get lazy". George: "Food provided by the club definitely helps you eat better. I think food has got to get provided because some people would definitely go away and eat something else that won't be as healthy". Adrian: "It used to be better, we could pick what we wanted. Now we get it supplied for us in a packed lunch, whatever we get given, so it's a lot tougher now because if you genuinely don't like the food that's your meal kind of gone for lunch time". Nathan: "I think sometimes we don't get enough food, the portion sizes, so I think that's a bit frustrating sometimes".
			Sports nutritionists Tim: "Yeah so, I mean it's good that the club provide them with breakfast and lunch, and then there's sometimes leftovers for them to take home, so that definitely helps and they're getting decent meals". Liam: "The food provision definitely impacts what you want to do because you just get lots of complaints from players and they feel really hard done by because they're not getting enough food". Ruth: "They like the food, and the catering is excellent".
			Coaches David: "I think when you can feed them yourself right, you know, getting breakfast and lunch at the club, you're influencing what they eat. Having that control, you've got a chance of changing them with what they are eating". Henry: "We're financially stable to provide breakfast, post-match meals, and pre-match meals". Jack: "I think taste is a big thing here, it's going to come down to whether they like it or not". Sam: "We don't know what they have for breakfast, if anything, as we don't have breakfast at the club".
			Players Colin: "I just always in contact, I think that's the main one, always being ready for us to use because sometimes we might not want to use it, sometimes you do". Nathan: "Having the nutritionist around I think works more because you sometimes forget that there's a nutritionist there to use, so when they come in it reminds you and you can ask questions". Ryan: "I think the main one is being comfortable in speaking to them, them being open and easy to talk to because you're the one who's often going up to them saying okay I need help on this, but if you don't feel comfortable talking to them then you'll be a bit put off".
Environmental context and resource (Social)	(e) Living status		Sports nutritionists Ethan: "Seeing them on a day to day basis you become more of a friendship contact rather than a member of staff – you start to build more of a rapport". Ben: "Players that particularly have positive nutrition behaviours, are the ones that you have the most contact time with". Craig: "I think they see value with you being there and seeing them work and understanding what they're doing, instead of just kind of being in an office. If you're invested in them, they'll invest more in you, which with time constraints you can't really do". Ruth: "It's kind of out of site out of mind, so if people aren't seeing me, they just sort of forget".
			Coaches Joseph: "I think to be fair, because he's around the players all the time it helps". Daniel: "I would say visibilities, I think being around the group, not just when it's nutrition time. The nutritionist at my previous club was unknown as far as the players were concerned and I think that meant that they didn't have a relationship in order to trust the information that was coming from them, even though it came from an expert it didn't feel like they knew the person".
			Jack: "Listen, not all clubs can afford to do it, but having a nutritionist full time is gold standard, because otherwise the nutritionist can't build lasting and respectful relationships with players unless they invest time in them. A part-time member of staff can't possibly get round those individuals and can't get to know them on an individual basis unless they have got the time to invest".
			Players Ryan: "I think the good thing is because my whole family is quite healthy it rubs off onto me. My sister cooks and she's very healthy so a lot of the time I'm eating similar dishes to her". Aaron: "When I have my mum around, she picks the right food to have in the cabinets and in the fridge, so I always have a choice of healthy food". Ian: "I'm in digs at the moment and the person who cooks for me cooks all the foods healthy, so it's easier to stick to healthy stuff". Jordan: "I think sometimes in digs you can't really always choose what you want or eat what you want. You can tell them what you need or what you want but it's not the same, it's easier living on my own". Chris: "At first it was a bit hard because of what the rest of the family was eating, I'd have to eat what they are eating. It is difficult to prepare different meals for different people because of others in the house that we've got account for".

(Continued)

Table 2. (Continued).

COM-B	TDF	Themes	Sample Quotations
		Sports nutritionists	
		Craig: "Sometimes host families can be a bit difficult, they don't want the players cooking in the house or any mess being caused, so yeah that is one of the issues at the moment".	
		Liam: "Some parents are really good, take everything on board, and some don't. I suppose there's a massive variety in terms of parent buy-in and that makes a big difference".	
		Coaches	
		Jack: "I think the thing that has the biggest impact is their home environment, so the education starts with their parents when they are younger".	
		Joseph: "Educating the house parents on what they should be feeding them is a massive help for the house parent, as well as the players. Although I know the players do not always get in what they should at digs, perhaps a bit of laziness from the people who are looking after them, and that's tough for us".	
		Sam: "It helps if we have a greater control from outside of the club, so the host family and parents actually cooking the right things, that has a big influence"	

Table 3. Perspectives of the motivation to nutritional adherence within a professional football club.

COM-B	Themes		Sample Quotations
	TDF	(f) Performance implications	
Motivation	Beliefs about consequences. Intentions. Goals. (Reflective).	Players	
		Ryan: "I find it very much affects how I play. You're eating habits can change how you play completely".	
		Charlie: "I think it's very important. I didn't really think that until a few years ago, when I changed to a healthier diet, I felt stronger, and yeah that's just changed my opinion about it".	
		Adrian: "If I was to say I have a checklist in front of me, I can go right okay well it wasn't my nutrition because I've got that right. So that's my motivation to know I'm doing it right, so I've got nothing to blame a bad performance on".	
		Jordan: "Yeah if you have like a poor game or a poor week of training you're going to go home and be like "ah I'm having a takeaway tonight".	
		Nathan: "If I've got a match at the end of the week, I think that motivates me a lot. If I didn't have a match at the end of the week, I'm not sure I'd eat correctly every day".	
		Charlie: "I think the biggest point for me is our skinfold tests, that changes everything. It depends if I'm high on that I'm going to have to change something, so I look up to that".	
		Charlie: "Just to have a goal in mind, that motivates me".	
		Gavin: "I had my skinfolds test two days ago, since I've been eating healthy apparently it's gone up, it's very demotivating".	
		Sports nutritionists	
		Liam: "What really helps is linking what you are doing to their performance, as this motivates them".	
		Ethan: It helps when players see the benefits on the training pitch and games"	
		Tim: "Everyone looks at the body fat percentage so that's a big motivator"	
		Craig: "With players who have no desire to change, which always seems to be the most technically gifted players, they are the hardest to change because they don't have the motivation to change because they're the best in the group".	
		Coaches	
		Sam: "I think if they're performing well, they want to know why they performed well that week so they might look at what they've eaten and then try and get a parallel that following week".	
		Joseph: "We put a big emphasis on the physical output in the data, and link this to nutrition, which helps get buy in from the players".	
		Jacob: said: "I suppose it can have a detrimental effect the other way round, if they do all this and they still don't see anything in enhancing their performance".	
		Joseph: "Players associate strong performances on the pitch with being in good shape".	
		Players	
	Beliefs about consequences. Intentions. Goals. (Reflective).	Cameron: "Seeing the better players in the club, the people who are above me, and seeing them at the table when we're all eating and seeing what they're eating is an example for me because you want to get to that level and you'll do anything that it takes".	
		George: "I feel like if we use other top footballer's diets and we compare it to ours it would probably make people change their diet, it would influence the players a lot".	
		Sports Nutritionists	
		Sarah: "I think it's when they start having more time in and around the first team, they then clock it and sort of think actually I want to turn up tomorrow and next weekend and then be picked to play".	
		Craig: It's quite good, I'm able to utilise a few of the first team players, so if we have a younger age group who have been a bit difficult I'm able to get one of the first team lads to put a little video together to show them which has a great impact".	
		Coaches	
		Daniel: "We are fortunate that we do have a lot of young players who are playing with the first team at the moment, or training with the first team, and that's a huge motivator".	
		David: "Somebody in the senior team might say something to them that makes them think 'I've got to make sure I sort myself out'. Or they might even see what condition they are in that might inspire them to do it".	
		Jacob: "A good motivational tool is to have other people explain it to them, so for example we've had the first team players come down and explain the importance of nutrition to the players".	

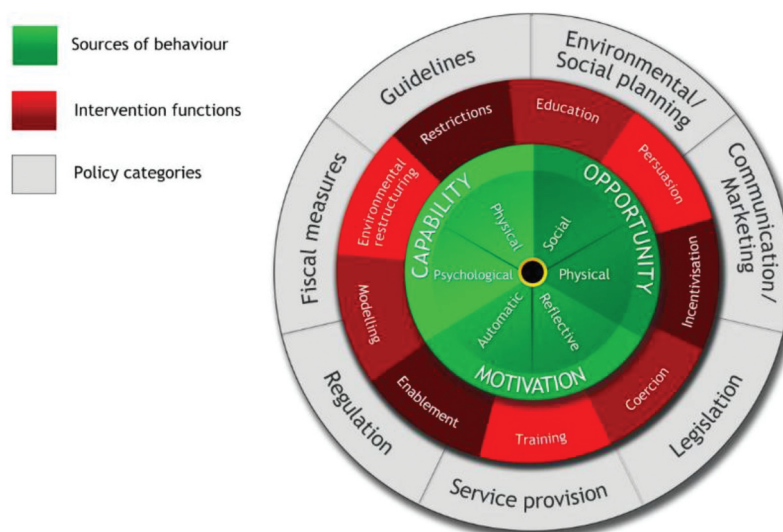


Figure 2. The behaviour change wheel (Michie et al. 2011).

nutritionist was a key enabler. Previous research has demonstrated that sports nutritionists who are most effective in their roles are approachable and maintain a trusting relationship with their athletes (Bentley et al. 2019). Interestingly, in our study, limitations on time were identified as a key barrier for sports nutritionists to build positive relationships and develop a rapport with their players, which is in agreement with Bentley et al. (2019), suggesting that part-time nutritionists may not be as effective as their full-time counterparts.

Eating behaviours have been shown to be shaped by an individual's environment, thus a poor nutrition environment can facilitate poor food choices (Ogden et al. 2013). Our results suggest that the physical environment has a large impact on a player's ability to adhere to nutritional recommendations, particularly in relation to the food provision at the training venue. High levels of food quality, taste, and variety enabled players to adopt a better diet, whilst no food provision, poor food quality, or limited portion sizes acted as a barrier for players to achieve their nutritional targets. These findings are similar to that of Shepherd et al. (2006) who reported poor food provision as a barrier to nutritional adherence in youth athletes. Furthermore, Bentley et al. (2019) outlined the importance of the sports nutritionists in guiding the food provided within the sport environment, as this has been demonstrated to facilitate nutritional adherence. Therefore, it is suggested that sports nutritionists should aim to modify the athlete's environment to meet their requirements, as opposed to being controlled by the environment in which they work (Bentley et al. 2019). In our findings, food provision outside of the club was also suggested to be a key influencer to nutritional adherence, with some players highlighting food provision in their accommodation as a key enabler. It has previously been reported that for athletes transitioning into a more independent setting can present difficulties in relation to lifestyle issues (Heaney et al. 2008). However, our findings demonstrated that some players found living independently to be an enabler to nutritional adherence as a consequence of greater control over food choices. Thus, the findings of this

study suggest that football clubs and sports nutritionists should educate and upskill parents and host families, in addition to the players themselves.

It is well established that good dietary practices can enhance sports performance (Beck et al. 2015), and our findings suggest that football players' motivation towards positive nutrition behaviours was largely influenced by this understanding in regard to the positive effects on performance. This finding is in agreement with a number of previous studies which demonstrate that athletes are primarily motivated by performance outcomes (Birkenhead and Slater 2015, Stokes et al. 2018, Bentley et al. 2021) and reinforces the need for nutrition practitioners to emphasise the potential impact that food choices can have on sports performance. However, it is important to acknowledge that previous research has highlighted the paradoxical role of the performance stimulus in that this can place increased and often unbearable demands on athletes (Bentley et al. 2021). Therefore, sports nutritionists should be aware of this when providing nutrition support to their athletes.

Body composition has previously been linked to team success, with a leaner physique being more advantageous (Lago-Penas et al. 2011). Interestingly, body composition and physical appearance was a key motivator to adopting a good diet for players in our research, a finding which is in agreement with other research in similar populations (Shepherd et al. 2006, Stokes et al. 2018). Additionally, the importance of routine body composition assessment has previously been demonstrated to be an enabler (Bentley et al. 2021). However, previous research has highlighted that body composition for some athletes reinforces motivational barriers, including heightened emotional distress and potentially harmful body image concerns (Bentley et al. 2021). In our study, another key motivator for players was the positive influence of role models, which included more senior players. This is supported by previous research, noting senior elite athletes act as role models for youth athletes (Henriksen and Stambulova 2017, Fleming et al. 2005). Research by Fleming et al. (2005) found their

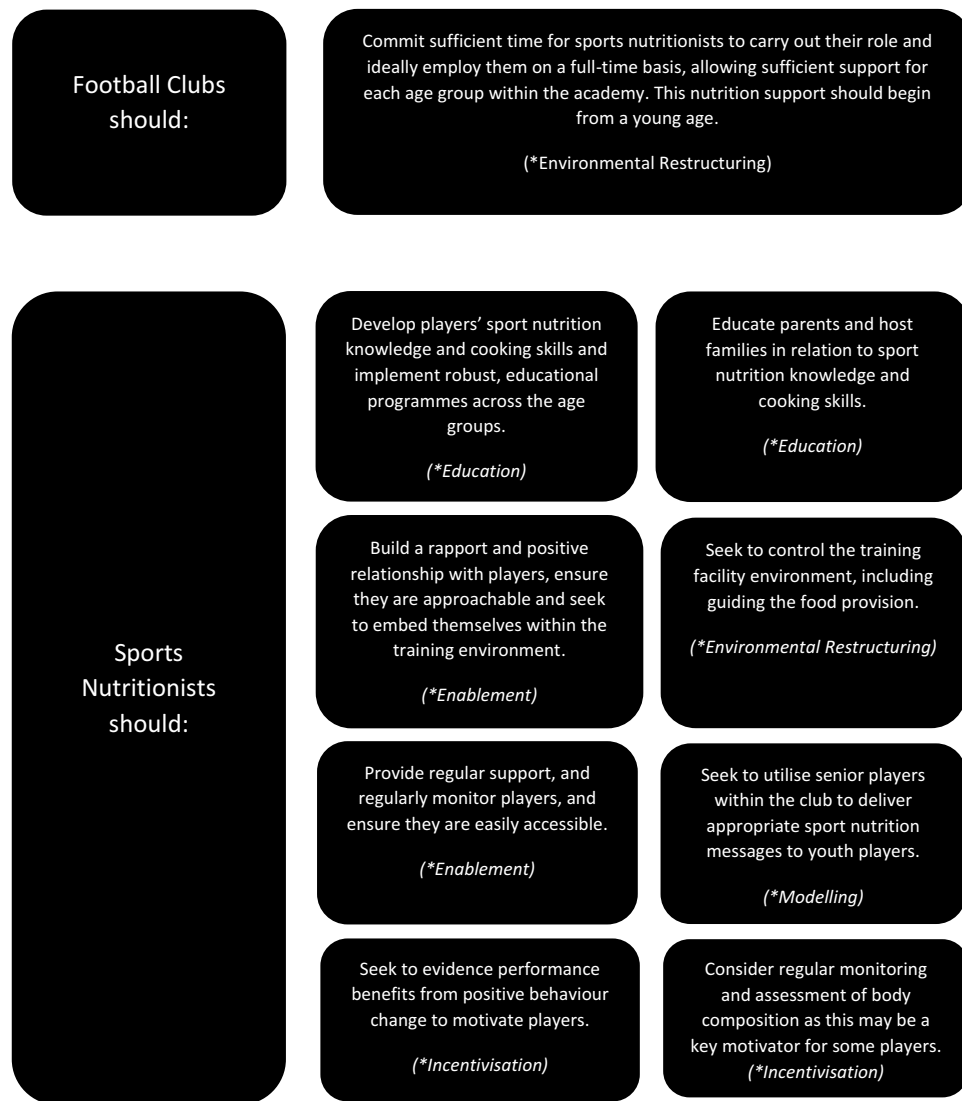


Figure 3. The key practical considerations for sports nutritionists and football clubs to consider when developing nutrition support for football players (*intervention functions of the behaviour change wheel to which the practical considerations align).

reasons of admiration involved that such as technical skills, physical characteristics, and professional attitude, which notably were similar findings to that of our study. Therefore, the influence of role models should be carefully considered when educating young players on the importance of nutrition.

Limitations

A potential limitation of this study was that only youth players from the English Premier League and Football League Championship football clubs within the UK were included which may not be representative of all football clubs within or outside of the UK. Moreover, as this study was specific to the high-performance football environment, the findings may not be extrapolated to other sporting contexts. Thus, future research should seek to broaden the perspectives of players, coaches, and sports nutritionists across a wider range of clubs, countries, and performance levels.

Practical considerations

A key strength of using the COM-B model as the basis for understanding the barriers and enablers of professional football players dietary behaviour is how the outcomes of this model can be subsequently linked to the Behaviour Change Wheel (BCW) (Michie et al. 2011) to help design evidence-based behaviour change strategies. The COM-B model forms the centre of the BCW, around which are positioned nine 'intervention functions' designed to address deficits in one or more of the COM-B constructs. Furthermore, seven 'policy categories' are placed around the outside of the BCW which are designed to support the implementation of the interventions (Figure 2). The BCW has previously been successfully utilised within the field of sports nutrition to design nutritional interventions (Costello et al. 2018). Therefore, aligned to the BCW, the findings of our study provide some key practical considerations for sports nutritionists and football clubs to consider when developing nutrition support for football players (Figure 3).

Conclusion

The findings from this study have provided an understanding of players' barriers and enablers to nutritional adherence within English professional football. Utilising the COM-B model and the TDF has allowed us to identify what aspects require change to enable positive dietary behaviour to arise. Therefore, this research may support sports nutritionists' and football clubs in developing sound, theory-driven nutrition programmes that target the behaviours of players which influence nutritional intake. Consequently, this may have a beneficial impact on players' dietary practices, and therefore health and performance. Future research should seek to investigate nutritional interventions that address the key barriers identified and assess the impact on nutritional adherence and intake, and consequently health and performance outcomes.

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JC & MC conceived the research design, formulated the interview framework, conducted the interviews, analysed the data, and prepared the manuscript. DL & MR contributed to the preparation of the manuscript and provided critical review throughout all aspects of the study design. All authors have had an opportunity to review of the manuscript and agree with the final submission.

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