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## **Performance Nutrition in the Digital Era – An exploratory study into the use of Social Media by Sports Nutritionists**

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## **Abstract**

This study aimed to explore how social media is being used by sports nutritionists as part of service provision, as well as practitioners' experiences and opinions of its use in practice. An exploratory sequential mixed methods approach was used during this research. Forty-four sports nutritionists completed an online survey detailing their personal and professional social media use. Semi-structured follow-up interviews were conducted with 16 participants who volunteered to do so. Survey responses were collated and reported as descriptive statistics. Interviews were thematically analysed.

Social media was used by 89% of sports nutritionists to support practice, of which 97% perceived its use to be beneficial. Platforms were used to deliver information and resources, and support athletes online via pages, groups and 1-2-1 messaging. Social media facilitated improved communication between the practitioner and the athlete, as well as facilitating mobile and visual learning. Lack of digital intervention training and time were reported as challenges to social media use in practice.

Sports nutritionists have embraced social media as an extension of service provision. Professional education should now consider supporting nutritionists' in developing digital professionalism.

## **Keywords**

Nutrition; social media; sport; mobile; behaviour

## **Introduction**

Social media use is a distinguishing and normative characteristic of recent generations (Brown and Bobkowski, 2011; Cupples and Thompsom, 2010). In the UK, 90% of young adults (aged 16-34 years) are active users of social media (Ofcom, 2015) and 18-25 year olds spend more time engaging with media and technology daily than any other activity (Coyne, Padilla-Walker and Howard, 2013). Social media platforms (e.g. Facebook, Twitter, Instagram, WhatsApp, etc) enable users to create and share content online. This departure from institutionally created content and proliferation of user-generated content has shifted information seeking behavior in society to the extent that, for some, a refreshed feed from a platform provides an immediate, convenient, and preferred method to keep up to date with news stories and information (Newman et al., 2017).

Sports clinicians have been encouraged to embrace social media and potentially also deliver digital interventions to their athletes as an extension of their service provision (Ahmed et al., 2015). Online platforms may provide sports nutritionists the opportunity to deliver successful, scalable and cost effective health, education and behavioural interventions to athlete populations (Héroux et al., 2017; Solbrig et al., 2017). The design and delivery of theoretical driven digital health interventions appears to be effective in improving nutrition knowledge and attitudes, and influencing individuals' behaviours (Nour, Chen, and Allman-Farinelli, 2016; Pagoto et al., 2013). Social media also provides a network for its users to seek health related social support from people within their network (Oh et al., 2013).

It is clear that online platforms can overcome physical or temporal barriers and provide a cost-effective way to increase interaction, provide social support as well as networks for learning and platforms to share credible information. However, to date there has been limited research to explore how or if sports nutrition practitioners use social media to support their practice with athletes. Identifying the current digital practices of practitioners and their experiences to date is an essential first step towards optimising this digital extension of service provision.

Using a mixed methods approach, this study aimed to explore; how social media is being used by sports nutritionists as part of service provision to elite athletes. Specifically to capture perspectives on social media training, perceived benefit of social media to service provision, current platform usage, type, frequency and format of content delivered. The second aim was to explore practitioners experiences and opinions of social media use as part of service provision.

## **Methods**

### ***Overall Study Design***

An exploratory sequential mixed methods approach, which integrates the quantitative and qualitative methods during the interpretation phase, similar to Mao (2014), was used during this research. Quantitative data was generated from online surveys and qualitative data was collected from semi-structured interviews with open-ended questions.

### ***Participants***

Study entry criteria required that participants had to be registered on the Sports and Exercise Nutrition register (<http://www.senr.org.uk/find/>) and were working as a sports nutritionist in the UK and/or Ireland with either professional athlete(s) competing at the highest level of elite team sport competition, e.g. top tier of English soccer and rugby union, or those working with athlete(s) competing in the elite Olympic domain. Participants were recruited through one of the following mediums: via email directly (retrieved from <http://www.senr.org.uk/find/>), through the Sports and Exercise Nutrition register (SENr) or through the English Institute of Sport (main science and medicine provider for Olympic sports within the UK). Snowballing sampling was used following initial responses (only practitioners that met the above inclusion criteria were included from snowballing). Participants (n = 44) were recruited from a wide range of professional sports organisations (see table 1). The total sample recruited represented 60% of all the practitioners eligible from the chosen sample population that was available based on the above inclusion criteria. Ethical approval was granted by Liverpool John Moores University Research Ethics Committee (ethical approval code 16/SPS/037).

**Table 1.** Range of sports the participants (n = 44) provided performance nutrition support too\*.

*\*The majority of participants reported working across multiple sports, likely reflecting the part time and consultancy nature of performance nutrition as a profession.*

Sport	Number of Practitioners
American Football	1
Athletics	18
	6

Australian Rules	1
Badminton	1
Basketball	3
Boxing	8
Canoe/Kayaking	3
Cricket	1
Cycling	12
Diving	1
Endurance Running	8
Football	12
Gaelic Football/Hurling	5
Golf	5
Gymnastics	1
Hockey	5
Horse Racing	3
Judo	2
MMA	4
Netball	1
Rowing	6
Rugby League	4
Rugby Union	14
Speed Skating	1
Squash	1



Swimming	8
Taekwondo	5
Tennis	4
Triathlon	11
Weightlifting	4

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### ***Data Collection***

All participants completed an online survey detailing their social media use. The questions included were taken both directly, and adapted from, the Sensis Social Media Report (2016) to describe practitioners' personal use of social media as a consumer as well as their professional usage as a service provider/business. Additional questions were included to provide greater insight into the sports nutrition support provided by practitioners. The questionnaire included the following categories: 1) demographic and background information, 2) personal social media usage, 3) professional social media usage. Practitioners who reported not using social media (n = 5) to support practice were excluded from section three of the online survey. All categories provided practitioners with a mix of open ended and closed multiple-choice questions. Response data was collected and stored online using online survey cloud software (Survey Monkey Inc., CA, USA). The questionnaire was firstly piloted with a small sample (n = 5) of MSc and PhD sports nutrition students, but these results were not included in the final analysis. A total of two multiple choice style questions were removed following this pilot and following feedback to reduce the time taken to complete the online survey.

At the end of the survey all participants were given the opportunity to opt into a follow up interview to discuss views, experiences, beliefs and motivations for use or disuse further (Gill et al., 2008). There were a total of 25 volunteers of which 16 took part in semi-structured interviews. After 16 respondents, saturation was achieved and it was not deemed necessary to collect further interview data by the lead researcher. Saturation was determined using a hybrid model of data saturation and inductive thematic saturation whereby new data appeared to consistently repeat what was expressed in previous data, and no additional codes emerged whereby the researcher could develop new higher order themes or subthemes (Saunders et al., 2018). Interview questions sought to add depth and context to the survey questions, specifically to explore practitioners' experiences and opinions of social media use in practice, as well as to establish rationales or factors for use or disuse. Initial questions were followed up with naturally occurring 'probing' questions, which facilitated further depth in responses from participants (Gratton and Jones, 2004; Turner, 2010).

Interviews were either conducted in a face-to-face format at participant place of work (n = 2), or via the telephone (n = 14). All interviews that occurred face to face were recorded using a dictaphone, whereas interviews that occurred over the phone were recorded using the TapeACall app (TapeACall Pro: Call Recorder, Epic Enterprises LLC). Subsequently all interviews were transcribed verbatim. Average interview length was 14 minutes.

### ***Data Analysis***

The results of the online survey are reported as descriptive statistics. All interview transcripts were uploaded to the NVivo10 software package (NVivo10 for Mac, QSP Int., Australia) to

facilitate the analysis process by managing and organizing data. A six-stage process of thematic analysis was adopted (Braun and Clarke, 2006; Clarke and Braun, 2017). Immersion of the data was achieved through multiple readings of the transcripts. Relevant content was identified from each of the transcripts by an initial systematic line-by-line coding process and assessed for reliability by a second coder. Once coding was complete, content was arranged to identify recurring themes that ran through the data, developing identifiable frameworks. At this stage, some individual codes were transferred to other themes. Before writing the report on the outcomes of data analysis, each of the themes was named or defined to clearly give the reader a sense of each one. Member checks with a selection (n = 7) of practitioners (selected based upon availability) were used to check the accuracy and trustworthiness of the data (Birt et al., 2016).

## **Results**

### ***Online Survey***

The majority of participants had 3 years or more applied experience working with athletes (23% with 1-2 years' experience, 27% with 3-5 years' experience, 9% with 5-8 years' experience, and 34% with 8+ years' experience). Less than 7% of the participants had 6-12 months applied experience working with athletes. Practitioners worked across various and multiple of elite sport levels (elite international, elite domestic, and academy) with 80% (n = 35) of practitioners reporting working at elite international level and 64% (n = 28) and 55% (n = 24) reporting working at elite domestic and academy levels respectively.

Social media was used by 89% (n = 39) of participants to provide nutrition information to their athletes. A total of 5% of participants had received formal social media training in how to develop social media skills and resources for online interventions, whereas 84% reported this training would be something they would be interested in. Of the participants who used social media (n = 39) to support their practice, 97% reported finding it beneficial. The types of information provided and the percentage of these participants providing this can be seen in table 2.

**Table 2.** Type of nutrition information provided across each social media platform by participants (%).

<b>Platform</b>	<b>Recipes</b>	<b>Information/ Facts</b>	<b>Nutrition Plans</b>	<b>Not used</b>
WhatsApp ( <i>n</i> )	<b>59% (23)</b>	<b>69% (27)</b>	<b>44% (17)</b>	<b>18% (7)</b>
Facebook ( <i>n</i> )	<b>41% (16)</b>	<b>46% (18)</b>	<b>10% (4)</b>	<b>38% (15)</b>
Twitter ( <i>n</i> )	<b>44% (17)</b>	<b>79% (31)</b>	<b>5% (2)</b>	<b>8% (3)</b>
Instagram ( <i>n</i> )	<b>44% (17)</b>	<b>21% (8)</b>	<b>5% (2)</b>	<b>44% (17)</b>
Snapchat ( <i>n</i> )	<b>10% (4)</b>	<b>10% (4)</b>	<b>0% (0)</b>	<b>67% (26)</b>
Linkedin ( <i>n</i> )	<b>3% (1)</b>	<b>10% (4)</b>	<b>3% (1)</b>	<b>74% (29)</b>
Youtube ( <i>n</i> )	<b>13% (5)</b>	<b>5% (2)</b>	<b>3% (1)</b>	<b>72% (28)</b>
Google+ ( <i>n</i> )	<b>5% (2)</b>	<b>5% (2)</b>	<b>5% (2)</b>	<b>80% (31)</b>
Pinterest ( <i>n</i> )	<b>5% (2)</b>	<b>3% (1)</b>	<b>3% (1)</b>	<b>79% (31)</b>

Pictures/Infographics were the preferred type of content developed and delivered over social media and was used by 77% of the participants. Text (62%), <30 second videos (29%), and


30-90 second videos (21%) were also used by participants. A total of 31% reported developing and delivering all of the above types of content.

Smartphones were the preferred device to engage and interact with social media from, used by 98% of total participants (n = 44). Laptops (59%), tablets (30%) and desktops (11%) were also used but to a lesser extent. Social media was used by 71% of participants to keep up to date with research. Social media was also used to find recipes for meals (39%), get athlete training information such as schedules and timings (27%), as well as to research products and foods (23%).

All participants reported having multiple social media accounts. Twitter was the only platform that 100% of participants had an account with and over half of the participants also reported having accounts with Facebook (93%), Whatsapp (86%), Linkedin (86%), Instagram (68%) and Snapchat (52%). All participants were frequent users of social media personally and professionally (see table 3).

**Table 3.** Top 7 social media platforms used by practitioners (%) and their daily frequency of visits (for personal and professional use).

<i>Most frequently visited</i>	<b>Platform</b>	<b>Daily Use</b>					
		<b>Never Use</b>	<b>1 – 2</b>	<b>3 – 5</b>	<b>6 – 10</b>	<b>11 – 19</b>	<b>20+</b>
	WhatsApp (n)	<b>7%</b> (3)	<b>14%</b> (6)	<b>20%</b> (9)	<b>11%</b> (5)	<b>18%</b> (8)	<b>30%</b> (13)

 <i>Least frequently visited</i>	Facebook (n)	<b>11%</b> (5)	<b>32%</b> (14)	<b>25%</b> (11)	<b>20%</b> (9)	<b>7%</b> (3)	<b>5%</b> (2)
	Twitter (n)	<b>0%</b> (0)	<b>41%</b> (18)	<b>32%</b> (14)	<b>16%</b> (7)	<b>9%</b> (4)	<b>2%</b> (1)
	Instagram (n)	<b>34%</b> (15)	<b>32%</b> (14)	<b>14%</b> (6)	<b>18%</b> (8)	<b>0%</b> (0)	<b>2%</b> (1)
	Snapchat (n)	<b>55%</b> (24)	<b>32%</b> (14)	<b>9%</b> (4)	<b>0%</b> (0)	<b>2%</b> (1)	<b>2%</b> (1)
	Linkedin (n)	<b>39%</b> (17)	<b>57%</b> (25)	<b>2%</b> (1)	<b>0%</b> (0)	<b>2%</b> (1)	<b>0%</b> (0)
	Youtube (n)	<b>52%</b> (23)	<b>43%</b> (19)	<b>2%</b> (1)	<b>0%</b> (0)	<b>0%</b> (0)	<b>0%</b> (0)

### ***Interviews***

Five higher order themes and five sub themes emerged from the data synthesis process. These have been clustered into two general dimensions, which are (1) Enablers and (2) Challenges to usage in practice. The dimension entitled enablers gives insight into how and why social media is being used by participants to support their practice. The dimension entitled challenges highlights experiences, opinions and practical issues that participants currently have with social media. Evidence is provided in the form of indicative verbatim quotations to highlight the participants' narrative, with reference made to the number of participants that contributed to each theme.

### ***Enablers***

This initial dimension demonstrates how and why using social media may be helping sports nutritionists to support their service provision with elite athletes. Three themes, *communication medium change*, *mobile learning* and *visual learning*, embodied this general dimension identified in table 4.

**Table 4.** Enablers to support sports nutritionists in practice.

<b>Raw Data</b>	<b>Higher Order Theme</b>	<b>General Dimension</b>
'I can e-mail an athlete and they never even look at it, WhatsApp and they'll reply within minutes, it's ridiculous. I think it's just an age thing, like, if you're a certain age. Even phone calls, like they don't even call you anymore' ( <i>Practitioner 6</i> )	Communication Medium Change (n=15)	Enablers
'WhatsApp is very, very useful and very efficient at information sharing, mainly because it is readily available on people's phones and you know, you can normally get a pretty instantaneous response to questions or you can, in real time, discuss nutrition' ( <i>Practitioner 9</i> )	Mobile Learning (n=9)	
'Everyone has their phone in their hands now and I genuinely think people don't really want to read, they want to see and interpret the visuals' ( <i>Practitioner 8</i> )	Visual Learning (n=6)	

Practitioners described scenarios in which social media has benefited how they communicate with their athletes:

'You go to a camp or a competition and WhatsApp, and group messages are invaluable, a very quick way to update people, very useful' (*Practitioner 3*).

The use of nudges to facilitate mobile learning was highlighted:

'We use social media as just a prompting exercise as opposed to actually pure education' (*Practitioner 4*).

The transition away from traditional e-mail was highlighted by a number of practitioners:

'They seem to get more out of that (WhatsApp) than if I sent them an e-mail. I'm not sure how many

people open their e-mails' (*Practitioner 11*).

Also highlighted was the athletes' preference for material:

'I did a survey of all the athletes just a few weeks ago actually and they all said that they preferred the videos than having to actually read material' (*Practitioner 13*).

### Challenges

Table 5 illustrates the seven higher order themes that express this dimension.

**Table 5.** Challenges to social media use in practice.

Raw Data	Sub Theme	Higher Order Theme	General Dimension
'I think it would be good to understand, formally, from the athletes, actually what, like, how often do they check it, the best times and all that kind of stuff.' ( <i>Practitioner 6</i> )	<i>Optimising Digital Intervention Effectiveness</i> (n=13)	Lack of Digital Intervention Training (n= 13)	Challenges
'I definitely think it has some impact but I can't say how much...how do you measure it?' ( <i>Practitioner 11</i> )	<i>Measuring Impact</i> (n=5)		
'The age group that I'm working with at the moment is probably averages about 17 and 25 or so and I think a lot of them just don't use e-mail anymore as their primary method of communication and they certainly don't understand that business still revolves around e-mail and that's one of my challenges' ( <i>Practitioner 3</i> )	<i>Generational Differences</i> (n=4)		
'In our domain I think training wise, the training that you'd need in our domain would be more around safety and confidentiality' ( <i>Practitioner 2</i> )	<i>Privacy and Confidentiality</i> (n=5)		
'I think we could get a lot better behaviour change by using these platforms and visual learning tools...I think that's definitely a way nutrition is going over the next few years.' ( <i>Practitioner 15</i> )	<i>Developing Behaviour Change Interventions</i> (n=4)		
'In terms of content it could take him a full day' ( <i>Practitioner 13</i> )		Time Requirement (n=4)	



The majority of practitioners highlighted a lack of digital intervention training as a barrier to social media usage:

‘I think the kind of areas of behaviour change, as a whole, in terms of nutrition is a bit under looked at times and probably one of the biggest areas to influence behaviour in getting the message right’  
*(Practitioner 15).*

‘If our whole point is to make an impact and influence athletes’ food choices, then why don’t we use the most effective ways of doing that and I think if we could have more training on how best to use social media then that would be good’ *(Practitioner 1).*

‘I can recognise that I need to improve a lot on it and I guess I just kind of haven’t had the time at the minute. It’s not one of my main priorities at the minute. If someone were to put it in front of me and say ‘this training course is on’ then I would definitely go’ *(Practitioner 13).*

It is important to note however, that despite the majority viewing digital interventions as beneficial, there was some disparity in the field as some practitioners gave their reasons for choosing to not use social media:

‘I can see the logic but I kind of feel that if you have to nudge someone to do that then you probably haven’t done the job right in the first place’ *(Practitioner 13).*

## **Discussion**

This primary aim of this study was to explore how sports nutritionists are using social media as part of their service provision to elite athletes. Our secondary aim was to explore practitioners’ experiences and opinions of social media use as part of service provision. Using mixed methods, our data highlights the prevalence and perceived benefits of social media use by sports nutritionists as part of their service provision. Twitter, Facebook and WhatsApp

were reported as the most popular platforms amongst practitioners. The underlying trends for social media use were to facilitate mobile and visual learning, as well as educate, nudge, and communicate with athletes across various environments, contexts and times of day. However, our data demonstrates that sports nutritionists' lack digital intervention training, echoed by current inability and lack of training in how to measure digital intervention impact, as well as their requests to better understand behaviour change. Furthermore, our data highlights that sports nutritionists now want formalised training pathways to optimise their digital service provision.

### *Communication Change*

The survey data highlights that sports nutritionists are not exempt from global trends as practitioners adopt similar practices to other industries that provide service provision (We Are Social, 2017). Qualitative findings suggest a shift from traditional communication support practices of phone calls and follow up emails to platforms such as WhatsApp. These findings are in agreement with recent global communication discoveries by Deloitte (2016), who demonstrated that 31% of smartphones users no longer make traditional voice calls in a given week. Furthermore, Montang et al., (2016) found that WhatsApp now accounts for an average of 20% of an individuals phone usage, with users averaging approximately 32 minutes a day on the platform. It appears that nutritionists have now, potentially inadvertently, established a “messaging support service” between themselves and the athletes they work with.

Practitioners own frequency of visits to social media sites also provide insight into how we interact and consume information. For example, 30% of practitioners report visiting

WhatsApp more than 20 times a day, therefore it is likely that most of these interactions are shorter in nature than traditional email. A similar conclusion was reached by Andrews et al. (2015) who reported that UK university students and staff are using their phones on average 85 times a day, with 55% of all uses less than 30 seconds in duration, likely to reflect the time taken to read or respond to a short message, voice note or to check notifications. The implications of these findings bring to light new considerations for the modern sports nutritionist. The movement towards smaller, bit-sized chunks of communication and content, and away from phone calls and emails now challenges practitioners digital delivery to not only be clear and concise, but also innovative in how they deliver messages to effectively engage and influence the athlete in the short period of time available.

#### *Mobile Learning, Nudging, and Visual Learning*

Our findings suggest that sports nutritionists are incorporating an anytime and anywhere mobile learning approach as they communicate ‘in real time’ (e.g. practitioner 9) to educate, collaborate and communicate with athletes across various environments, contexts and times of day. This finding is consistent with trends in pedagogy, again highlighting sports nutrition is no different to global trends, as social media and online platforms continue to establish a supporting role for itself in the education system (Biloš, Turkalj, and Kelić, 2017; Brooks, 2016; Cheston, Flickinger, and Chisolm, 2013; Moran, Seaman, and Tinti-Kane, 2011). Pascarella and Terenzini (2005) investigated the impacts of incorporating these platforms into the teaching activities of their university faculties and found that the most effective faculty members used social media with their students as a platform for active learning as well as to engage students in real-time, with minimal hindrances. Maloney, Moss and Ilic (2014)

explored students' perspectives of these platforms use in education, demonstrating that students felt it was appropriate and would benefit their learning by facilitating peer collaboration, enhanced communication and complementary learning. Biloš et al. (2017) states that this augmentation of practice through mobile devices and applications can enrich traditional learning. Perhaps this is because mobile learning facilitates communication in a highly situated and contextualized manner, enabling learning to take place in the context in which it is applied, as proposed by the Situated Learning Theory (Lave and Wenger, 1991).

However, it appeared that not all practitioners used these online platforms to educate and communicate. Practitioners also used social media as a 'prompting exercise' (e.g. practitioner 4). This is more commonly referred to as "nudging", a concept popularised by the work for Thaler and Sustein (2009). By delivering these "nudges" practitioners are inadvertently adopting the role of a choice architect as they attempt to use the digital environment to influence real world decisions and behaviours in athletes. It appears there is an opportunity now for practitioners to refine and potentially systemise these nudges to optimise their effectiveness at influencing behaviour (Abdukadirov, 2016).

Both the survey and interview results highlight that practitioners are making attempts to be more innovative by incorporating mobile learning and visual learning techniques together. This example approach has been shown to be effective in other fields, for example, Krum (2013) reported individuals to be 6.5 times more likely to remember new information if they had learnt it from an infographic rather than text alone. Similarly, Delp and Jones (1996) explored the effect of pictures on patient comprehension and compliance and found that the

use of pictures and text increased patients' comprehension of the instructions by 40% and compliance by 23% rather than text alone. Interesting, they also found that the inclusion of pictures with text improved compliance by 37% over text alone in participants without a high school education. These findings highlight the value of sports nutritionists investing in digital resource development, especially if they are working with youth athletes.

However, before spending more time developing and delivering content online it seems important practitioners take a step back and consider how to optimise their digital intervention effectiveness as well as clearly identify how to quantify the impact of their digital interventions instead of relying on their perceptions.

### *Training*

The overwhelming majority (98%) of practitioners using social media reported in the survey that it was beneficial to their service provision despite a lack of industry training, suggesting that these tools are easy to use and the skills required can be learned autonomously. The survey did however identify that practitioners would be interested in formal digital training, whereas the interviews detailed areas of training, such as behaviour change and digital safety regulations that sports nutritionists would like to receive to optimise this digital element of service provision.

Presently, sports nutrition appears to exist in a sport science echo chamber, siloed from other fields, such as behaviour change and computer science, who are most likely the parties needed to collaborate with to optimise online behaviours. It is possible that may be because sports

nutritionists are predominantly trained in physiological aspects of sport and exercise science, with some but perhaps limited consideration given to behavioural aspects of the discipline. Theory and evidence based tools developed in behavioural science already play an important role in informing the design and evaluation of effective digital health interventions (Cheung et al., 2015; Craddock et al, 2017; Jackson et al., 2014; Nour et al., 2016). An example of such a tool is ‘The Behaviour Change Wheel’ (BCW), a method for developing behaviour change interventions (Michie, van Stralen and West, 2011). Atkins and Michie (2013) have used these tools to develop a clear six-step process for practitioners to use when delivering nutritional behaviour change interventions. More recently, Mazorra et al. (2018) demonstrated how a data science approach to delivering behavioural interventions, using a computational platform can optimise intervention delivery for individual users and provide clear quantitative data to measure the impact of the intervention. It seems clear that behavioural science and computer science appears to provide solutions for the majority of challenges highlighted by practitioners in this study as well as opportunities to collaborate on future research.

### ***Limitations***

Capturing the content and messages currently being delivered and generated by practitioners, as well as the user engagement with these, was beyond the scope of this study. Professional social media usage was also self-reported rather than captured in real time via each platform and so we cannot rule out error and/or deliberate misreporting. No athlete data was captured during this study, so all the results and findings only describe this topic from a practitioner perspective. Practitioners were also based in the UK and Ireland and may not be representative of the worldwide nutrition community.

### ***Areas for future research***

Research and improvements in practice remain slow and variable, consistent with healthcare (Hardyman, Daunt and Kitchener, 2015). Future areas of research should see multidisciplinary collaboration between sports nutrition, behavioural science and computer science to develop and deliver theory driven digital behaviour interventions (Contento, 2008; Michie et al., 2008), coded with behaviour change techniques, to help answer the questions put forward by the Human Behaviour Change Project, “what works, compared with what, how well, with what exposure, with what behaviours (for how long), for whom, in what settings, and why?” (Michie et al., 2017). Future research should be complimented with a data science approach to behavioural interventions to distill what is really happening in these digital environments. This may help sports nutritionists refine and quantify the effectiveness of individual interventions instead of relying on perceptions.

To gain depth and insight into digital intervention optimisation it seems logical that athletes should also be collaborated with in a value creation process, similar to how businesses collaborate and co-create with customers to produce new products (Koniorczyk, 2015). Tapping into the intellectual capital of young as well as experienced athletes with this co-creation process may aid the development of innovative ideas, or improvements to training and practice, as well as detect any current or potential faults.

### ***Practical applications***

The current study provides some direction for practical application. While our data suggest wide and successful adoption of social media by sports nutritionists, it also highlights some consistent barriers to its use. Accordingly, we suggest practitioners and the wider community may want to consider the following practical applications from our work:

*For the individual practitioner*

- Use social media channels, such as WhatsApp (rather than email), to communicate with athletes in real time and to 'nudge' athletes to perform desired behaviours.
- Use visuals rather than text content where possible to encourage engagement from athletes.
- Seek out seminars or courses for formal digital media training to overcome concerns around communication strategies, measuring impact and privacy/security risks.
- Seek feedback from athletes to better tailor format and frequency of content to their individual needs.

*For the sports nutritionist community*

- Utilise behaviour change models such as COM-B and the Behaviours Change Wheel to develop impactful, evidence based behaviour change interventions.
- Create specialised online tools or platforms to enable easy handling of communication and automate delivery of content.
- Collaborate with computer scientists to harvest the digital data “crumbs” left behind by athletes to better understand their online behaviours, using methods such as network analysis, to continually refine and adapt interventions to the target population.



## **Conclusion**

Our data highlights the prevalence and perceived benefits of social media use by sports nutritionists as part of their service provision. A total of 89% of the participants used social media as part of their practice. WhatsApp was the most frequently visited platform whereas Twitter, WhatsApp and Facebook were the most popular for providing information and resources. The main trends for social media use were to facilitate mobile and visual learning, as well as educate, nudge, and communicate with athletes across various environments, contexts and times of day. We also highlight the clear challenges practitioners are facing, such as lack of training, as they embrace social media and discuss some of the available solutions to progress this digital extension of practice. Despite these platforms introducing new legal, ethical and professional considerations for sports nutritionists, they do provide networks for scalable interventions and platforms to share credible information. Professional education now could support sports nutritionists' to overcome the training and time challenges highlighted and develop digital professionalism. New, and ever iterating tools, mean new competencies, collaborations and knowledge are required if these external forces are to be harnessed to optimise practice.

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