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Considering the youth voice: needs and asset assessment in sport for development using photovoice

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ABSTRACT

With the growth of sport for development (SFD), it is increasingly important to ensure that programmes are intentionally designed to meet the needs of the communities they serve, in a way that helps build community capacity. Still, many programmes have been criticised for not considering the voices of marginalised individuals, specifically youth programme recipients, in the planning and development of SFD-programmes. Additionally, programmes are developed from a deficit approach where only the needs or negative aspects of the community are being considered in the planning and development of programming. With these issues in mind, the purpose of this study was to assess the usefulness of photovoice as a strategic tool to give youth a voice in SFD needs and asset assessment. Additionally, it examined how practitioners can utilize the outcomes of a needs and asset assessment in planning and implementing SFD programming. The results highlight the assets and challenges that the youth participants identified and the practical use of the assessment from the perspective of programme administrators. The results suggest that photovoice can allow youth programme participants to have a genuine voice in programme development.

KEYWORDS

needs assessment; asset assessment; sport for development; community based participatory research; photovoice

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INTRODUCTION

Historically, sport for development (SFD) programmes were created out of the understanding that sport can have an impact beyond physicality, in ways such as building character traits, creating unity, and overcoming bias. SFD can be defined as ‘the use of sport to exert a positive influence on public health, the socialization of children, youths and adults, the social inclusion of the disadvantaged, the economic develop-

ment of regions and states, and on fostering intercultural exchange and conflict resolution' (Lyras & Welty Peachey, 2011, p. 311). SFD programmes have emerged across every continent, utilising a multitude of sports, and addressing numerous social issues including disability, education, gender, health, livelihoods, peace, social cohesion, and infrastructure, among others (Svensson & Woods, 2017). However, within these programmes exist issues of power and equity, as many initiatives are led by those in high socioeconomic societies intending to assist lower socioeconomic communities, which has caused many issues (Darnell, 2012; Levermore & Beacom, 2012; Spaaij et al., 2018).

Within SFD literature, scholars have argued that the voices of participants should be a more central focus of programme development (Collison & Marchesseault, 2018; Darnell, 2007; Giles & Lynch, 2012; Hayhurst, 2009; Kidd, 2008). Additionally, there is a need for better mechanisms to monitor and evaluate programming (Coalter, 2007), and to include local participants in the planning and development stages of SFD (Edwards, 2015; LeCrom & Dwyer, 2015; Nicholls et al., 2011; Schulenkorf, 2012; Spaaij et al., 2018). Given this, the use of community-based participatory research (CBPR) has grown within the field. CBPR is a method that purposefully incorporates participants from historically disenfranchised groups within society (Green & Haines, 2015). In addition to a lack of participant involvement, many scholars have noted that SFD interventions tend to be designed from a deficit approach (Giles & Lynch, 2012) that focuses on only the negatives and none of the progress or positives (Wright & Lopez, 2002).

With these challenges in mind, the purpose of this study was to examine how photovoice can be used as a strategy to include the youth voice in SFD planning and programming. This is critical in that the youth voice has often been absent from programme development; in addition, the approach utilised here provides opportunities for the community to be assessed in terms of both its strengths and challenges, not just its deficits. In order to tackle this purpose, the research team partnered with a community centre that was looking to revamp their sport programming to include more deliberate SFD. The community centre was concerned with including their youth participants in this process, and in doing so needed an assessment of how the youth viewed their community. The following research questions were used to guide the study:

- 1) What do youth community centre members view as assets and challenges of their community?
- 2) How can the results of the needs and asset assessment guide future SFD programming for the community centre?

Literature review

Needs assessment in SFD

SFD scholars have called for stronger participant voices in program development (Darnell, 2007; Giles & Lynch, 2012; Hayhurst, 2009; Kidd, 2008). Based on a review of SFD policy documents, Hayhurst (2009) found that SFD policies and programs tend to be driven by politics rather than by the needs of individuals or groups that are targeted. The author also suggested that in many instances, "first-world" values and

beliefs are placed on marginalised groups in the development of SFD programmes and policies. Instead, Hayhurst (2009) proposed that policy makers and program administrators should consider the values, beliefs, and experiences of those marginalised groups in developing SFD programming and policies.

In addition to a lack of community involvement, there have been other criticisms about how some programmes are conceptualised and developed. Specifically, many scholars have noted that SFD interventions tend to be designed from a deficit approach (Giles & Lynch, 2012). That is, programme developers have focused on identifying problems that exist in communities and design programmes that aim to address those negative issues. Scholars have disapproved of these programmes because they tend to reinforce a negative bias of marginalised populations and their situations (Wright & Lopez, 2002). Researchers have suggested a need to consider the various characteristics of communities, and create programmes that go beyond the identification of problems or treatment of symptoms, but instead focuses on a more holistic based solution model (Cox, 2006; Giles & Lynch, 2012). This requires that input from all constituencies be considered throughout the process.

Community-based participatory research in SFD

Community-based participatory research (CBPR) has grown within the field in response to those feeling the participant voice has been left out of programme planning. CBPR strategically incorporates participants from historically disenfranchised groups within society (Green & Haines, 2015). Researchers have used these methods to engage those living in poverty, ethnic and racial minorities, women, and children (Dubnewick et al., 2018; Hayhurst et al., 2016; McHugh et al., 2015). For example, McHugh and colleagues (2015) utilised one-on-one interviews, sharing circles, and photovoice to understand the experiences of Indigenous Canadian youth so that sport programming could be better tailored toward that population, while Hayhurst and colleagues utilised the same methods (interviews, photovoice, sharing circles) in examining SDG programmes targeting Aboriginal young women in Vancouver (Hayhurst et al., 2015). Furthermore, in an effort to better understand the sport experiences of youth, researchers applied CBPR in the form of one-on-one interviews and focus groups with community youth and adults (Dubnewick et al., 2018). Much of the CBPR within SFD utilizes methods such as focus groups and one-on-one interviews (Dubnewick et al., 2018; Hayhurst et al., 2016; McHugh et al., 2015). Similarly, Collison & Marchesseault (2018) introduced the concept of participation social interaction research (PSIR) into the field of SFD, noting the ways it gives voice to culturally specific contexts. The authors applied the approach across developing countries in Africa and specifically identified the way it “empowers local voices to construct detailed accounts of culture within and outside of SDP” (Collison & Marchesseault, 2018, p. 226). Hayhurst (2017) advocates for participatory methods, specifically those more visual in nature (photography, video, blogs, zines), in that they have the power to build trust and collaboration through the process.

Power and voice

One of the main issues CBPR, PSIR, and other participatory research methods aim to amend is the lack of voice and power among marginalised groups, often the groups

from whom data is being collected and for whom programmes are being planned. Power, voice, and empowerment are complex phenomenon, influenced by centuries of cultural, economic, and political oppression. Jo Rowlands, specifically addressing internalised oppression of the female gender notes, “a group of people who are systematically denied power and influence in the dominant society will internalize the message it received about its supposed roles and capacities and will come to believe the messages to be true” (1998, p. 12). It is likely that youth face a form of internalised oppression, as they can be seen and treated by many adults as vulnerable, incompetent and immature (Grace, 1995), therefore minimising the power of their voice. However, steps can be taken to shift this view over time.

A good example of this would be student voice. Over the last several decades, educators around the globe have slowly begun to recognize the value of student voice as a contributor to the education system in general (Bahou, 2011). Students are being asked for feedback and ideas that can contribute to how education is delivered and received. They are being viewed as ‘expert witnesses’ (Flutter & Rudduck, 2004, p. 4) and are a voice in shaping their own education. While there are certainly challenges to this approach, where implemented properly, the results are predominantly positive (offers teachers important insights into learning, better engagement between teachers/learners, more motivated students, less absenteeism, etc.) (Bahou, 2011). However, for student voice to truly make an impact, there must be a strong commitment on the part of the administration to listen to and respect the views of the students (Bahou, 2011). The overall respect being offered to youth in student voice movement demonstrates Rowlands’ statement that the more power is exercised, the more it can grow (1998).

In general, power and voice continue to be challenging concepts when applied to any marginalised group, a group within which youth certainly fit. Voice does not guarantee power. “Voice means having a say when asked but without any guarantee of a necessary response” (Bahou, 2011, p. 3). There need to be people in positions of power who are willing to listen and defer in order for voice to become power. The current study offered a unique opportunity to explore some of these dynamics, in that SFD programme administrators specifically appealed to the researchers to help guide them through a process fully focused on the youth voice and how it could guide future endeavors.

Needs assessment and asset/capacity building hybrid model

The current study utilised the needs assessment and asset/capacity building hybrid model proposed by Altschuld, Hung, & Lee (2014) as a theoretical guide. Until rather recently, community development practitioners and scholars have planned for the improvement or development of social programming from a needs-only approach, taking into account only what is needed, wrong, or missing within the community (Altschuld et al., 2014; Green & Haines, 2015). Traditional needs assessments are commonly led by external parties, and are initiated in response to problems either within the community or within organisations that conduct programming in the communities (Costa & Serrano-Garcia, 1983). Despite the past focus on a needs-based approach, there has been a shift, and scholars and practitioners are beginning to stress the importance of considering assets, strengths, and resources that exist within the community

that might assist in programme development (Green & Haines, 2015; Kretzmann & McKnight, 1993). Researchers have indicated that focusing on assets may help mobilise communities to address their issues and help build community capacity.

Altschuld and colleagues (2014) proposed a hybrid model in which needs assessment and asset building are not viewed as separate and opposite; rather, they are used in conjunction to support each other in the community development process. Through this integrated model, programme recipients should not only provide the data, but should also be actively involved in the process of developing or changing programming (Altschuld et al., 2014). Figure 1 provides a visual depiction of the model.

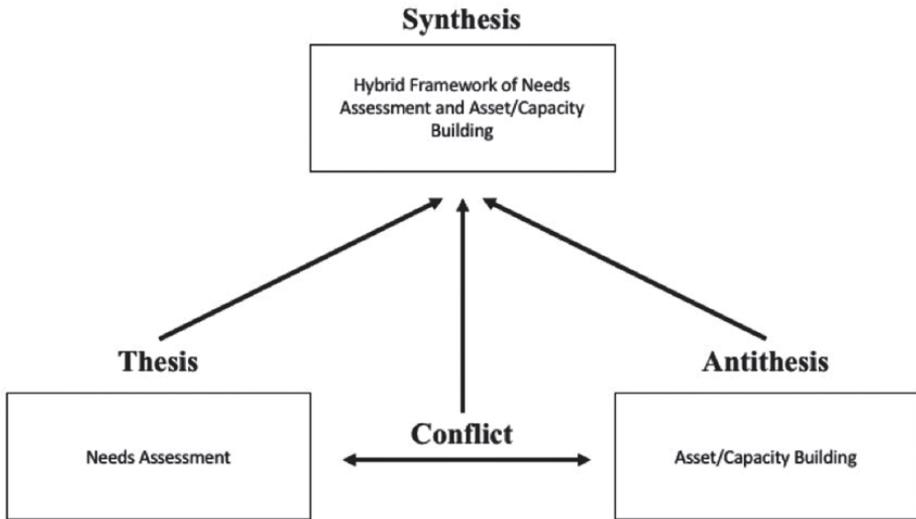


Figure 1 Hybrid framework of needs assessment and asset capacity building

Altschuld, Hung, & Lee (2014) suggest that a hybrid approach should determine needs and assets independently, yet in a way where both are connected. The asset assessment should focus on building community capacity for change by allowing individuals to consider the assets or strengths of a community or organisation (Altschuld et al., 2014). The needs assessment component should work to determine the gap between ‘what should be’ and ‘what is’ by focusing on what the community or organisation needs, discrepancies, or shortcoming that may exist. Authors have noted that assessing the needs and assets simultaneously can prove useful in building community capacity and for deciding how best to use the assets to address the needs (Belvins, 2017; Curtis, 2018; Platt, 2016).

METHODS

The current study utilised a multi-method qualitative case study design to understand how youth members of a community centre view needs and assets in their community and how those needs and assets can be used by centre administrators to develop SFD

programming. This design was chosen because qualitative research is necessary to uncover the complex issues that inform SFD programmes (Steward-Withers & Brook, 2009), in that the design can elicit thick description of the experiences of the community participants (Van Manen et al., 2015). Thus, this needs and assets assessment was performed using a photovoice project with SFD programme recipients (youth members), and interviews with programme administrators.

Research setting

A community centre located in a low-socioeconomic urban neighbourhood on the East Coast of the United States was used as the setting of this case study. The community centre is in one of the lowest income neighbourhoods in America with an average household income lower than 94.5% of neighbourhoods in the United States (NCCP, 2016). Furthermore, with 74.7% of the children living below the federal poverty line, this neighbourhood has a higher rate of childhood poverty than 98.7% of U.S. neighbourhoods (NCCP, 2016). Additionally, the crime rate in the area is about 25% higher than the national average (Zimmerman et al., 2016). The community centre is committed to improving the lives and meeting the needs of youth living in the community, and currently serves approximately 300 youth in their after school and summer programs. This centre was chosen because administrators were interested in assessing the needs of the community they serve, and determining how they can better meet the needs of their youth members through their sport programming.

Participants

From within the chosen community centre, a total of 11 individuals participated in this assessment. Youth participants and adult administrators were recruited based upon their involvement in the afterschool sport programming offered at the centre. To recruit the youth, a member of the research team attended the Fall open house, which is held at the centre annually, where local youth and adults come to find out about fall programming offered. At this open house, the needs assessment and capacity building project was presented, and parents whose youth were interested signed up that night. Eight youth, ranging in age from 10–14, signed up. There were a total of 3 boys and 5 girls that participated in the photovoice project.

Additionally, three community centre administrators were purposefully selected to take part in this assessment. Administrators were selected based on their role within the centre, and their ability to provide relevant and useful information related to the needs and assets of the community (Onwuegbuzie & Collins, 2007). One of the administrators is a member of the board of directors, another is the executive director of the centre, and the final administrator is in charge of the centre's sport programming. Two of the administrators lived in the community at some point. To protect participants, pseudonyms were assigned in the presentation of results.

Data collection

Photovoice. In the current study, a photovoice strategy was utilised to include the youth voice in the SFD planning process at a community centre. It was coupled with focus groups to enrich the researchers' and centre administrators' understanding of how the youth viewed the needs and assets within the community that could lead to

the most appropriate and effective SFD programming at the centre. Photovoice, based on its creative and non-verbal format, has been identified as a strong data collection tool for youth (Hudson et al., 2020).

Data collection for the photovoice project lasted approximately 11 weeks, closely following the procedure laid out by Wang & Burris (1997). Cameras for this project were purchased with internal grant funds from the researchers' institution. Prior to the start of the project, participants were trained on how to use the cameras, as well as safety and ethical issues related to photography. Next, participants engaged in four group photography sessions, where all participants, along with a researcher, went around the community together for approximately one hour. Youth participants were responsible for selecting the sites they wished to visit. During these photography sessions, the youth were only instructed to take pictures of things that represented their experience living in the community. They were not asked to specifically identify needs and assets. The youth additionally took the cameras home for one week to take photographs of the community assets and needs on their own. Group and individual photography sessions yielded a total of 325 pictures.

In addition to the photography sessions, youth participants engaged in four focus group discussion sessions, where they came together to discuss the photographs they took, specifically discussing what their photograph was and what the photograph said about their community (i.e., if the picture represented a positive component (asset), or a shortcoming (need)). A research team member guided these group discussions. Group discussions were audio-recorded, then transcribed verbatim. Both the photographs themselves, as well as the group discussion related to each, were collected as data.

During the final group discussion, participants were tasked with selecting 20 pictures that helped tell the story about their community and their experiences living in the community. The 20 pictures that were selected were printed and framed. As a group, the youth prepared a presentation in which the 20 pictures were showcased and accompanied by explanations. The presentation was attended by community centre administrators, staff, youth members, families of participants, and other members of the community.

Interviews. Interviews were used for the current study to elicit reflection on the needs and assets identified by the youth and about how those needs and assets could inform future SFD programming. Following the conclusion of the photovoice project, one-on-one, semi-structured interviews were conducted with each centre administrator. The interview protocol (Appendix A) included questions about the general perception of the community, and how the results of the photovoice project can inform SFD programming moving forward. The interviews were conducted by a member of the research team and lasted between 35–50 minutes. Each interview was audio recorded and transcribed verbatim.

Data analysis

Miles & Huberman (1994) and Patton (2002) suggest a deductive approach to data analysis, using theory to guide discovery. In analysing our data, we followed a systematic deductive approach, where we began with a premise based on the needs assessment and asset/capacity building hybrid model, and made sense of the data from this

frame. In doing this, data were coded into categories that fell under assets and needs, with different trends emerging within each. This prefigured coding scheme allowed additional codes to emerge into broader themes.

Atlas.ti software was used to store data and assist in data analysis. Researchers paid close attention to trustworthiness throughout the data collection and analysis process (Lindloff & Taylor, 2011). To reduce individual bias, two researchers were involved in the coding of data. One of these researchers was involved in data collection and the other was not. Each researcher individually openly coded the data, in a process where each was immersed in the data, looking at all photographs, and re-reading all transcripts from the focus groups and interviews (Lenneis et al., 2020). This resulted in various codes, at which point each researcher again went through the codes, trying to generate initial themes. As a third step, the two came together to collaborate on establishing final trends and themes discovered through the data. Inter-coder reliability was established only if both researchers identified a theme in the initial coding process, at which point it was moved forward for further discussion (Creswell & Poth, 2017). Discussion around themes took place over a number of sessions, in between which researchers would go back into the data to ensure they were respecting the words of participants. Finally, the reduction process resulted in two overarching themes and six subthemes when it came to assets and needs. Additionally, a final theme related to the practical value of the needs and asset assessment is discussed.

Researcher stance

It is important, especially in qualitative work, to understand the standpoint from which a researcher approaches his or her work (Maxwell, 2013). Both researchers involved in this project have spent time working with youth and community centers in the neighborhood where the project took place. Through their work, they have an understanding of the demographics within this community and the issues youth in this area face daily. While they do not reside in this community, their work there has given them an outsider's perspective on the youth with whom they would be working. Because of this, they were able to work to establish trust and communicate the purpose of the study clearly so that participants could be open and honest in their participation.

Given their own backgrounds, great care was taken in approaching this work in an unbiased manner. During the photovoice sessions, focus groups and interviews, the researchers asked questions in a straightforward manner without inserting their opinions or thoughts into the conversation. The participants led the conversations in the direction they saw fit, with the researchers guiding the discussion purely from a standpoint of keeping it focused on community assets and needs. The researchers also looked for any cases where their own views appeared in any of the transcripts of the focus groups or interviews, to ensure they remained as unbiased as possible. Through these deliberate strategies, the scholars are confident that they have respected the voices of those in the community, rather than inserting their own views into the findings.

RESULTS

The aim of this study was to examine how photovoice can be used as a strategy to include the youth voice in SFD planning and programming. The results revealed that

youth saw multiple assets within their community, such as 1) their community being close-knit, 2) multiple community resources, 3) education, and 4) positive outlets. On the other hand, youth identified 1) violence and 2) subpar community facilities as needs or challenges in the community. In addition, in order to examine the practical value of the needs and asset assessment, interviews with programme administrators were conducted. The results revealed that programme administrators valued the photovoice project in its ability to give voice to the youth who are often overlooked in these types of processes, and they planned to use the information provided by the youth to inform future SFD programming. Additionally, administrators saw value in giving youth a voice in decision making within the programme overall. Each of these aspects are discussed in detail in the following section.

Community assets

The youth who participated in the photovoice project commonly identified several key assets within the community in which they live. The most salient asset was the idea of *Close-Knit Community*. Youth participants stated that the community is close in the sense that people know, trust, and care about each other. During one of the photo sessions, Nia, age 10 took a picture of her grandmother's church. She later explained, 'They [members of the church] are nice. They ask me questions about my life and myself. I got baptized there. They support me because I think they care.'

Participants also described the *Close-Knit Community* as one where community members look out for each other. Camryn, age 13, talked about the *Close-Knit Community* as she discussed a picture that she took of a street in her neighbourhood. She explained:



Figure 2 Neighbourhood



Figure 3 Community resource

This street it's just exciting to me, because when you need something from your neighbours, they'll be right there. Like if your parents aren't there and you told them that they weren't there and the door was unlocked, they'll make sure that you're in there. They'll check on you and stuff. That's the one thing I love about that street.

Nicole, age 12, echoed this point during discussion. She expressed, 'I guess the people are nice. My next door neighbour, she's old. She watches me sometimes, like when my mom is at work or when the club is not open.' As evidenced by the youth, the *Close-Knit Community* is clearly an asset.

Another asset of the community identified by youth was *Community Resources*. Youth pointed out that not only are there external resources being brought in to the community by non-profit organisations, there are also resources, such as facilities, that are a part of the community's built environment. For instance, during discussion, Carlos, age 13, shared, 'I like the park by my house. I like to go there because I can play basketball and they have a field and sometimes we play kick ball. It's just a place to go to hang out with my friends.' Shawn, age 11, talked about another *Community Resource* as he discussed a picture that he took during one of the sessions:

I took that picture because it's a recreation centre right there and [a non-profit organisation] bring food for free to there, and I think that's good for kids to have food and a recreation centre. Because if kids, like homeless kids, they don't have food, they can go to the recreation centre. You play basketball or you can drum, and once the food comes, you can eat for free.



Figure 4 Classroom

Clearly, youth viewed *Community Resources* as a positive aspect of the community.

Third, youth participants identified *Education* as an asset. The youth shared how important education was to their future. Andrea, age 14 shared, in response to a photo taken of a classroom:

School to me means a future, because you can't be nothing without school. Like if I dropped out of school right now, I'm not going to get nothing at all. When I'm old enough to get a job, I'm probably going to be working at Chick-fil-a, Popeyes, and McDonalds for the rest of my life.

Additionally, Tina, age 12, shared, 'But why do all those people have guns and have to sell drugs and stuff? My mama said that if go to school, get good grades, go to college, I won't have to sell drugs.'

Finally, the youth participants talked about *Positive Outlets* as avenues such as music, sports, church, and friends, that help them escape some of the negative aspects of life. Camryn, age 13, took a picture of her music class and shared with the group, 'I took it because it helps relieve my stress about school, personal life, friends and family...I put all of my feelings into music.'

Nia, age 10, also shared how church is a *Positive Outlet* for her. She stated, 'I love church. Because I praise the Lord. Because the stuff that's happened in my life, I can pray. My aunt is an alcoholic, and I try to pray to the lord so that she can stop.' Other photos taken and discussed by the youth related to *Positive Outlets*, including the sports offered by the recreation centre.

In summary, the youth participants acknowledged their community was close, the community had multiple resources, there is an opportunity for education, and there are positive outlets for youth in the community. These were all deemed as community assets.

Community challenges

In terms of community needs, youth participants discussed many challenges that exist in their community. By far the biggest challenge was *Violence*. Participants described the community as unsafe and filled with gang related activity and shootings. During a photography session, one participant took a picture of graffiti at a park. This started a discussion about gang activity in the community. Shawn, age 11, shared with the group, 'It's a crazy world out there. People shooting people. Makes me feel not safe. My granddad carries a gun just in case.'



Figure 5 Park graffiti

Others echoed his sentiment of not being safe. Nicole, age 12, shared her experience, stating:

I have to be honest. People be doing bad stuff. Shooting and selling drugs. My friend's brother used to sell drugs but then he got shot. He died. He was like 16 or whatever. People do other bad stuff too. My mama don't like me walking around at night because she think I might get robbed or something.

Also in regard to *Violence*, participants shared their fear of being a victim, especially at a young age. In response to a picture taken at a local cemetery, the group discussed



Figure 6 Cemetery

the likelihood of dying young. Andrea, age 14 shared: ‘It’s sad, but people get killed every day. It doesn’t matter how young. You could just be in the wrong place at the wrong time.’

Additionally, when asked about how *Violence* made her feel, Carlos, age 13, responded, ‘Sad. And I don’t know ... scared. I mind my own business, but I could still get shot. You never know.’ Clearly, as indicated by the youth, *Violence* is a challenge for this community.

In addition to violence, *Community Facilities* was another salient challenge or need of the community. Youth noted that while there are some recreational facilities that they can utilise in their community, there are not many and the quality of the facilities is subpar. Tina, age 12, stated during discussion:

I play sometimes at [a park], but sometimes I don’t like to go there because it’s dirty. The net thing is all raggedy and the there’s trash all over the court and stuff. And there’s always people standing around on the court. Not even playing but just stand there.

The issues with *Community Facilities* came up among others as well. Marcus, age 10, who took a picture of the equipment when the group visited a local park, explained:

I took this picture because the city needs to come, and kids need to stop jumping up there and tearing...when they jump up on the net and they hold on to it and try to get up to the rim, they stretching the net. And the city needs to fix that and get all that glass up and fix them courts because the courts are rusty, dusty, dirty and triffin.



Figure 7 Playground

Collectively, there are many needs in the community identified by the youth, but many of them come back to violence, gangs, and the damage that is being done by those affiliated with these things.

Practical use of youth-identified needs/asset assessment

Research question two dealt with how results of the youth-centred needs and asset assessment could be used to influence SFD programming for the centre. Administrators saw a chance to use the results of the needs/asset assessment to improve upon their sport programming. Specifically, administrators discussed how to use the identified assets to improve sport and programming, as well as how sport could specifically address the identified challenges. The administrators were collectively impressed with how much information was gleaned from the youth through the photovoice project, and the youth input encouraged them to think differently about their sport programming.

Concerning the use of assets to improve programming, the administrators focused primarily on utilising the asset of *Community Resources*. According to Mr. Paul, the sport programme director, 'We should be partnering with organisations that are in the community. We do already, but we should continue to do that. Partner with the churches, the schools, to recruit.' Mr. Griffin, the executive director, added:

Maybe working with the other parks and things in the neighbourhood, getting those cleaned up so that we can use them, and so that other kids in the community can use them. Even if they don't attend our [centre].

Next, Mr. Griffin spoke to how the centre can use sport to address some of the challenges that were identified through the needs/asset assessments. He explained:

We talked about maybe incorporating some of our other programmes like Positive Actions or Passport to Manhood with sport. And based on what the kids pointed out, Positive Actions would be good for them. It's evidence-based that it helps reduce violent behaviour among kids. Since violence is an issue in this community, then I think we could do that.

In addition, administrators acknowledged the youth perspective in that the youth saw *Education* as an asset, while the administrators would not have identified it as such. In reflecting on this, Mr. Crawford, the board member, talked about using sport as a hook to get kids involved in the education programmes the community centre already offers. He said, 'using sport and having a sport presence can get kids involved and we can reach them through the other programmes that the [centre] offers. The education programmes, and the other ones.'

Finally, administrators talked about the importance of giving youth participants a say in the planning of the programme moving forward. They spoke to how the photovoice process was a good way to involve youth and give them a chance to share their experiences. Mr. Paul shared: 'I think that's part of why this project was so interesting. It's good to give kids a voice and a chance to share their reality.' He further explains:

I think one of the things that I perceive that we don't do enough of is really ... I'll just call it the youth voice. I think as kids grow older, they'll want more input and they should. And I think that we can do more to develop that youth voice. Both in terms of programmes and content that is meaningful to them. I think that's important for developing good programmes, I think it's important for developing self-confidence.

The other administrators agreed with the importance of giving youth a voice. Mr. Griffin concurred:

We can't, or shouldn't tell these kids what they need. They have to tell us. We can't assume that we know. This photo project ... it gave them the opportunity to tell us what they need. What is important to them.

Seemingly, programme administrators saw the benefits of the youth-based needs/asset assessment, in that it gave youth a chance to be involved in the decision making and direction of the community centre.

DISCUSSION

The purpose of the current study was to encourage a more thoughtful inclusion of the youth voice in programme development and reconstruction by examining how administrators of a community centre can utilise the outcomes of a youth-focused needs and asset assessment in sport programme planning and implementation. This study was conceptualised out of the concern for the lack of youth voices involved in the programme development process (Green & Haines, 2015; Hayhurst, 2009), and

the challenge of finding a way to pull deep, rich information from a youth population. The results of the study shed light on what youth participants saw as assets and challenges within the community in which they live. In addition, the results highlight how the administrators who are involved in SFD programming plan to utilise the information provided by youth participants.

Research question one was concerned with determining what youth programme participants view as assets and challenges in the community in which they live. Utilising a photovoice project allowed for information to come forward in various ways. The photovoice strategy seemed to elicit rich, descriptive information from the youth, in that it took them out into their community where they could see and document assets and needs in real-time. Youth took pictures of things that they viewed as positive aspects of their community, as well as things they viewed as challenges, then the researcher led them through discussions around these topics.

Research has suggested that being a part of a photovoice project can give youth an opportunity to think about their community in a way that they had not or could not before (Leung et al., 2017; Strack, Magill, & McDonagh, 2004). The depth and breadth at which the youth were able to discuss the assets and challenges in their community was strong within the photovoice project. Given that photovoice participants had pictures to facilitate the discussion, they were able to talk about the assets and challenges they identified in great detail. This study provides evidence that giving the youth a different, perhaps more creative way to express the assets and needs of their community (photovoice), led to detailed and expressive responses that are very useful to the administrators at the centre. This is consistent with Wang and Burris' original hope of photovoice - that it would 'promote a process of participation that would be analytical, proactive, and empowering' (1994, p. 179). In addition, Hayhurst (2017), in reflecting on two experiences using visual data collection methods such as photovoice, notes that "SDP participants are potentially able to better exert agency and strategically heighten their own voices to key decision-makers" (p. 119). She adds, however, that this is not a solution to unequal power relations or a host of other challenges of SFD, but that it is a method that may be worth further examining in its ability to build collaborations.

Overall, the photovoice initiative resulted in important data from a group often left out of the conversation (youth). In a systematic review of SFD in South Africa, Laureus identified improved youth participation in SFD as a recommendation and remaining need (Laureus, 2019). Similar to Laureus's findings, there is a likelihood that the youth participants in this study have not been asked their input or opinions on community issues in the past. Therefore, by simply being participants and leaders for change, feelings of empowerment may have begun to emerge. As with issues of voice and power among marginalised groups, there is often the slow change that takes place over time. Rowlands discusses these small changes over time among women moving through an empowerment process (things like perceiving themselves as capable, initiating activities, etc.), noting that 'they do not in themselves, however, demonstrate empowerment processes: they demonstrate the product of empowerment processes – the evidence that empowerment has been taking place' (1998, p. 23). It is the hope that the process the youth participated in here helped them view themselves as important players in their community. This is a sentiment expressed by the programme administrators as a potential outcome of the project.

The longer-term impact on the youth themselves, however, is also contingent upon how the data they provided will be used moving forward. If the youth are unable to see change as a direct result of their input, then it is likely that they will continue to operate from a standpoint of internalised oppression. As stated previously, youth do have a voice, but the question is who is giving power to that voice and in what ways, leading into research question two.

The results pertaining to research question two suggest that programme administrators saw the value of the youth-led needs and asset assessment, and they planned to use the information that the youth provided to enhance the centre's sport programming. This finding is consistent with the overall goal of photovoice and other forms of needs and asset assessment, which is to reach programme administrators or policy makers and allow for critical discussion (Hayhurst, 2017; Wang & Burris, 1997; Wang & Pies, 2004; Wang et al., 2004). Additionally, needs and asset assessments should help build community capacity by helping programme coordinators determine how to best use the assets in the community to address the needs (Curtis, 2018). This was clearly the case with programme administrators in this study, as they recognised *Community Resources* and *Tight-Knit Community* were both assets that could be used to address some of the issues with *Violence*, and to improve upon the centre's SFD programming. When asked to consider the information that the youth provided, centre administrators cited some of the pictures that the youth took and how this enhanced their understanding of how the youth view their community. In Hayhurst's work (2017) she found that photovoice helped others better understand a wider range of viewpoints related to SFD, which the administrators seemed to also feel through this project. This further highlights photovoice as an effective needs and asset assessment tool to help guide SFD programming, and speaks to the importance of including youth in the process when programming is being created for them. This could, more broadly, be applied in cases where curriculum is being designed or redesigned. For instance, the Czech physical education curriculum has been criticised as 'not working,' and Petr Vlček (2020) suggested a framework for assessing and improving it, yet it seems only adults are involved in the solution; more thoughtfully including the youth voice in this process could result in findings not uncovered when only involving teachers and administrators in the process.

Finally, empowerment is an essential part of photovoice and other needs and assets assessment techniques, where participants should feel inspired and enabled to effect change in their community (Strack et al., 2004; Wang et al., 2004). While it seems empowerment may have been fostered through the photovoice project by giving youth a chance to share aspects of the community and elements of their lived experience, the impact should be approached cautiously. In critiquing photovoice as a technique, Liebenberg points out many topics for consideration. She notes that, 'concerns add weight to the current critiques of photovoice, underscoring the importance of meaningful collaboration, rigorous research, and skillful sharing of findings in establishing true participant empowerment and meaningful social change' (2018, p. 7). In short, the needs and asset assessment in itself is not what is empowering; it is the short- and long-term changes that result from a project such as this that can result in empowerment among the youth. This is heavily influenced by the programme administrators involved.

Administrators in this study emphasised the importance of giving youth a say in the programming that is directed toward them. This youth voice is essential as more often than not, programme administrators are outsiders to the community and youth community members may offer a different, more nuanced perspective to some issues (Leung et al., 2017). Within SFD needs and asset assessment and programme development, the youth voice has historically been ignored and the perspective of administrators and funders are given preference (Green & Haines, 2015). This case study hopefully sheds light on how youth can be a part of a needs and asset assessment geared toward improving SFD programming in their communities. However, there must be buy in from program administrators in order for this to have an impact, so more work stands to be done on how we can create the environment that values multiple voices in the process.

Limitations

In addition to some of the limitations that exist in nearly any qualitative study or case study (sample size, bias, generalisability), one other potentially impactful limitation was identified. Because programme administrators were aware of the purpose of the study before interviews were conducted, reactivity may have occurred. According to Maxwell (2013), interviewees are often reacting to the interviewer rather than the situation being observed; participants may mislead in an effort to give researchers the answers they think they want. Thus, administrators may have overstated their desire to use the needs and asset assessment in their future planning of centre activities. Maxwell (2013) makes it clear that one cannot fully eliminate the threat of reactivity, thus it is a limitation of this study. Following up with administrators and continued collaboration with the centre will be the only way to truly know the impact of this project. In addition, this study was conducted in the United States, so its generalisability beyond North America is unknown. Given that many SFD programmes operate in the Global South, more work would need to be done to assess its applicability in different geographical settings. Finally, the sample size was small, so differences across age, gender, and racial or ethnic diversity were difficult to tease out. Some of the photovoice projects assessed by others in the SFD space have been all female (Hayhurst et al., 2015; Hayhurst, 2017), so cannot distinguish between the experiences of young men versus women. Some of these demographic differences in response to photo voice would be interesting for further study.

CONCLUSION

The overarching goal of this study was to assess the viability of photovoice as a strategy for giving voice to youth SFD participants. Additionally, there was a focus on finding out how youth-derived data can play a role in the planning process. Centre administrators found great value in the results of the photovoice project. While it has its limitations, photovoice emerged in this study as a viable tool that SFD practitioners and scholars should be using to engage youth in the programme development process, thus empowering the youth well beyond the data they gather. However, we present this as just one example of what can be done to give youth a voice. Finally, it is vital that programme administrators are committed to allowing the youth they serve

to have a voice in the process, otherwise the exercise is futile. With a willing audience, as was the case here, there is the very real possibility that the SFD programme going forward will be altered by what was learned from the youth of the centre. Not only does this result in empowerment among the youth (seeing their ideas in practice), but also creates a more appropriate and hopefully successful SFD programme overall, that is sure to connect with the youth of the community.

REFERENCES

- Altschuld, J. W., Hsin-Ling, H., & YiFang, L. (2014). "Needs Assessment and Asset/Capacity Building: A Promising Development in Practice." *New Directions for Evaluation*, 144, 89–103.
- Blevins, M. E. (2017). *Exploring Grades 3–8 Principals' Beliefs about the New TNReady Standards: An Assets or Deficits Perspective?* Ph.D. dissertation, University of Tennessee.
- Burnett, C. (2008). Participatory Action Research in Monitoring and Evaluation of Sport-for-Development Programmes. *African Journal for Physical Health Education, Recreation and Dance*, 14(3), 225–239.
- Burnett, C. (2015). Assessing the Sociology of Sport: On Sport for Development and Peace. *International Review for the Sociology of Sport*, 50(4–5), 385–390.
- Coalter, F. (2007). *A Wider Social Role for Sport: Who's Keeping Score?* London, UK: Routledge.
- Collison, H., & Marchesseault, D. (2018). Finding the Missing Voices of Sport for Development and Peace (SDP): Using a 'Participatory Social Interaction Research' Methodology and Anthropological Perspectives within African Developing Countries. *Sport in Society*, 21(2), 226–242.
- Costa, S. M., & Serrano-García, I. (1983). Needs Assessment and Community Development: An Ideological Perspective. *Prevention in Human Services*, 2(4), 75–88.
- Cox, K. (2006). Investigating the Impact of Strength-Based Assessment on Youth with Emotional or Behavioral Disorders. *Journal of Child and Family Studies*, 15(3), 278–292.
- Creswell, J. W., & Poth, Ch. N. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Thousand Oaks, CA: Sage Publications.
- Curtis, Ch. A. (2018). Enhancing Global Citizenship through Service Learning: Implications for Capacity Building with Youth. *Journal of Community Engagement and Scholarship*, 11(1), 38–46.
- Darnell, S. C. (2007). Playing with Race: Right to Play and Production of Whiteness in 'Development through Sport'. *Sport in Society*, 10(4), 560–579.
- Darnell, S. C. (2012). *Sport for Development and Peace: A Critical Sociology*. London, UK: Bloomsbury.
- Dassah, E., Aldersey, H. M., & Norman, K. E. (2017). Photovoice and Persons with Physical Disabilities: A Scoping Review of the Literature. *Qualitative Health Research*, 27(9), 1412–1422.
- Delgado, M., & Humm-Delgado, D. (2013). *Asset Assessment and Community Social Work Practice*. New York, NY: Oxford University Press.
- Dubnewick, M., Hopper, T., Spence, J. C., & McHugh, T. L. F. (2018). There's a Cultural Pride through our Games: Enhancing the Sport Experiences of Indigenous Youth in Canada through Participation in Traditional Games. *Journal of Sport and Social Issues*, 42(4), 207–226.
- Edwards, M. B. (2015). The Role of Sport in Community Capacity Building: An Examination of Sport for Development Research and Practice. *Sport Management Review*, 18(1), 6–19.
- Giles, A. R., & Lynch, M. (2012). Postcolonial and Feminist Critiques of Sport for Development. In: *Sport for Development, Peace and Social Justice*, edited by R. J. Schinke & S. J. Hanrahan, 89–104. Morgantown, WV: Fitness Information Technology.

- Green, G. P., & Haines, A. (2015). *Asset Building & Community Development*. Thousand Oaks, CA: Sage Publications.
- Halsall, T. G., & Forneris, T. (2016). Behind the Scenes of Youth-Led Community Events: A Participatory Evaluation Approach using Photovoice in a Canadian First Nation Community. *Youth Engagement and Health Promotion*, 1(2), 1–40.
- Hayhurst, L. M. C. (2009). The Power to Shape Policy: Charting Sport for Development and Peace Policy Discourses. *International Journal of Sport Policy and Politics*, 1(12), 203–227.
- Hayhurst, L. M. C. (2017). Image-ining resistance: Using participatory action research and visual methods in sport for development and peace. *Third World Thematics: A TWQ Journal*, 2(1), 117–140.
- Hayhurst, L. M. C., Giles, A. R., Radforth, W. M., & The Vancouver Aboriginal Friendship Centre Society (2015). ‘I want to come here to prove them wrong’: Using a post-colonial feminist participatory action research (PFPAR) approach to studying sport, gender and development programmes for urban indigenous young women. *Sport in Society*, 18(8), 952–967.
- Hayhurst, L. M. C., Giles, A. R., & Wright, J. (2016). Biopedagogies and indigenous knowledge: examining sport for development and peace for urban indigenous young women in Canada and Australia. *Sport Education and Society*, 21(4), 549–569.
- Hudson, B. W., Spence, J. C., & McHugh, T. L. F. (2020). An Exploration of the Physical Activity Experiences of Northern Aboriginal Youth: A Community-Based Participatory Research Project. *Qualitative Research in Sport, Exercise and Health*, 12(1), 108–124.
- Kidd, B. (2008). A New Social Movement: Sport for Development and Peace. *Sport in Society*, 11(4), 370–380.
- Kretzmann, J. P., & McKnight, J. L. (1993). *Building Communities from the Inside Out: A Path toward Finding and Mobilizing a Community's Assets*. Chicago, IL: ACTA Publications.
- Laureus Sport for Good South Africa (2019). *Sport for Development: South Africa Road to Evidence*. Cape Town, South Africa: Laureus Sport for Good.
- LeCrom, C. W., & Dwyer, B. (2015). From Evaluator to Insider: An Academic's Guide to Managing Sport for Development Programmes. *Sport in Society*, 18(6), 652–668.
- Lenneis, V., Agergaard, S., & Evans, A. B. (2020). Women-only Swimming as a Space of Belonging. *Qualitative Research in Sport, Exercise and Health AOP*, 1–16.
- Leung, M. M., Agaronov, A., Entwistle, T., Harry, L., Sharkey-Buckley, J., & Freudenberg, N. (2017). Voices through Cameras: Using Photovoice to Explore Food Justice Issues with Minority Youth in East Harlem, New York. *Health Promotion Practice*, 18(2), 211–220.
- Levermore, R., & Beacom, A., eds. (2012). *Sport and International Development*. New York, NY: Palgrave MacMillan.
- Liebenberg, L. (2018). Thinking Critically about Photovoice: Achieving Empowerment and Social Change. *International Journal of Qualitative Methods*, 17(1), 1–9.
- Lindloff, T. R., & Taylor, B. C. (2011). *Qualitative Communication Research Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Lyras, A., & Peachey, J. W. (2011). Integrating Sport-for-Development Theory and Praxis. *Sport Management Review*, 14(4), 311–326.
- Maxwell, J. A. (2013). *Qualitative Research Design: An Interactive Approach* (3rd ed.). Thousand Oaks, CA: Sage.
- McHugh, T. L. F., Holt, N. L., & Andersen, Ch. (2015). Community-Based Sport Research with Indigenous Youth. *New Perspectives in Physical Education Sport and Recreation*, 28, 219–224.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: Sage Publications.
- National Center for Children in Poverty (2016). *Virginia Demographics of Low-income Children*. Retrieved from: http://www.nccp.org/profiles/VA_profile_6.html.

- Nicholls, S., Giles, A. R., & Sethna, Ch. (2011). Perpetuating the 'Lack of Evidence' Discourse in Sport for Development: Privileged Voices, Unheard Stories and Subjugated Knowledge. *International Review for the Sociology of Sport*, 46, 249–264.
- Novek, S., & Menec, V. H. (2014). Older Adults' Perceptions of Age-Friendly Communities in Canada: A Photovoice Study. *Aging & Society*, 34(6), 1052–1072.
- Onwuegbuzie, A. J., & Collins, K. M. (2007). A Typology of Mixed Methods Sampling Designs in Social Science Research. *Qualitative Report*, 12(2), 281–316.
- Overmars-Marx, T., Thomése, F., & Moonen, X. (2018). Photovoice in Research Involving People with Intellectual Disabilities: A Guided Photovoice Approach as an Alternative. *Journal of Applied Research in Intellectual Disabilities*, 31(1), 92–104.
- Patton, M. Q. (2002). Two Decades of Developments in Qualitative Inquiry: A Personal, Experiential Perspective. *Qualitative Social Work*, 1(3), 261–283.
- Platt, A. (2016). *Sustainable Livelihood Community Level Assessment of Wayanad, Kerala*. Master's thesis, Tufts University.
- Rowlands, J. (1998). A Word of the Times, but What Does it Mean? Empowerment in the Discourse and Practice of Development. In: *Women and Empowerment: Illustrations from the Third World*, edited by H. Afshar, 11–34. Hampshire, England: MacMillan Press Ltd.
- Schulenkorf, N. (2012). Sustainable Community Development through Sport and Events: A Conceptual Framework for Sport-for-Development Projects. *Sport Management Review*, 15(1), 1–12.
- Spaaij, R., Schulenkorf, N., Jeanes, R., & Oxford, S. (2018). Participatory Research in Sport-for-Development: Complexities, Experiences and (Missed) Opportunities. *Sport Management Review*, 21(1), 25–37.
- Steward-Withers, R., & Brook, M. (2009). *Sports as a Vehicle for Development: The Influence of Rugby League in/on the Pacific*. Development Studies 3, Palmerston North, N. Z.: Massey University. Institute of Development Studies. <http://hdl.handle.net/10179/1070>.
- Strack, R. W., Magill, C., & McDonagh, K. (2004). Engaging Youth through Photovoice. *Health Promotion Practice*, 5(1), 49–58.
- Svensson, P. G., & Woods, H. (2017). A Systematic Overview of Sport for Development and Peace Organisations. *Journal of Sport for Development*, 5(9), 36–48.
- Van Manen, S., Avard, G., & Martinez-Cruz, M. (2015). Co-Ideation of Disaster Preparedness Strategies through a Participatory Design Approach: Challenges and Opportunities Experienced at Turrialba Volcano, Costa Rica. *Design Studies*, 40, 218–245.
- Vlček, P. (2020). A quality framework for assessing the designed curriculum - a basis for the Czech PE curriculum revision. *AUC Kinanthropologica*, 56(1), 47–55.
- Wang, C. C. (2006). Youth Participation in Photovoice as a Strategy for community Change. *Journal of Community Practice*, 14(1–2), 147–161.
- Wang, C. C., & Burris, M. A. (1997). Photovoice: Concept, Methodology, and Use for Participatory Needs Assessment. *Health Education & Behavior*, 24(3), 369–387.
- Wang, C. C., Morrel-Samuels, S., & Hutchinson, P. M. (2004). Flint Photovoice: Community Building among Youths, Adults, and Policymakers. *American Journal of Public Health*, 94(6), 911–913.
- Wang, C. C., & Pies, Ch. A. (2004). Family, Maternal, and Child Health through Photovoice. *Maternal and Child Health Journal*, 8(2), 95–102.
- Wright, B. A., & Lopez, S. J. (2002). Widening the Diagnostic Focus: A Case for Including Human Strengths and Environmental Resources. In: *Handbook of Positive Psychology*, edited by C. R. Synder & S. J. Lopez, 26–44. New York, NY: Oxford Publications.
- Yankeelov, P. A., Faul, A. C., D'Ambrosio, J. G., Collins, W. L., & Gordon, B. (2015). "Another Day in Paradise": A Photovoice Journey of Rural Older Adults Living with Diabetes. *Journal of Applied Gerontology*, 34(2), 199–218.

Zimmerman, E., Haley, A., Walker, A., Woolf, S., Nguyen, K., Shue, W., Kelley, L., Hellman, J., & Chapman, D. (2016). Health Equity in Richmond, Virginia. *Center on Society and Health Report*. <http://societyhealth.vcu.edu/media/society-health/pdf/RVAHealthEquityFINAL.pdf>.

APPENDIX A

Programme administrators interview guide

1. Describe your current sport programming.
2. What do you see as the assets and barriers to physical activity and sport participation in the community?
3. What do you see as (general) positive attributes of this community?
 - a. How do you know/how did you draw this conclusion?
4. What are some (general) shortcomings of this community?
 - a. How do you know/how did you draw this conclusion?
5. What is the biggest need in this community?
6. Has your perception of the challenges and assets of the community guided your sport programming? How?
7. After seeing and hearing the perspective of the youth, how (if at all) have your perception of the assets and barriers in the community changed?
8. What was your reaction to seeing (via photovoice photos) what the kids believed to be the challenges and barriers in their community?
9. Discuss the benefits of hearing/seeing the youth's perspective of the challenges and assets in their community.
10. How might you use the youth-identified assets to inform future centre sport programming?
11. How might you use the youth-identified barriers/challenges/ shortcomings to inform future centre sport programming?

Space for self-expression: communication of Czech female athletes on social media and fans' reactions

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ABSTRACT

Social media platforms allow athletes to share information with the public. This opportunity is arguably more important for female athletes who traditionally receive less space in the mainstream media than their male counterparts. This article focuses on the social media self-presentation of six successful, internationally recognized, professional Czech female athletes and their fans' reactions. By using qualitative and quantitative content analyses, it was revealed that throughout the season, the selected athletes presented themselves as powerful professionals, while their off-season posting tended to be more personal and, for the most part, more feminine. Contrary to previous research, fans did not frequently respond with explicitly sexual or negative comments. Moreover, they supported and admired the athletes, and in most cases, reacted positively. A higher sensitivity was indicated in relation to the sportswomen's personal relationships and opinions. This leads us to the conclusion that social media enables professional female athletes to present themselves more freely than traditional media and be positively received by the public.

KEYWORDS

Facebook; sport; gender; presentation; content analysis

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INTRODUCTION

It has been noted that traditional media gives more coverage to male athletes (Jakubowska, 2015; Vann, 2014). Female athletes have appeared less often in the traditional media, and the portrayal has supported the stereotypical hegemonic masculinity view (Billings et al., 2018). Journalists have also paid less attention to the sport disciplines in which women dominate, as for example rhythmic gymnastics or synchronized swimming (Jakubowska, 2015).

Currently, female athletes have the opportunity to “balance the force ratio” by using social media and share their content directly with their audience, without journalists

transforming it into any kind of stereotyped coverage (Toffoletti & Thorpe, 2018). Social media provides a platform for promoting athletic achievements and personal opinions and sharing the pieces of (private) everyday life that athletes themselves want to show to the public. This “exclusive” social media content is commonly sought and appreciated by fans, who often react positively to the athletes’ posts (Bruce, 2016; Smith & Sanderson, 2015).

Unfortunately, the online environment has not been flooded solely by positive responses, but also by extremely harsh and critical remarks from so-called fans, who have been termed “haters” – people who systematically rather than rationally criticize others, especially in the Internet environment (Dawson, 2018). The negative social media communication between athletes and their followers is often triggered by the possibility of direct interaction. Negative comments and reactions addressed to athletes through social media can adversely affect both the career growth and personal lives of the athletes targeted (Woodman & Hardy, 2003). The availability of anonymous social media accounts demonstrably increases the level and intensity of hate speech (Dawson, 2018; Mondal et al., 2017). Moreover, the level of stress caused by micro-aggressive behavior or trolling by the public and fans in the social media environment can be even higher in the cases of female athletes (Woodman & Hardy, 2003). Despite the aforementioned risks, social media communication represents a powerful and beneficial tool and should not be omitted by female athletes, as the results of this research show.

The study focuses on the communication of professional Czech female athletes on their official Facebook pages: track and field athlete Zuzana Hejnová, tennis players Petra Kvitová and Karolína Plíšková, skier and snowboarder Ester Ledecká, snowboarder Eva Samková and speed skater Martina Sáblíková. The ambition of this article is to analyze the communication strategies or approaches used by these six famous female athletes and the tone and manner of fans’ reactions in the social media environment. Quantitative and qualitative content analysis methods were employed (Riffe et al., 2005; White & Marsh, 2016), and all of the athletes’ posts and fans’ reactions from July 2018 to December 2019 were coded. This extensive period allowed us to cover both the in-season and off-season as well as providing sufficient analytic material for capturing possible trends in their communication. The primary aim of this article was to discover whether the processes and findings described in American and Western European athletes’ social media analyses are applicable to athletes from Central Europe, since analyses from this region have been considerably neglected.

All the aforementioned sportswomen compete at the international level and have been globally successful in the long-term; hence their audiences consist of both Czech and English speakers. The athletes post in both languages, even though the combination of the languages varies depending on the individual personality. Naturally, the different audiences use various languages to express their opinions on the social media channels of the selected athletes. Because of this situation, we were also interested in learning if there was any difference between the Czech and foreign language comments.

FEMALE ATHLETES AND SOCIAL MEDIA

In a broad sense, social media are represented by various Web 2.0 forms, e.g., blogs, user-generated sites, online sites to share video and pictures, and podcasts. Fuchs

(2017) noted that the later forms of social media which support: communication, collaboration, content sharing, and encourage building virtual communities, have greater impact and are nowadays used more frequently. Examples of these modern social media are, i.e., Facebook, Twitter, Instagram, and YouTube (Fuchs, 2017). Facebook is the most commonly used social media worldwide, as well as in the Czech environment (Statista.com, 2020). Among others, sports reporters also favor Facebook and Twitter in comparison with other social media channels as sources of information (Sheffer & Schultz, 2015). Some of the most followed and liked profiles on Facebook are the accounts of popular athletes (Trackalytics.com, 2020). As athletes become celebrities, they step into the public sphere and literally share their lives with their admirers, giving fans a feeling of closeness (Weiss, 1996).

As previously mentioned, many authors have written about the fact that more coverage is given to male athletes in traditional media from the quantitative as well as the qualitative perspective (Fink, 2015; Jakubowska, 2015; Vann, 2014). Hardin (2005) remarked that sport was the domain of men in the past, and this stereotype persists. Female athletes gain press attention most commonly when they are visually attractive or significantly more successful than their male counterparts (Jakubowska, 2015). In this context, social media represents an opportunity for female athletes to present themselves in the ways they desire. Specifically, they can express their opinions and feelings to the wider public through these platforms without any kind of mediatization or outside influence. On the other hand, the social media environment remains a threat, especially concerning mental health. For example, the negative or rude fan reactions can stress the athletes and negatively affect the female athletes' performance. It has also been known to cause depression (BBC.com, 2020; Kubištová, 2020).

Existing research focusing on female athletes' self-presentation on social media has reported various results. For example, Emmons and Mocarski (2014) claimed that female athletes were more likely to pose for photos while male athletes are captured during a performance; hence the men are more often in motion and looking away from the camera. In contrast to this, Smith and Sanderson (2015) argued that female athletes nowadays present themselves more frequently as active women, posting photos taken during training or competition.

Differences have been discovered in the way female and male athletes use social media for promotional purposes (Voráček & Čáslavová, 2019). Among others, Lebel and Danylchuk (2012) noted that female athletes could promote a wider range of brands and products than male athletes.

Overall, Hagay and Bernstein (2019a) provided a typology of female athletes' social media presence. Despite research concentrated specifically on Instagram, their findings are also applicable to other platforms, i.e., Facebook. The authors stated that the style of presentation could be influenced, for example, by age or an athlete's identity, and they distinguished three types of self-presentation by female athletes. "Professional athletes" mainly post photos of training and competitions, whereas "human athletes" provide fans not only with sports content but also insight into their personal lives. "Pro Instagram" athletes usually arise from the younger generation who use social media on a regular basis. Among others, they "participate and initiate joyful 'challenges', upload social photos and use emojis to accompany the photos," (Hagay & Bernstein, 2019b, p. 71).

Since the nature of social media helps to reduce physical barriers between athletes and their fans, and facilitates engagement between them, many passive media consumers have become content creators and contributors, so-called producers (Jenkins, 2006). Putting these changes into the context of the study, the visitors of athletes' social media pages can contribute to the content and create an important part of the publicly visible content on those pages. Overall, social media represents a powerful and useful tool, not only for athletes' self-promotion, but also for sharing their opinions and sponsors' promotion (Smith & Sanderson, 2015; Toffoletti & Thorpe, 2018). These new forms of media make it simple for athletes to strengthen relationships with their fans all around the world (Wann & James, 2019).

Fans' responses to the published content are both positive and negative. Positive reactions from fans are often expressed through emojis. The visuality of the characters guarantees easier transfer of emotions than would be described by words (Danesi, 2017). Authors dealing with the topic of critical comments addressed to both male and female athletes revealed that their audience often criticized sports performance and results (Browning & Sanderson, 2012; Franck & Nüesch, 2012). In the case of female athletes, more critical voices were centered on physical appearance, such as an athlete's weight (Mutz & Meier, 2016) or lack of femininity (Cooky & Dworkin, 2013). Other problematic issues were sexual orientation (Hardin & LaVoi, 2013) and an excessive amount of commercial content (Walsh et al., 2013). Discussions on lack of femininity were reported, for example, in the case of South-African runner Caster Semenya (Cooky & Dworkin, 2013). Sanderson (2013) noted that hateful comments on social media could be caused by individual intentions or community movement, when the group of people jointly criticize similar things or behavior.

Moreover, female sports celebrities particularly deal with trolling, which can be described as an intentional impolite or aggressive behavior and manipulation, evoking conflict; hence the common purpose is to make fun of the actual person or provoke them (Lumsden & Morgan, 2012, Ortiz, 2020). Although the gender of "trolls" could not be predicted, they often present, or even identify themselves, as men (Bishop, 2014; Lumsden & Morgan, 2012). Additionally, Lumsden and Morgan (2012) highlighted that the victims of trolling are often women. Trolling as a form of bullying is also observable in computer-mediated communication and declared on celebrities' Facebook pages (Ortiz, 2020), and in more extreme instances, stalking was evidenced. Whereas trolling mostly focuses on a wide social group, stalking is more personally oriented. Cyberstalking includes ongoing visiting and observation of particular pages and can also be associated with repeated annoying comments published under the selected peoples' posts. Stalkers tend to read and react to each post (Antonini et al., 2019). Therefore, athletes must block the offending fans and followers.

RESEARCH AIM

The main objective of this research was to analyze the communication approaches used by six famous Czech female professional athletes and the tone and manner of fans' reactions in the social media environment.

METHODS

To characterize female athletes' communication on social media, the official Facebook pages of six professional Czech female athletes (all of them competing in Olympic disciplines, three of them summer and three of them winter sports representatives) were chosen for analysis. Facebook as a platform was selected due to its popularity and wide use (Statista.com, 2020). The selected athletes have been successful and popular at the international level and their official Facebook pages have more than forty thousand fans and followers. The selected athletes represent two generations, Martina Sáblíková, Zuzana Hejnová and Petra Kvitová being in their thirties and Ester Ledecká, Eva Samková and Karolína Plíšková in their twenties. All of the selected athletes, except Track & Field representative Zuzana Hejnová, are currently significantly more successful in their sports disciplines than their Czech male counterparts (cf. Zlatkovský & Kočí, 2018).

Zuzana Hejnová is a track and field athlete who specializes in the 400m hurdles. She has held the World Championship title in this discipline twice (in 2013 and 2015). In the same years, she also won the Diamond League. Additionally, she is a bronze medalist from the London 2012 Summer Olympics and a national record holder (Hejnova.cz, 2020). Petra Kvitová and Karolína Plíšková are tennis players and long-time members of the WTA Top 10. Kvitová has won Wimbledon two times, and in 2016 she won bronze at the Rio de Janeiro Olympics (Olympic.cz, 2018b). In December 2016, Kvitová was attacked by a man with a knife in her flat which resulted in her undergoing surgery on her left hand. However, she overcame these obstacles and returned to the top of the standings (Kvitová, 2020). Karolína Plíšková has been a part of the WTA Top 10 since 2016. She was also the first Czech female tennis player to be ranked number 1 in the world by the WTA (Karolina-pliskova.com, 2020).

Ester Ledecká, Eva Samková and Martina Sáblíková are winter sports representatives. Ledecká is an alpine skier and snowboarder who became the first Olympian to win two gold medals in both alpine skiing and alpine snowboarding in PyeongChang in 2018 (Ledecká, 2020). Eva Samková is a snowboard cross rider who won the Sochi 2014 Olympic Games and placed third at the PyeongChang 2018 Winter Olympics in her discipline (Evasamkova.cz, 2014). Samková also achieved victory in the World Cup series in 2017 and 2019 and placed second at the X Games in snowboard cross two times (RedBull.com, 2020). Martina Sáblíková is a world speed skating celebrity; she specializes in long distance. She has attended four Olympic Games and won six Olympic medals, including three golds. Moreover, she is also a multiple World and European medalist and winner of World Cup standings (Nutrend.cz, 2020; Olympic.cz, 2018a).

The official Facebook pages of the selected female athletes in the observation period were managed both by themselves and by professionals. Eva Samková administered the Facebook page on her own; hence she had some social media training (Samková, WhatsApp communication, March 31, 2020). Zuzana Hejnová consulted with her manager Alexandr Kliment regarding social media content, especially in the case of promotional and commercial posts (Hejnová, personal communication, February 18, 2020). Petra Kvitová managed her social media profiles in collaboration with her spokesperson Karel Tejkal, and PR manager Katie Spellmann (Tejkal, personal communication, November 8, 2019). Karolína Plíšková's Facebook page was admin-

istered by her manager and husband Michal Hrdlička (Hrdlička, personal communication, February 26, 2020). The social media content on Ester Ledecká's accounts were created and posted by Ledecká's team and monitored by SportInvest agency. The same agency helped Martina Sáblíková with social media postings (Pillár, personal communication, November 5, 2019).

Table 1 displays the athletes' names, sports disciplines and numbers of fans and followers of their official Facebook pages in the observation period. The data are also complemented by total numbers of likes, shares and comments of all posts published on the selected athletes' Facebook pages from June 2018 to December 2019.

Table 1 Selected Athletes' Names, Disciplines, FB Page Creation Dates and Data Derived from their Official Facebook Pages

Athlete's Name and Discipline	FB Page Creation Date	N of Page Likes	N of Page Followers	N of Likes (06/2018–12/2019)	N of Shares (06/2018–12/2019)	N of Comments (06/2018–12/2019)
Petra Kvitová (Tennis)	July 20, 2011	652,470	643,833	463,975	8,276	23,111
Martina Sáblíková (Speed Skating)	February 9, 2009	314,972	303,478	441,959	14,988	16,473
Eva Samková (Snowboarding)	November 29, 2011	189,246	187,851	129,115	1,426	2,021
Ester Ledecká (Alpine Skiing & Snowboarding)	February 7, 2012	155,740	166,476	439,039	8,028	10,222
Karolína Plíšková (Tennis)	April 15, 2015	116,634	119,084	329,973	4,802	12,362
Zuzana Hejnová (Track & Field)	March 22, 2013	40,134	40,120	56,656	552	2,958

The research was conducted using methods of quantitative and qualitative content analysis (Riffe et al., 2005; White & Marsh, 2016), and all of the athletes' posts and fans' reactions for a period of one and half years, from July 2018 to December 2019, were coded. The qualitative content analysis played an essential part in the research, because the emphasis was placed both on the way various topics were presented by the sampled athletes and the type of fans' reactions. In total, we categorized the topic (sport or diversity) and other items of 988 posts and went through more than 67,000 comments under the content published by the athletes.

The following main research questions were formulated:

RQ1: How do the professional Czech female athletes present themselves on their official Facebook pages?

RQ2: What are the fan reactions to posts which are published on the official Facebook pages of the selected professional Czech female athletes?

At first, we focused on the topic of athletes' posts, deciding whether each post was sports-oriented or covered diverse areas. Sports posts referred to the sport in general, the sports discipline, or sports events and training routines, while diverse content

covered other fields, e.g., free time activities, family and friends, pop culture or politics (Hambrick & Mahoney, 2011; Guerin & Clavio, 2015). The presence of interactive content, such as pictures, videos was also taken into account.

Secondly, we studied fans' reactions. We recorded the number of likes, comments and shares under each post (Ozanne et al., 2017). Another categorized item was the prevailing tone of comments under the post: a mostly positive, mostly negative, or neutral tone of the discussion. Positive comments included clearly positive reactions and supportive messages; neutral comments were not clearly negative or positive, unidentifiable or ambivalent reactions; and negative comments were defined as critical, offensive, rude or vulgar statements. The tone of the comments under the post were classified as mostly positive when the number of positive comments outnumbered the negative comments. The mostly negative posts were those where the critical reactions were more prevalent. If the ratio of positive and negative fans' reactions was equal, the tone of the comments was categorized as neutral. The quantitative content analysis categories used for this article are specified in Table 2.

Table 2 The quantitative content analysis categories

Variable	Values
Language of post	Czech
	English
	Both/ Without text/ Emoticons only
	Other
Seasonality	In the season
	Off-season
Shares	N of shares of post
Likes	N of likes of post
Comments	N of comments of post
Type of comments	Neutral comments
	Mostly positive comments
	Mostly negative comments
Picture(s)	The post does not contain picture(s)
	The post contains picture(s)
Video(s)	The post does not contain video(s)
	The post contains video(s)
Topic of the post	Sport
	Diversity

The data were coded by three independent human coders. The data was processed manually because the need to assign meaning to the posts was essential (Burch et al., 2014). The reliability of the process (stability and reproducibility) was ensured. Reproducibility was checked; hence both percent agreement as well as Krippendorff's Alpha

took values confirming the reliability and validity of the coding process (Lombard et al., 2002). Then, the coders also discussed the indefinite cases at project meetings, and the stability was reviewed (Riffe et al., 2005). For the coding and data processing online electronic forms (Google Xls Sheets) and MS Excel and SPSS Statistics programs were used (cf. Skalski et al., 2017).

The results of the qualitative content analysis allowed us to describe and compare the selected female athletes' social media presentation. For a deeper understanding and explanation of the athletes' posting, a qualitative approach was employed. As a result of the comprehensive and detailed qualitative content analysis, the authors were able to detect the similarities and differences in the selected female athletes' official Facebook content in the observation period. Analysis was conducted on both the textual and non-textual (e.g. visual, audiovisual and interactive) components of the communication of the selected female athletes on their official Facebook pages.

The qualitative approach also allowed the researchers to detect the positive and supportive statements, as well as negative and critical fans' statements, including trolling. Thus, all the comments were studied, and their manners and meanings were analyzed.

RESULTS

The results of the research were divided into two main subchapters: the athletes' postings and the fans' reactions. The section dedicated to the athletes' postings begins with describing the intensity of the selected athletes' Facebook communication. After that, their sports-related and diverse postings are presented and contextualized. The second part has a similar structure regarding the fans' reactions. First, the numbers and types of fans' and followers' reactions to selected athletes' communications in the observation period are summarized and compared. Secondly, consideration is given to the reactions to sports-related posts. Finally, the reactions to diverse posts are described and explained.

Athletes' posting

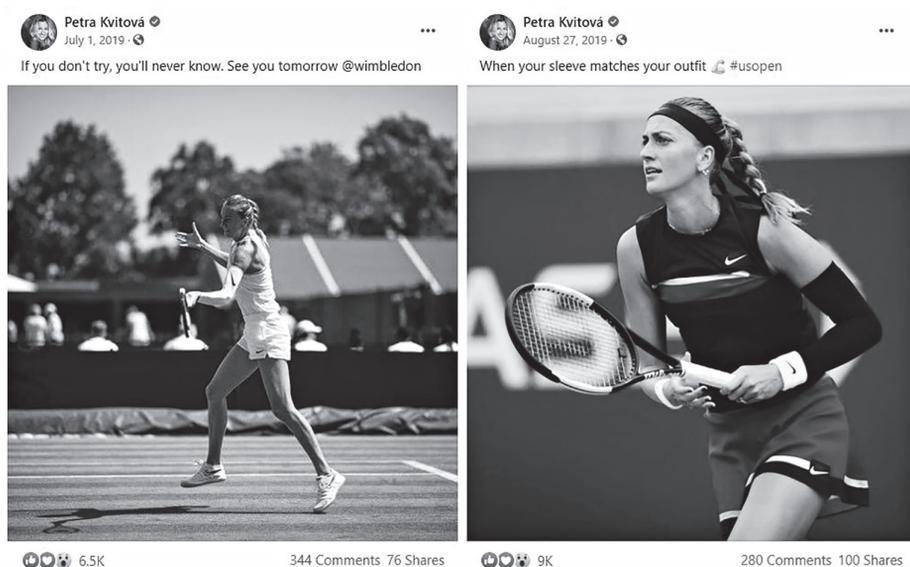
All of the sampled athletes covered sports and diverse topics on their official Facebook pages in the observation period; however the ratio of these categories differed. Sports-related posts prevailed on the pages of Petra Kvitová, Karolína Plíšková and Martina Sáblíková, whereas diverse posts appeared more often on Ester Ledecká's, Eva Samková's and Zuzana Hejnová's official Facebook pages (Table 3). These results could be affected by the observation period; different lengths of season and off-season periods of the selected athlete's sports disciplines took place from July 2018 to December 2019.

Sports-related posting

Sport makes up a significant part of all of the selected athletes' lives, it is their job and fills their free time. Nevertheless, only three official Facebook pages of the sampled sports-women were predominantly sports-oriented. The typical social media profile of a female athlete where sport dominates (Hagay & Bernstein, 2019a) was that of the tennis player Petra Kvitová. The posts (displayed in Figure 1) show the athlete during the training process or at tournaments, and they are tightly connected to sports performance.

Table 3 Total number of sports-related and diverse posts analyzed in the observation period

Athlete's Name and Discipline	N of Analyzed Posts	N of Sports Posts	N of Diverse Posts
Zuzana Hejnová (Track & Field)	127	59	68
Petra Kvitová (Tennis)	171	91	80
Ester Ledecká (Alpine Skiing & Snowboarding)	230	85	145
Karolína Plíšková (Tennis)	210	128	82
Eva Samková (Snowboarding)	133	34	99
Martina Sáblíková (Speed Skating)	127	81	46
Total N of Posts	998	478	520

**Figure 1** Two representative posts from the Facebook page of Petra Kvitová (July 1, 2019 and August 27, 2019).

Similar posts appeared on the Facebook pages of Karolína Plíšková and Martina Sáblíková, whose pages were also predominantly sports-oriented during the observation period. Among the aforementioned posts topics including training and competition, invitations to upcoming races and events could be found on athletes' Facebook Walls. For example, Martina Sáblíková announced the races where she had competed and let her own fans know on which TV channel the race had been broadcast (Figure 2).

Sports-related posts were also used for commercial purposes, as some of the sampled female athletes were involved in social media paid partnerships. Karolína Plíšková connected this type of partnership with sports-related content, as displayed in Figure 3. All other athletes in our sample presented advertisements directly with the given products or through photos from everyday life.



Figure 2 The example of a competition announcement from the Facebook page of Martina Sáblíková (December 5, 2019). Translation of the post: Tomorrow in Kazakhstan! 🇰🇿 The first 5 km race of the season awaits me, so watch it on ČT sport, Nikola Zdráhalová will also compete! 😊

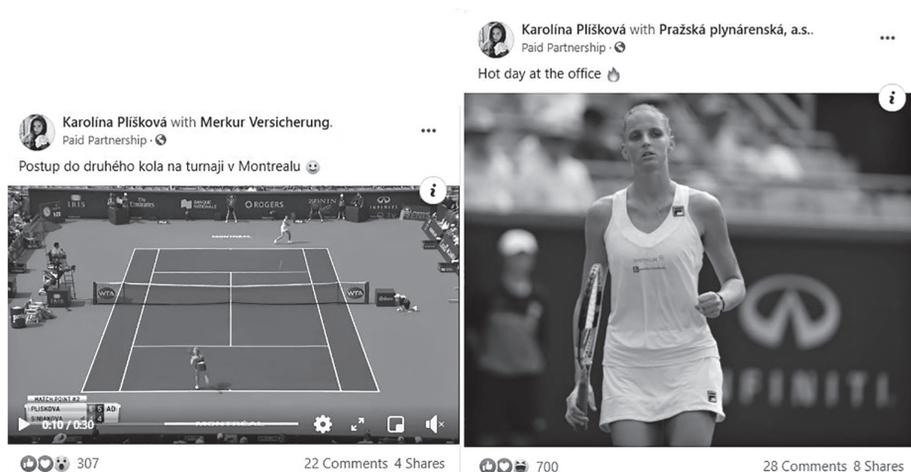


Figure 3 Examples of paid partnership connected with sports content on Karolína Plíšková's Facebook page (August 7, 2018). Translation of the post on the left: Advance to the second round of the tournament in Montreal 😊

While talking about sports-related videos on selected athletes' Facebook pages, the videos were shot by the media or sponsors and then the athletes posted them. The official Facebook page was also a space for self-promotion and sharing of articles and reports about successes at competitions.

Diverse posting

Throughout the observation period, all of the sampled athletes published significant numbers of posts to their official Facebook pages which were classified into the diverse



Figure 4 Posts from the Facebook pages of Petra Kvitová (August 2, 2019) and Karolína Plíšková (September 5, 2019).



Figure 5 Example of a post from the diverse category of posts from the Facebook pages of Zuzana Hejnová (October 14, 2019) and Karolína Plíšková (July 21, 2019).

category. When sportswomen added posts with photos from their private life, they tried to look more feminine than on directly sports-related pictures. On the other hand, the published photos had no sexual undertone, as confirmed by posts of Petra Kvitová or Karolína Plíšková (Figure 4).

As Kong and Harris (2015) argue, the sportswomen's bodies often meet the ideal of kalokagathia. Therefore, many athletes like to show the positive effect participating in sport has had on their bodies and pose in swimsuits. These pictures were also present in the posts of the athletes we sampled, whether it was spending a holiday in a swimsuit (Figure 5) or a challenge in the form of winter hardening in cold water.

The clearest example of an athlete whose posts were not predominantly oriented towards sports competitions and results was snowboarder and skier Ester Ledeck. She shared glimpses of ordinary life on her Wall and exemplifies the new generation of female athletes' approach to social media, her communication being more inventive. Ledeck has been very popular, and she likes to make jokes about herself and other people as evident in Figure 6 which shows how Ledeck created a funny contrast using two consecutive posts.



Figure 6 Posts from the Facebook page of Ester Ledeck (August 10, 2019 and August 12, 2019).



Figure 7 Typical posts with a diversity of content from the Facebook pages of Eva Samkov (November 3, 2019 and August 8, 2019).

Translation of the post on the right: Relax, swimming and dogs! #doma @honorczsk #HONOR20 #HONOR20series #selfcamera32MP



Figure 8 Karolína Plíšková and her husband Michal Hrdlička on Plíšková's Facebook page (August 18, 2019 and October 23, 2019).

Czech skier and snowboarder is the Facebook version of Hagay's and Bernstein's (2019) "pro Instagram" athlete. Since, on social media, private content is frequently valued more than information about the followed person's professional life (Ozanne et al., 2017), Ledecká's most liked post (13,373 likes and 566 comments) was not about sport, but rather a post about the successful completion of her BA studies. Like Ester Ledecká, Eva Samková gave fans a glimpse into her private life. The Czech snowboarder showed her interests, how she spent her free time and has been well regarded for her relaxed lifestyle and presentation (Figure 7).

Karolína Plíšková is the only one of our sample of sportswomen who showed a partner on her Facebook page. The former presenter of sports news is not only her husband but also her manager, and he has attended tournaments with Plíšková all over the world. He often appeared in the pictures published on her page, usually sharing a private moment with his wife (Figure 8).

Commercial or self-promotional content¹ was present in all of the posts categorized as diverse in the analyzed athletes' posts. Although Ledecká and Samková posted a lot of diversity and commercial content, promoting namely lifestyle clothes, cell phones and cars, the posts were not always correctly disclosed as advertisements or endorsements by the aforementioned athletes.

Competitions were another form of promotion commonly organized on the athletes' pages, such as STARLIFE or Le Gracie competition presented by Zuzana Hejnová (see Figure 9). They give the fans a chance to win products from the company who is sponsoring the athlete. Furthermore, these forms of promotion usually produce high numbers of fans' interactions. In the case of Zuzana Hejnová, this kind of post received on average three times more reactions and comments than other types of postings.

¹ For this purpose, all the posts endorsing or supporting the sporting event, corporate sponsor, product, activity, or mentioning the sponsors were categorized as commercial ones.

Zuzana Hejnová - Official
October 16, 2018 · 🌐

Třéninky začaly dost z ostra. Ježdění na kole mi dává pěkně zabrat, cyklistiku bych fakt dělat nemohla. Ale pro zpestření přípravy na proslulou Šumavu, je to fakt nádherná 😊. Dneska mě v pauzách zachraňovaly tyčinky od @legracie_czechia. Mají nově, kávové a čokoládové. Už ste zkusile? Mám pro vás soutěž o bednu těchto tyčinek (30ks), protože LeGracie slaví 3.marozeniny a chceme vám udělat radost 😊. Stačí dát líke této fotce, sledovat můj IG profil + profil @legracie_czechia a označit 2 kamarády, kterým by tyčinky mohly chutnat. Losovat budu v sobotu večer 😊. Tak šup do toho ❤️

👍 274 22 Comments 1 Share

Zuzana Hejnová - Official
June 27, 2019 · 🌐

Soutěž o produkty, které mohu jedine doporučit 😊. Zkuste štěstí a vyhraďte voucher od STARLIFEcz 🎁 na jejich stránce 📄

STARLIFE VOUCHER
1.000,-

Healthy Lifestyle Activity.Life WWW.STARLIFE.EU starlife.cz starlife.cz

STARLIFEcz
June 27, 2019 · 🌐

SOUTĚŽ O DVA VOUCHERY NA PRODUKTY STARLIFEcz V HODNOTĚ 1.000,- Kč
👉 Do komentářů napište, kde se budou konat Letní olympijské hry v roce 2020?
👉 SDÍLEJTE tento příspěvek!
📅 7. 7. 2019 Losování výherců!

👍 49 25 Comments 10 Shares

Figure 9 Products and Companies Promoted by Competitions on Official Facebook Page of Zuzana Hejnová (October 16, 2018 and June 27, 2019).

Translation of the post on the left: The training started pretty hard. Riding a bike destroys me, I really couldn't do cycling. But as part of the preparation for the sunny Šumava, it's really beautiful 😊. Today, I was saved by bars from @legracie_czechia. They have new flavors: coffee and chocolate. Have you tried it yet? I announce a competition for a box of these bars (30pcs), because LeGracie is celebrating its 3rd birthday and we want to make you happy 😊 Just like this photo, follow my IG profile + @legracie_czechia profile and tag 2 friends who might like the bars. I will draw on Saturday evening 😊. So go ahead ❤️

Translation of the post on the right: Competition for products I can truly recommend 😊. Try your luck and win a voucher from STARLIFEcz 😊 📄 on their page 📄

Fans' reactions

The sampled female athletes' social media presentations and postings evoked different forms and intensity of fans' and followers' responses. Tennis player Petra Kvitová received the highest number of page likes and followers as well as total number of likes and comments under the posts in the observation period. The most shares of content were recorded on the Facebook page of speedskater Martina Sáblíková, which was the second most liked official page from the sample. The lowest number of page likes and followers, and also the lowest number of likes and shares under the posts belonged to Track & Field athlete Zuzana Hejnová, which may have been due to the Hejnová's unsuccessful 2018 season, when she had to deal with an injury (ČTK, 2018; Macek & Tomíček, 2018). Although her results improved significantly in 2019, she did not achieve the similar successes as e.g. in 2012, 2013 or 2015 (Hejnova.cz, 2020).

The correlation matrix (Table 4) shows that the topic of the post did not significantly influence the prevailing tone of comments under the posts. On the other hand,

the sports-related postings were accepted mostly positively, whereas the discussions under diverse content published e.g. by Eva Samková, Karolína Plíšková or Martina Sáblíková had more neutral or negative prevailing tenor than their sport posts.

Table 4 Prevailing tone of comments under sports- and diverse-related posts on selected athletes' official Facebook pages analyzed in the observation period (correlation matrix)

Athlete's Name and Discipline	N of Analyzed Posts	N of Sports Posts	N of Post with Prevailing Tone of Comments			N of Diverse Posts	N of Post with Prevailing Tone of Comments		
			+	0	-		+	0	-
Zuzana Hejnová (Track & Field)	127	59	58	1	0	68	63	4	1
Petra Kvitová (Tennis)	171	91	91	0	0	80	80	0	0
Ester Ledecká (Alpine Skiing & Snowboarding)	230	85	81	3	1	145	137	7	1
Karolína Plíšková (Tennis)	210	128	106	17	5	82	67	13	2
Eva Samková (Snowboarding)	133	34	33	1	0	99	87	12	0
Martina Sáblíková (Speed Skating)	127	81	79	2	0	46	41	5	0
Total N of Posts	998	478	448	24	6	520	475	41	4

Overall, our analysis proved that the prevailing tone of comments under the posts published by the sampled athletes in the observation period was positive (Table 4; Figure 10). Only ten contributions in the whole sample received predominantly negative comments (i.e. more than 50% of comments to them were negative). Seven of the posts which received negative comments were published by Karolína Plíšková (Figure 10).

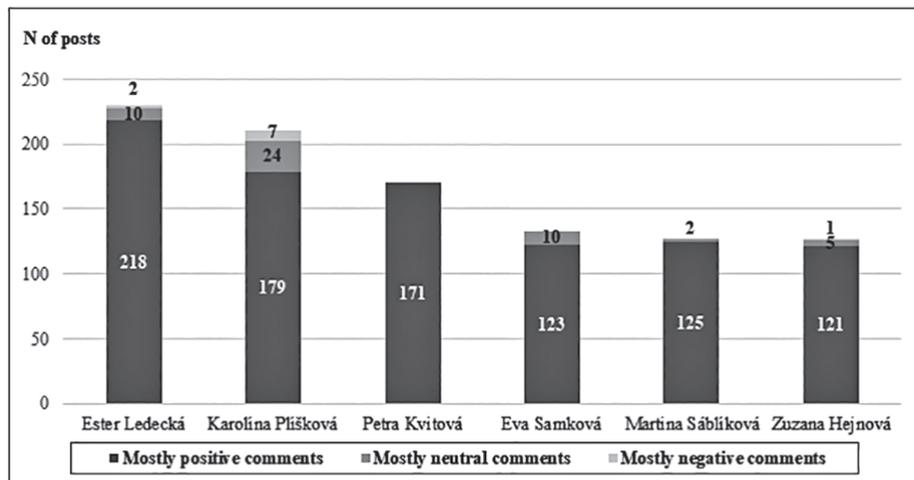


Figure 10 Prevailing tone of comments on all selected Facebook pages.

The number of posts with a neutral tone (i.e. more than 50% of reactions were neutral) was higher (51 posts), but in total numbers it was still a small minority. On the other hand, between Martina Sáblíková, Eva Samková and Petra Kvitová we did not record a single mostly negatively commented on post on any of their pages. Moreover, all of Petra Kvitová's contributions in the observation period were evaluated positively (Figure 10).

Reactions to sports-related posts

The sports-related postings of the sampled athletes were predominantly positively received. Similarly, the posts aimed at athletes' sports performance, usually complemented by visual or interactive elements, belonged to the group of the most liked, commented and shared posts. For example, the most commented post published on Karolína Plíšková's Facebook Wall during the observation period was published after her victory at the Australian Open in 2019 where she defeated Serena Williams and advanced to the semifinals (Figure 11). This was an example of a post based on sports photography, and the reactions to it were mostly positive.

Another type of positively accepted sports-related posts were announcements of individual and team achievements and successes. Figure 12 displays the posts on Sáblíková's Facebook page which received the highest number of shares and comments during the observation period. The most shared post was Sáblíková's announcement of breaking the 3000m world record. The second one contained a summary of the season and an acknowledgement to her team and fans which received more than 33,000 likes.

On the other hand, critical and abusive comments were also identified under the selected athletes' sports posts, however, most of those were aimed directly at their performance or results. One rare example of an aggressively commented sports-related contribution posted on Samková's page referred to a podium picture (Figure 13) early in the season, accompanied by the reactions of one man shaming Eva Samková's weight without any provocation ("Small and fat", "it could be better, you are not moving and you have gained weight, haven't you?"). These comments were immedi-

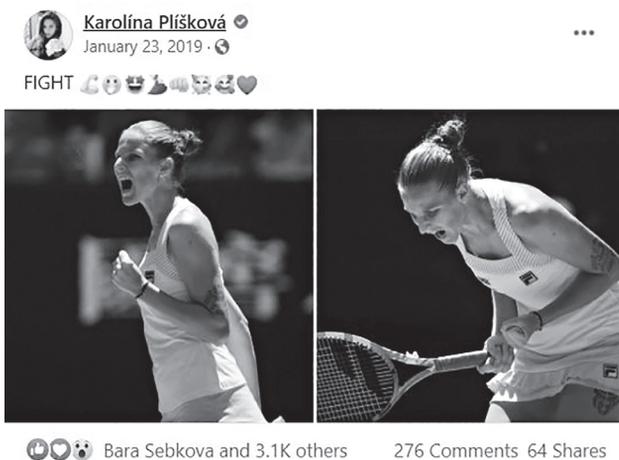


Figure 11 The most commented on post from the Facebook page of Karolína Plíšková (January 23, 2019).



Figure 14 Examples of trolling on the Facebook page of Karolína Plíšková (September 28, 2018; October 3, 2018; October 10, 2018).

ately rebuked by several of Samková’s fans. In particular, one of Samková’s supporters posted one of the provocateur’s own profile pictures, in which he is shown to be unathletic and out of shape, with the ironic caption of “It could be better, Vlasta. You are not moving, are you?”.

Besides the aforementioned negative reactions, instances of trolling were discovered on the selected tennis players’ official Facebook pages during the observation period in connection to sports-related content. One of the examples, three screenshots of the comments from the same person who commented on Karolína Plíšková’s sports-related posts is shown in Figure 14. Negative reactions to the match and the result were disproportionate to the situation.

This person’s comment had appeared several times under a few different posts, but it was not the only example of trolling on the tennis players’ pages. Negative reactions under Petra Kvitová’s content used vulgar and disgusting language similar to reactions on Karolína Plíšková’s Facebook page. In some cases the tennis player was even accused of throwing matches. These “trolls” reacted to Kvitová’s posts.

Tennis PR manager Karel Tejkal claimed in an interview that this behavior was typical for unsuccessful bettors and was already legally prosecuted in the Czech Republic. “It’s even more specific to those tennis players that bettors often do it. Then, in frustration, when tickets are torn, they go and write a lot,” (Tejkal, personal communication, November 8, 2019).

Reactions to diverse posts

The majority of reactions to diverse postings were positive as well. Among the written statements, visitors of the athletes pages sampled for this research used emojis to express positive or negative reactions. In our research, positive emojis predominated (the same results were observed by Danesi (2017)). The positive emojis usually appeared under the postings with mostly positive reactions, which amounted to 923 of 998 posts in total.

With the exception of clearly positive reactions, sports celebrities also have to deal with the fact that people think they know them very well and live their lives with them (Weiss, 1996). These unsolicited reactions appeared more often under the diverse-oriented postings. Typical examples were the comments of Sábliková’s Czech fan who

described there his whole day, including a precise summary of his daily activities and routines (e.g. information about testing a new computer keyboard, description of the first day in a new job, etc.). Despite the fact that Martina Sáblíková never wrote him back, he continued to post in a similar way.

The pieces of everyday lives of the sampled athletes were accepted both positively and negatively, depending on the athletes' reputation or media coverage. As visible from Eva Samková's most popular post from the analyzed period (Figure 15), the

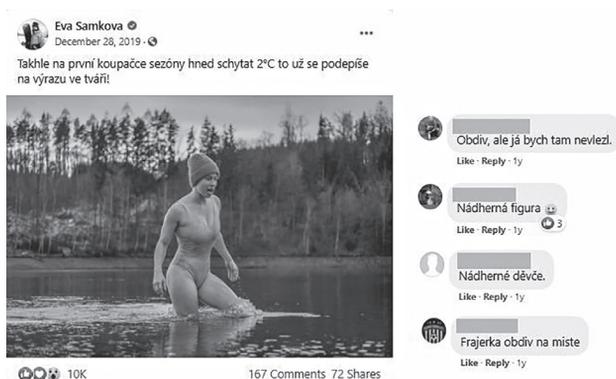


Figure 15 The most liked post (and typical comments) from the Facebook page of Eva Samková (December 28, 2019). Translation of the post: This is how it looks when the temperature is 2 °C on the first swimming of the season. It has to be reflected in my face expression!



Figure 16 A partially negatively commented on post from the Facebook page of Zuzana Hejnová – Official (November 3, 2019).

Translation of the post: Do you know how you want to catch up on the last day and come home tan? So that was my case now, even though I didn't care at all 😊😁 I just smeared a little 😊. I'm burned and saved by Panthenol from @pharmafuturecz Body lotion that doesn't stick after lubrication and works great. Try taking it with you on your next vacation 😊. Keep your fingers crossed that I won't be completely peeled off until the Athlete of the Year is announced 🙏😁. But otherwise a great holiday, thank you @ck_fischer for help with the selection and all services 🙌

diverse posting was commonly accompanied by appreciative comments like “admiration, I would not dare to give it a try,” “a beautiful girl,” “a beautiful body” or “dude, the admiration is appropriate” (gaining 10,373 likes and 167 comments). These reactions contrast with the rare nonacceptance of Samková’s sports-related post, as seen in Figure 12, where she wore winter clothes, and the fan shamed her body.

Regarding the differences in the tone of comments, based on the language of the reaction, no generalizing variation was found between those written in the Czech and English language on the prevalently negatively commented posts. In the case of Ester Ledecká and Zuzana Hejnová, the negatively commented on posts were in Czech and the reactions were also in the Czech language.

In very few cases, mainly Czech-speaking fans had a problem with the promotional aspects of the post (either with a paid partnership or only a photo with a certain product). One of the negatively received posts released by an athlete in the sample was Hejnová’s half-commercial for after-sun lotion and a travel agency (Figure 16), with comments of this kind: “I like you very much but this sounds really like a top commercial,” or “It sounds really embarrassing,” but still, the majority of reactions to this content were positive. Hejnová wrote in the post that she had sunburnt her skin while on vacation and the after-sun lotion of one particular brand saved her; thus, she recommended fans take it with them on holidays. Then she thanked the travel agency for help with her stay. What puzzled people the most was the absence of a clear statement if it was or was not a paid partnership (Hejnová defended herself in the following discussion below the post that the published content presented her partnership with the after-sun lotion producer, but she had no kind of agreement with the travel agency).



Figure 17 A photo of Karolína Plíšková and Michal Hrdlička from the Facebook page of Karolína Plíšková (July 18, 2019).

Contrary to the previously mentioned athletes, the photos in which Karolína Plíšková posed or showed the glimpses of her non-sport life were occasionally accepted differently. The fans and visitors of Plíšková's page reacted negatively (seven posts elicited predominantly negative comments) to non-sports contributions released after unsuccessful matches or photos from her private life.

In the case of Karolína Plíšková, we can observe distinctions in the negative comments by Czech and English-speaking audiences as well. While reactions in English usually shamed Plíšková's poor sports performance, Czech speakers focused on her marriage; thus, the photos of Hrdlička and Plíšková were perceived negatively in the observation period. The concentration of Czech fans on Plíšková's relationship posts could be caused by the negative mediatization of her husband who has been commonly discussed in the Czech national tabloids (nh, 2020; om, tuš, 2017; venu, 2016). Figure 17 captures a characteristic photo of the couple that evoked critical reactions. For example, one fan stated that the Czech tennis player did not have a brain and there was no reason to congratulate Plíšková and her husband on their one-year wedding anniversary.

DISCUSSION AND CONCLUSION

The analysis of Czech female athletes' communication on their official Facebook pages and fans' reactions to them confirmed the results of previous studies conducted within other cultural backgrounds, usually U.S. or Western European, which is not surprising in the current globally connected world. Besides that, our research also brought new findings, especially in the field of fans' comments.

The athletes under study represented two generations with specific approaches towards social media; however, it was not always possible to distinguish the approach by the biological age of the athlete. More important than the age of the sportswomen was their professional age, which can be measured by the length of their international sports career. In general, the longer the athletes were in professional sports, the more conservative, professional and in some cases unpersonal their communication style was. The individual approaches also seemed to depend more on each athlete's personality and specific inclination towards social media. Using a slightly modified (instead of Instagram, we used Facebook) typology of Hagay and Bernstein (2019a), Martina Sáblíková belongs to the group of professional athletes who usually share only photos from their sports events, with a current trend to more "humanize" herself with more personal pictures. Petra Kvitová and Karolína Plíšková try to combine both professional and human approaches with Kvitová utilizing her page more for commercial endorsements and Plíšková promoting her personal life, which unfortunately is not generally supported by her fans. Zuzana Hejnová started the analyzed period as a "human" athlete but with the increase in promotion of the various consumer contests of her partners has been slowly moving into a "pro Facebook" athlete, where Ester Ledecká and Eva Samková have already firmly established themselves.

Generally, the results of our study are in accordance with the previous findings of Toffoletti and Thorpe (2018). The selected athletes used their Facebook pages for the successful promotion of their achievements and had their own space for self-expression without the risk of being medially distorted in any way. All the athletes seemed

to be well aware of this advantage and created portrayals of themselves as sexy and powerful (Bruce, 2016) professional athletes.

Content published during the athletes' on and off-season differed. While the seasonal posts were full of sports photographs and pictures of podium successes, the off-season content more often reflected the athletes' personal lives, such as glamour photos of themselves as beautiful women in nice gowns or swimsuits. Female athletes are sometimes stereotypically criticized for their lack of femininity (Cooky & Dworin, 2013). Therefore, they capitalize on any occasion during the off-season to show their audience a contrasting portrait. Still, this cannot be considered the rule, as it depends on the athlete's personality, e.g. Martina Sáblíková did not publish any photos of herself in a swimsuit and only rarely posted glamour photos within the analyzed time period and Eva Samková had a very similar approach.

Contrary to the findings of Browning and Sanderson (2012) or Fink (2015), fans predominantly treated the athletes with respect and sexually explicit or abusive remarks were not common. The overwhelming majority of fans' reactions was supportive and/or admiring. However, the results of the study proved that, throughout the same time period, the selected athletes faced various types of negative, hateful or inappropriate followers' comments and reactions that were caused not only by unsatisfactory sports results, but also by an overemphasis on sexuality, seemingly "non-feminine" appearance, body weight, or excess of promotional and commercial content (Mutz & Meier, 2016 or Walsh et al., 2013). Although the negative, unfavorable, hateful or annoying comments occurred on the official Facebook pages of the selected female athletes, the reason for them in most cases was not (only) the sportswomen's sports performance but mainly the other aforementioned personal factors.

Some positive or negative comments were not related to the popularity of the sport and its spread in the Czech Republic. This fact was reflected, for example, in the high numbers of likes and shares of Martina Sáblíková's posting, despite the fact that speed skating is not one of the most popular sports worldwide (Ozanne et al., 2017). The overtone of comments was also not directly related to the success or failure of selected athletes in the certain period, as the results this research shown.

Additionally, it was revealed that the Czech audience focused on different negative aspects of the athletes than English speaking fans. The international public generally focused on poor sports performance and results, while Czech fans criticized athletes' personal opinions or the consequences of their private life. For Czech fans, we can speculate it also depended on the media presentation of the athletes, for example, in the case of Petra Kvitová and her story with attack and injury, her positive outlook during interviews, etc. Karolína Plíšková, however, had a completely different media image largely associated with her husband's controversial reputation. Even though Kvitová and Plíšková represented the same sport, each was perceived differently by fans.

The case of Karolína Plíšková was unique and did not match the other athletes in our sample. Even though there was almost no difference in the proportion of Czech and English comments, the topics of the negative comments varied. The English were more hateful from assumed bettors and focused on Plíšková's game and failures while Czechs commented negatively on her personality, especially in connection to her husband.

It would seem obvious that if the athletes are successful and win medals, only positive comments would follow under their posts, but this was not confirmed by our research. As mentioned above, on the Facebook page of Eva Samková, for example, in reference to a post about her podium success, one man commented that she was overweight, so she “did not win.” Even success in the form of a medal was not enough in this case. Comments on the character and appearance of the athletes occurred in several instances. In addition to Eva Samková, this also was demonstrated on Karolina Plíšková's page. While Samková's fans defended her against these haters, the visitors of Plíšková's page did not react to the negative content.

Still, contrary to previous studies, negative comments represented only a tiny minority of all the fans' communication on the selected female athletes' Facebook pages, the majority being supportive reactions, expressing happiness for both the athletes' achievements and personalities. Therefore, we can conclude that in the case of the (self)presentation of professional Czech female athletes on social media there are advantages to doing so despite its risks. We witnessed that social media represents a high potential for female athletes to control their media images in an environment generally not hostile towards them.

Regarding the overall scope of the research, the authors concede that the results of this study are partially limited. At first, a relatively small sample of female athletes' pages was examined. Due to that, the results cannot be overgeneralized; each athlete communicated in her own way. The other factors that influenced the results were the disciplines in which selected athletes competed and the observation period. For the validation of results, it would be necessary to include more athletes from various sports disciplines in the sample. To sum up, the female athletes' social media communication and the fans' reactions are current topics and provide the implication for further research both in the Czech Republic and worldwide.

DECLARATION OF CONFLICTING INTERESTS

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

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REFERENCES

- Antonini, A., Gomez Mejia, G., & Lupi, L. (2019). All We Do is “Stalking”: Studying New Forms of Reading in Social Networks. In: *Proceedings of the 30th ACM Conference on Hypertext and Social Media*, Hof, Germany.
- BBC.com. (2020, August 13). Hannah Craig: Social Media Has Positives and Negatives for Female Athletes. *BBC.com*. Retrieved from <https://www.bbc.com/sport/canoeing/53750191>.
- Billings, A. C., Butterworth, M. L., & Turman, P. D. (2018). *Communication and Sport: Surveying the field* (3rd ed.). Thousand Oaks, CA: SAGE.
- Bishop, J. (2014). Representations of ‘Trolls’ in Mass Media Communication: A Review of Media-texts and Mo.al Panics Relating to ‘Internet Trolling’. *International Journal of Web Based Communities*, 10(1), 7–23.

- Browning, B., & Sanderson, J. (2012). The Positives and Negatives of Twitter: Exploring How Student-Athletes Use Twitter and Respond to Critical Tweets. *International Journal of Sport Communication*, 5(4), 503–521.
- Bruce, T. (2016). New Rules for New Times: Sportswomen and Media Representation in the Third Wave. *Sex Roles*, 74(7–8), 361–376.
- Burch, L. M., Clavio, G., Eagleman, A. N., Major, L. H., Pedersen, P. M., Frederick, E. L., & Blaszk, M. (2014). Battle of the Sexes: Gender Analysis of Professional Athlete Tweets. *Global Sport Business Journal*, 2(2), 43–61.
- Cooky, C., & Dworkin, S. L. (2013). Running Down What Comes Naturally: Gender Verification and South Africa's Caster Semenya. In: Wenner, L. A. (Ed.), *Fallen Sports Heroes, Media, and Celebrity Culture* (pp. 148–162). New York: Peter Lang.
- ČTK. (2018, August 20). Zraněná Hejnová už letos nebude závodit. Příští rok se chce vrátit [Injured Hejnová will no longer race this year. She wants to come back next year]. *Aktuálně.cz*. Retrieved March 25, 2021, from <https://sport.aktualne.cz/ostatnisporty/atletika/zranena-hejnova-uz-letos-nejbude-zavodit-pristi-rok-se-chcev/r~2e1b1af6a44411e89de10cc47ab5f122/>.
- Danesi, M. (2017). *The Semiotics of Emojis: The Rise of Visual Language in the Age of the Internet*. London: Bloomsbury Publishing.
- Dawson, V. R. (2018). Fans, Friends, Advocates, Ambassadors, and Haters: Social Media Communities and the Communicative Constitution of Organizational Identity. *Social Media + Society*. Retrieved from <https://doi.org/10.1177/2056305117746356>.
- Emmons, B., & Mocarski, R. (2014). She Poses, He Performs: A Visual Content Analysis of Male and Female Professional Athlete Facebook Profile Photos. *Visual Communication*, 21(3), 125–137.
- Evasamkova.cz (2014). Eva Samková: Snowboardcross. *Evasamkova.cz*. Retrieved from <http://www.evasamkova.cz/english/>.
- Fink, J. S. (2015). Female Athletes, Women's Sport, and the Sport Media Commercial Complex: Have We Really "Come a Long Way, Baby"? *Sport Management Review*, 18(3), 331–342.
- Franck, E., & Nüesch, S. (2012). Talent and/or Popularity: What Does It Take to Be a Superstar? *Economic Inquiry*, 50(1), 201–216.
- Fuchs, C. (2017). *Social Media: A Critical Introduction (Second Edition)*. London: SAGE.
- Hagay, H., & Bernstein, A. (2019a). *Israeli Sportswomen Self-presentation on Instagram* [Conference talk]. IAMCR 2019. Madrid, Spain.
- Hagay, H., & Bernstein, A. (2019b). *Israeli Sportswomen Self-presentation on Instagram* [Abstract]. In: *IAMCR 2019 Final Abstract Book: Media and Sport Section* (pp. 70–71). Retrieved from <https://iamcr.org/es/madrid2019/iamcr-2019-final-abstract-books>.
- Hardin, M. (2005). Stopped at the Gate: Women's Sports, 'Reader Interest'; and Decision Making by Editors. *Journalism and Mass Communication Quarterly*, 82(1), 62–77.
- Hardin, M., & LaVoi, N. M. (2013). The "Bully" and the "Girl Who Did What She Did": Neo-Homophobia in Coverage of Two Women's College Basketball Coaches. In: Wenner, L. A. (Ed.), *Fallen Sports Heroes, Media, and Celebrity Culture* (pp. 267–283). New York: Peter Lang.
- Hejnova.cz (2020). Zuzana Hejnová: O mně [About me]. *Hejnova.cz*. Retrieved from <https://www.hejnova.cz/o-mne>.
- Jakubowska, H. (2015). Are Women Still the "Other Sex": Gender and Sport in the Polish Mass Media. *Sport in Society*, 18(2), 168–185.
- Jenkins, H. (2006). *Convergence Culture: Where Old and New Media Collide*. New York and London: New York University Press.
- Karolina-pliskova.com (2020). Official Site of Czech Professional Tennis Player Karolína Plíšková. *Karolina-pliskova.com*. Retrieved from <https://www.karolina-pliskova.com/en>.

- Kong, P., & Harris, L. M. (2015). The Sporting Body: Body Image and Eating Disorder Symptomatology Among Female Athletes from Leanness Focused and Nonleanness Focused Sports. *The Journal of Psychology, 149*(2), 141–160.
- Kubištová, D. (2020, December 7). Když ‚fanouškům‘ nevyjde tiket, píšou, že mě zabijí, říká Strýcová o obtěžování na sociálních sítích [When the ‚fans‘ don't win the money from the bet, they write me that they will kill me, says Strýcová about harassment on social networks]. In: *iRozhlas.cz* [News]. Retrieved from https://www.irozhlas.cz/sport/barbora-strycova-rozhovor-obtezovani-socialni-site_2012071153_dok.
- Kvitová, P. (2020, May 9). In: *Facebook.com* [Fan page]. Retrieved from <https://www.facebook.com/petrakvitovaofficial/>.
- Lebel, K., & Danylchuk, K. (2012). How Tweet It Is: A Gendered Analysis of Professional Tennis Players' Self-Presentation on Twitter. *International Journal of Sport Communication, 5*(4), 461–480.
- Ledecká, E. (2020, April 8). In: *Facebook.com* [Fan page]. Retrieved from https://www.facebook.com/pg/esterledecka.cz/about/?ref=page_internal.
- Lombard, M., Snyder-Duch, J. & Bracken, C. C. (2002). Content Analysis in Mass Communication: Assessment and Reporting of Intercoder Reliability. *Human Communication Research, 28*(4), 587–604.
- Lumsden, K., & Morgan, H. M. (2012). ‚Fraping‘, ‚Sexting‘, ‚Trolling‘ and ‚Rinsing‘: Social Networking, Feminist Thought and the Construction of Young Women as Victims or Villains. In: *Proceedings of Forthcoming Feminisms: Gender Activism, Politics and Theory (BSA Gender Study Group Conference)*, Leeds, UK.
- Macek, T., & Tomíček, J. (2018, August 11). Poraženi bolestí. Jak se mají Hejnová a další hvězdy vyhnout zraněním? [Defeated by pain. How should Hejnová and other stars avoid injuries?]. *iDnes.cz*. Retrieved April 03, 2020, from https://www.idnes.cz/sport/atletika/me-berlin-ceska-atletikazraneni.A180810_235854_atletika_par.
- Mondal, M., Silva, L. A., & Benevenuto, F. (2017). A Measurement Study of Hate Speech in Social Media. In: *Proceedings of the 28th ACM Conference on Hypertext and Social Media (HT '17)*, Prague, Czech Republic. Retrieved from <https://doi.org/10.1145/3078714.3078723>.
- Mutz, M., & Meier, H. E. (2016). Successful, Sexy, Popular: Athletic Performance and Physical Attractiveness as Determinants Of Public Interest in Male and Female Soccer Players. *International Review for the Sociology of Sport, 51*(5), 567–580.
- nh (2020, May 25). Přiznání Hrdličky: Prachy na nule! Co na to Plíšková? [Hrdlička's confession: Money at zero! What about Plíšková?]. In: *Ahaonline.cz* [News]. Retrieved from <https://www.ahaonline.cz/clanek/zhave-drby/172095/priznani-hrdlicky-prachy-na-nule-co-na-to-pliskova.html>.
- Nutrend.cz (2020). Martina Sáblíková. *Nutrend.cz*. Retrieved from <https://www.nutrend.cz/martina-sablikova-a29722.htm>.
- om, tuš (2017, July 14). Sporták Hrdlička (28): Po Borhyové dostane prachy i z Plíškové! [Sports commentator Hrdlička (28): He will get money from Plíšková after Borhyová!]. In: *Ahaonline.cz* [News]. Retrieved from <https://www.ahaonline.cz/clanek/zhave-drby/136090/sportak-hrdlicka-28-po-borhyove-dostane-prachy-i-z-pliskove.html>.
- Olympic.cz (2018a). Martina Sáblíková. *Olympic.cz*. Retrieved from <https://www.olympic.cz/sportovec/1499--martina-sablikova>.
- Olympic.cz (2018b). Petra Kvitová. *Olympic.cz*. Retrieved from <https://www.olympic.cz/sportovec/2754--petra-kvitova>.
- Ortiz, S. M. (2020). Trolling as a Collective Form of Harassment: An Inductive Study of How Online Users Understand Trolling. *Social Media + Society*. Retrieved from <https://doi.org/10.1177/2056305120928512>.

- Ozanne, M., Cueva Navas, A., Mattila, A. S., & Van Hoof, H. B. (2017). An Investigation Into Facebook “Liking” Behavior An Exploratory Study. *Social Media + Society*. Retrieved from <https://doi.org/10.1177/2056305117706785>.
- Pegoraro, A. (2010). Look Who’s Talking—Athletes on Twitter: A Case Study. *International Journal of Sport Communication*, 3(3), 501–514.
- RedBull.com (2020). Eva Samková. *RedBull.com*. Retrieved from <https://www.redbull.com/int-en/athlete/eva-samkova>.
- Riffe, D., Lacy, S., & Fico, F. G. (2005). *Analyzing Media Messages: Using Quantitative Content Analysis in Research (Second Edition)*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Sanderson, J. (2013). From Loving the Hero to Despising the Villain: Sports Fans, Facebook, and Social Identity Threats. *Mass Communication and Society*, 16(4), 497–509.
- Sheffer, M. L., & Schultz, B. (2015). The New World of Social Media and Broadcast Sports Reporting. In: *Routledge Handbook of Sport Communication* (pp. 210–218). New York: Routledge.
- Smith, L. R., & Sanderson, J. (2015). I’m Going to Instagram It! An Analysis of Athlete Self-Presentation on Instagram. *Journal of Broadcasting & Electronic Media*, 59(2), 342–358.
- Statista.com (2020). Most Popular Social Networks Worldwide as of July 2020, Ranked by Number of Active Users. *Statista.com*. Retrieved from <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>.
- Toffoletti, K., & Thorpe, H. (2018). Female Athletes’ Self-Representation on Social Media: A Feminist Analysis of Neoliberal Marketing Strategies in “Economies of Visibility.” *Feminism & Psychology*, 28(1), 11–31.
- Trackalytics.com (2020). Free Social Media and Website Statistics/Analytics. *Trackalytics.com*. Retrieved from <https://www.trackalytics.com/>.
- Vann, P. (2014). Changing the Game: The Role of Social Media in Overcoming Old Media’s Attention Deficit Toward Women’s Sport. *Journal of Broadcasting & Electronic Media*, 58(3), 438–455.
- venu (2016, November 30). Dcera Borhyové pekla cukrovi s přítelkyní Hrdličky: Dají mamince ochutnat? [Borhyová’s daughter bake sweets with Hrdlička’s girlfriend. Will the mum be able to taste it?]. In *Blesk.cz* [News]. Retrieved from <https://www.blesk.cz/clanek/celebrity-ceske-celebrity/433441/dcera-borhyove-pekla-cukrovi-s-pritelkyni-hrdlicky-daji-mamince-ochutnat.html>.
- Voráček, J., & Čáslavová, E. (2019). Effects of Sports Personalities in Marketing Communication on the Purchasing Preferences of Generation Y. *AUC Kinanthropologica*, 55(2), 107–127.
- Walsh, P., Clavio, G., Lovell, M. D., & Blaszká, M. (2013). Differences in Event Brand Personality Between Social Media Users and Non-Users. *Sport Marketing Quarterly*, 22(4), 214–223.
- Wann, D. L., & James, J. D. (2019). *Sport Fans: The Psychology and Social Impact of Fandom*. New York: Routledge.
- Weiss, O. (1996). Media Sports as a Social Substitution Pseudosocial Relations with Sports Figures. *International Review for the Sociology of Sport*, 31(1), 109–117.
- White, M. D., & Marsh, E. (2016). Content Analysis: A Flexible Methodology. *Library Trends*, 55(1), 22–45.
- Woodman, T., & Hardy, L. (2003). The Relative Impact of Cognitive Anxiety and Self-Confidence upon Sport Performance: A Meta-Analysis. *Journal of Sports Sciences*, 21(6), 445–457.
- Zlatkovský, M., & Kočí, P. (2018, February 23). Od Rašky po Ledeckou: Cenné kovy letos pro Česko vybojovaly především ženy [From Raška to Ledecká: This year, the medals for Czechia were won mainly by women]. In: *iRozhlas.cz* [News]. Retrieved from https://www.irozhlas.cz/sport/olympijske-hry/od-rasky-po-ledeckou-ceska-republika-uz-ma-ze-zimnich-olympiad-vic-medaili-nez_1802230635_zlo.

Clinical evaluation of shoulder ROM in volleyball and handball players in youth categories

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ABSTRACT

Aims. The aim of this study was to clarify whether volleyball and handball players, as representatives of the so-called overhead athletes, already have an increased ROM and specific local hypermobility in the shoulder joints in the junior categories. These changes are described by goniometric measurements and hypermobility tests according to Sachse and Beighton. The results are examined with respect to gender and sport specialization.

Methods. Ninety-five subjects without previous shoulder joint injury aged 16 to 19 years, including 73 volleyball and handball players, were tested. The cohort included 33 men, 40 women, 34 handball players and 39 volleyball players. The control group consisted of 22 participants, including 11 men and 11 women. The majority (90.5%) of the study participants were right-hand dominant. Only 9.5% of the participants were left-handed. Measurements were taken with a goniometer with digital display and hypermobility tests according to Sachse and Beighton.

Results. In a selected group of volleyball and handball players, the ROM of the shoulder joints of the dominant arm was significantly greater in three ways: into extension, horizontal adduction and external rotation. On the other hand, the ROM of their shoulder joints in internal rotation is smaller and the research group has significant hypermobility in the glenohumeral (scapulohumeral) joint compared to the control group. Our study showed that females compared to males playing volleyball and handball have a significantly higher degree of internal rotation of both dominant and non-dominant arms. No significant differences were found when comparing volleyball and handball players. The difference in ROM between the dominant and non-dominant arms of volleyball and handball players was shown in extension and external rotation.

KEYWORDS

goniometry; range of motion; hypermobility; handball; volleyball

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INTRODUCTION

Throwing above head level is an extremely complex and agile movement. The thrower's arm must be sufficiently lax to allow excessive external rotation, but at the same time stable enough to prevent subluxations of the humeral head, which requires a balance between joint mobility and functional stability. We speak of this as the "thrower's paradox". This balance is very often disturbed and is thought to lead to various types of injuries to surrounding tissues. Among these injuries, the authors also include "internal impingement", which was first described in 1992 by the Tennis Association. In total, patients with this pathology usually have full range of motion (ROM), but on the dominant arm the external rotation is increased by 10° to 15° and the internal rotation is decreased by 10° to 15° compared to the non-dominant arm (Wilk et al., 2011).

According to Wilk and Arrigo (1992), most overhead athletes show significant glenohumeral joint laxity (scapulohumeral), which allows for excessive ROM. The hypermobility of the "overhead shoulder" was referred to in this article as the "thrower's laxity".

However, Borsa and colleagues did not report any difference in overhead athletes compared to the control group when objectively testing joint hypermobility on a Telos device (Borsa et al., 2005).

An extensive study of the "overhead shoulders" of New York Yankees baseball players has come to several conclusions. The first conclusion was that players have an increased range of external rotation and a reduced range of internal rotation of the dominant arm, and thus an altered arc of glenohumeral movement in the throwing position relative to the non-dominant arm. In this study, the authors also sought to determine the relationship between a player's age and years of active career and ROM in the shoulder joints or hypermobility in the shoulder joints. According to their results, there is no significant relationship in this direction (Bigliani et al., 1997).

Regarding the shoulder joint and throw, the relationship between the individual's height and weight and the speed of the shoulder during the baseball throw was also observed. The result was negative, no regularity between these factors was demonstrated (Pappas, Zawacki, & Sullivan, 1985).

THEORETICAL BACKGROUND

Jobe and Pink (1993) describe that overhead athletes most often have a rotator cuff rupture during a shoulder injury. These altered ranges of motion (increased in extension, external rotation, and decreased in internal rotation) can affect this type of injury.

Due to the nature of volleyball and handball, a significant burden is placed on external rotation. Wilk et al. (2011) described that there is a significant difference in the ROM between the external and internal rotators on the dominant shoulder joint. This author described that overhead athletes usually have a full ROM, but on the dominant arm the outer rotation is increased by 10° to 15° and the inner rotation is reduced by 10° to 15° compared to the non-dominant arm.

According to Russek (1999), 0.6–31.5% of the adult population has hypermobility, depending on factors such as ethnicity or age. Studies in rheumatology clinics across Europe report a prevalence of joint hypermobility in adults of 5–15%.

Demographic characteristics by population are reported a lot, for example, hypermobility is more common in Asians than in Europeans. In our population, however, the true degree of generalised hypermobility is unknown. Janda states that it is 40% of the female population, but also adds that local pathological hypermobility is independent of gender (Janda, 2004).

In athletes, local pathological hypermobility is often present, which is further divided into two types. The first type is compensatory hypermobility in individual segments, compensation for reduced range in another segment. The second type is post-traumatic instability arising, for example, after injuries to the shoulder joints of handball players and volleyball players, ankle joints to basketball players, or, for example, to the knee joints of football players (Satrapová & Nováková, 2012; Wilk et al., 2002).

OBJECTIVES OF THE WORK

Because of frequent functional disorders in the shoulder joint of the dominant upper extremity in volleyball and handball players, we were interested in the question of whether the functional status of the glenohumeral joint in players without difficulties shows common features. The objective of this study was to elucidate whether volleyball and handball players, experience increased ROM and specific local hypermobility in their shoulder joints already in junior categories. These changes are going to be described by trigonometric measurements and hypermobility tests according to Sachse (Lewit, 2009) and Beighton (Beighton et al., 2011). The results are monitored with respect to gender and sport specialization.

METHODS

Data collection was performed using an anamnestic questionnaire, goniometric measurement with a goniometer with a digital display, hypermobility of scapulohumeral joint according to Sachse and Beighton score. An anamnestic questionnaire was developed for the appropriate selection of participants. The measurement always took place according to the prescribed positions and according to the prescribed fixation from the literature, all *lége artis*. All players and the members of the control group were measured after basic athletic warm-up and a dynamic stretching for the shoulder area with the assumption of obtaining the usual functional ROM in the shoulder joint used in training or competition. All subjects were measured by one physiotherapist. The time schedule for data collection took place in November 2019.

It was a deliberate selection of participants. Athletes were selected according to the anamnestic questionnaire based on the following facts: required junior category, training or match at least 3 times a week. Participant had to play the extraleague or the 1st league of his/her category.

The anamnestic questionnaire was used to reduce the variability of the research group – the athlete should have no previous problems with the shoulder joint, such as dislocations, soft tissue damage, frozen shoulder, impingement, postoperative conditions similar disorders. All subjects included in the research group signed informed consent and the project was approved by the ethics committee FTVS UK

(N. 149/2019). The total number of overhead athletes in the research group was 73 (there were 33 men and 40 women, 34 handball players and 39 volleyball players). 22 participants were measured in the control group (11 men and 11 women). The group includes the majority of right-handers – 91%, with 9% left-handers.

Data collection method

Beighton score assessment

To distinguish whether it is only local hypermobility or generalised mobility, the Beighton score was used. Testing is performed on both halves of the body and it is possible to get 0–9 points (Beighton et al., 2011).

Sachse scapulohumeral joint hypermobility test

The test is performed sitting. We perform passive abduction of the examined arm while fixing the scapula and the collar bone from above. The range “A” is up to 90°, the range “B” from 90° to 110° and the range “C” above 110° (Lewit, 2009).

Goniometry – ROM in the shoulder joint

During the research, the active and passive ROM in the shoulder joint was measured. The measurement was performed in all planes of the shoulder joint (Norkin & White, 2016). That is, in the sagittal plane (extension and flexion), vertical (abduction and adduction), transverse (abduction and adduction) and in rotations (external and internal). A two-arm goniometer with a digital display was used for the measurement.

Data processing

The measured values were converted into a spreadsheet in Excel. Trigonometric values were written in degrees. Sachse hypermobility tests were recorded by a numerical record, where the test result “A” corresponds to the numerical value 1, the test result “B” corresponds to the numerical value 2 and the test result “C” corresponds to the numerical value 3. This record was chosen due to the necessary statistical processing.

Overhead athletes were then compared using statistical methods against hypotheses compared to the control group. This was followed by a comparison of the differences in the dominant shoulder between women and men, then between handball players and volleyball players, and in the end the dominant shoulder joint was compared in measured values against the non-dominant shoulder joint in all participants.

Data analysis

The R mathematical system (Free Software) was used for data analysis and statistical processing, and the R Studio environment was used, which was used for data analysis, prognostic analysis and hypothesis testing.

The Shapiro-Wilk test used on smaller populations was used to test the normality of the data. Due to the abnormality of half of the variables, non-parametric tests were used for statistical testing ($p < 0.05$ = level of statistical significance).

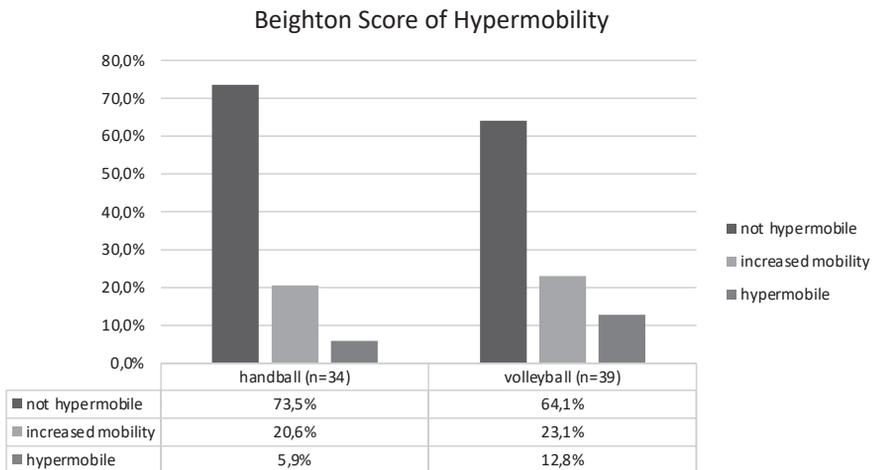
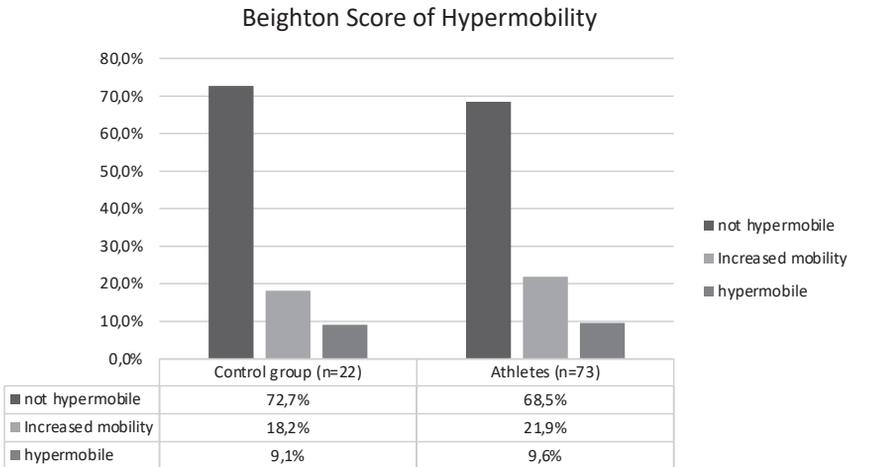
RESULTS

File characteristics

95 people without a prior injury of a shoulder joint in the age from 16 to 19 years old including 73 volleyball and handball players as overhead athletes were tested. There were 33 men, 40 women, 34 handballers, and 39 volleyballers. In the control group, there were 22 participants, of which 11 men and 11 women. The 91% of the study participants were right-handed. Only 9% people were left-handed.

Beighton score assessment

Beighton’s score results show that the experimental and control group are balanced. Graph 1 shows both examined groups according to the degree of generalised hypermobility and thus emphasizes the balance of both groups in this score.

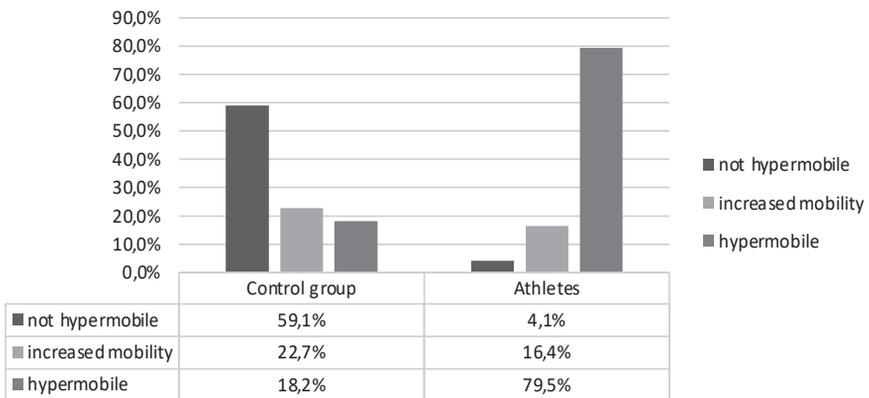


Graph 1 Evaluation of Beighton score according to the degree of generalised hypermobility a) in control group and overhead athletes and b) in handball and volleyball players (expressed as a percentage)

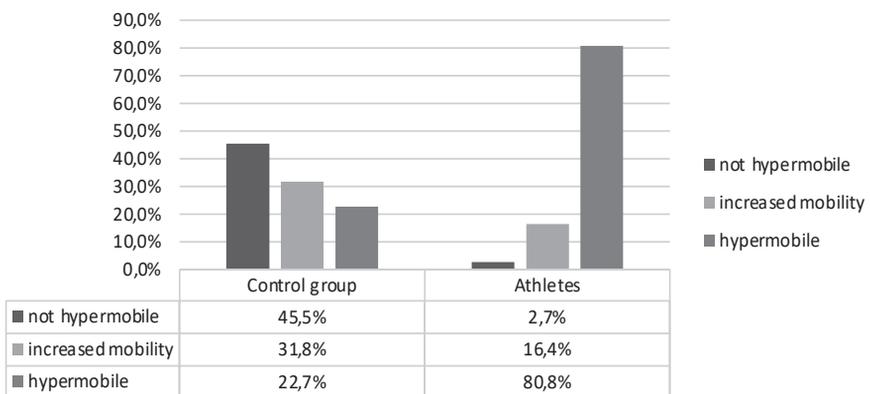
Sachse scapulohumeral joint hypermobility test

Local hypermobility was considered significant if the subject did not have generalized hypermobility. Graph 2 shows the results of the scapulohumeral examination according to Sachse. It can be seen that the control group is over-represented by people with an “A” rating (no hypermobility). People with a rating of “B” and “C” do not even make up half of those tested, 40.9% to be precise. In overhead athletes, individuals with a physiological rating of “A” are only 4.1% and, conversely, a rating of “C”, the highest possible hypermobility rating for this test, was found in 79.5% of overhead athletes.

Scapulohumeral joint hypermobility according to Sachse - dominant arm



Scapulohumeral joint hypermobility according to Sachse - nondominant arm



Graph 2 Evaluation of scapulohumeral joint hypermobility according to Sachse in control group and overhead athletes in a) dominant arm and b) non dominant arm (expressed as a percentage)

ROM in compare of dominant and non-dominant arm in overhead athletes

Table 1 shows statistically significant difference in ROM in the shoulder joint of the dominant arm between overhead athletes and the control group. Measurements were performed in active and passive ROM, and comparisons and results from active ranges are included in the paper. No significant difference was observed for passive ROM.

Table 1 Comparison of shoulder joint active ROM of overhead athletes and control groups

Dominant arm	P-value	Result
Sagittal plane – Extension	0.002	ROM athletes increased
Sagittal plane – Flexion	0.121	ROM athletes not increased
Vertical plane – Abduction	0.190	ROM athletes not increased
Transverse plane – Adduction	0.100	ROM athletes not increased
Transverse plane – Abduction	0.123	ROM athletes not increased
Rotation – External Rotation	0.000	ROM athletes increased
Rotation – Internal Rotation	1.000	ROM athletes not increased

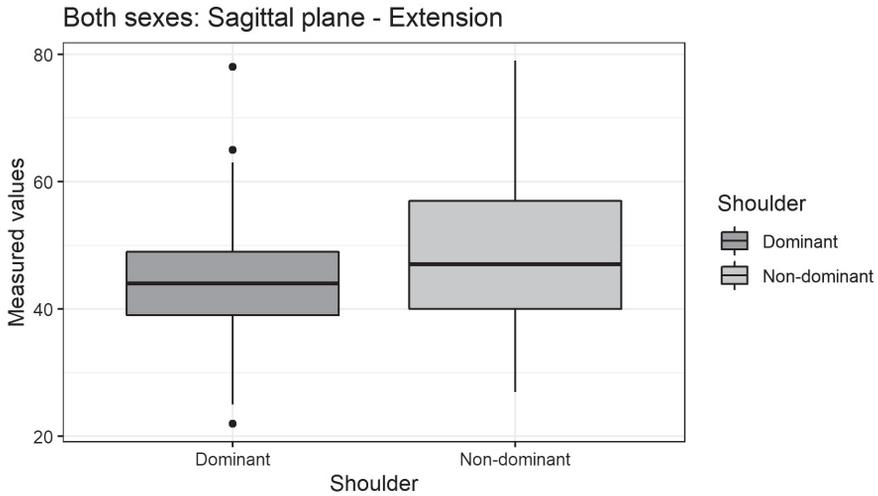
Table 2 compares the difference in ROM between the dominant and non-dominant arm in the examined group of overhead athletes. The difference and thus the asymmetry was found in the extension and external rotation.

Table 2 Comparison of dominant and non-dominant shoulder joint in active ROM movement in overhead athletes overhead athletes

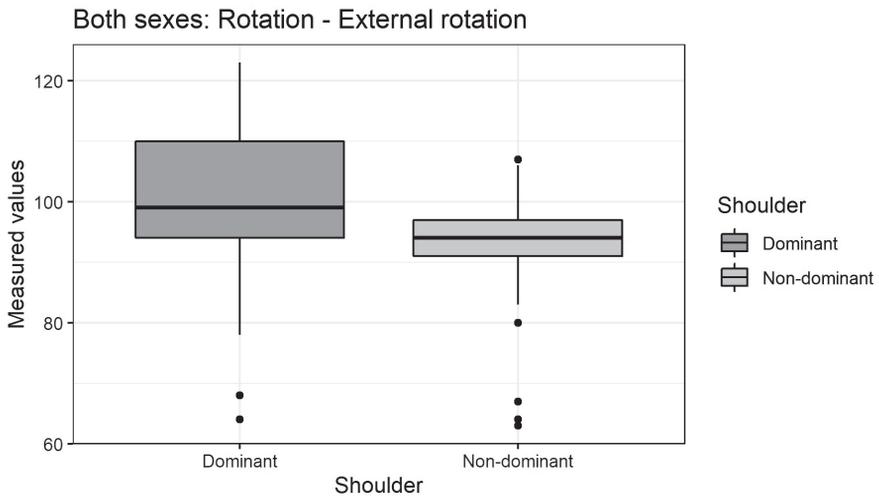
Athletes	P-value	Result
Sagittal plane – Extension	0.034	asymmetry in ROM
Sagittal plane – Flexion	0.366	no asymmetry
Vertical plane – Abduction	0.091	no asymmetry
Transverse plane – Adduction	0.416	no asymmetry
Transverse plane – Abduction	0.300	no asymmetry
Rotation – External Rotation	0.000	asymmetry in ROM
Rotation – Internal Rotation	0.326	no asymmetry

Extension in the sagittal plane (see Graph 3) was more pronounced in non-dominant shoulder joints of overhead athletes.

Another direction of movement, where a significant difference between the dominant and non-dominant arm of overhead athletes was discovered, was external rotation. External rotation had a higher extent in the dominant shoulder joint of overhead athletes. As can be seen in Graph 4, both shoulder joints of overhead athletes exceed the physiological limit of 90° in external rotation. The extent of the non-dominant arm is slightly above this limit, the dominant arm exceeds the limit by 9°. There are also some participants in the graph whose ranges of external rotation are very different



Graph 3 Extension of dominant and non-dominant shoulder joint in overhead athletes (given in degrees)



Graph 4 External rotation of the dominant and non-dominant shoulder joint in overhead athletes (given in degrees)

from the rest of the measured set. These participants are highlighted by a black dot in the graph, and with the exception of one case of a non-dominant arm, these were reduced ranges of motion in external rotation. Despite these differences, the difference between the shoulder joints is significant.

Our study showed that females compared to males playing overhead sports have significantly higher internal rotation rates of both dominant and non-dominant arms (Table 3).

Table 3 Comparison dominant and non-dominant shoulder joint in active ROM in overhead athletes according to gender

Athletes – dominant arm	P-value	Result
Sagittal plane – Extension	0.786	no difference
Sagittal plane – Flexion	0.408	no difference
Vertical plane – Abduction	0.387	no difference
Transverse plane – Adduction	0.075	no difference
Transverse plane – Abduction	0.357	no difference
Rotation – External Rotation	0.094	no difference
Rotation – Internal Rotation	0.000	significant difference ROM
Athletes – nondominant arm	P-value	Result
Sagittal plane – Extension	0.202	no difference
Sagittal plane – Flexion	0.552	no difference
Vertical plane – Abduction	0.481	no difference
Transverse plane – Adduction	0.070	no difference
Transverse plane – Abduction	0.594	no difference
Rotation – External Rotation	0.859	no difference
Rotation – Internal Rotation	0.000	significant difference ROM

DISCUSSION

Both volleyball and handball participants showed an increased ROM to extension in the sagittal plane. The increased range may be due to the nature of the start of the spike in volleyball. Here, the emphasis is on maximum engagement in the shoulder joints with extended elbow joints, so that subsequently the arms during flexion in the shoulder joints help to make the maximum vertical jump and thus the attacker obtains optimal conditions for attack. According to the literature, handball shows the upper arc of the stretch when throwing the ball. This is the most common way and the fastest way to throw the ball. Very often, however, in handball players you can see the ball leading the so-called lower arc, when the dominant arm with the ball reaches maximum extension, in modern handball, when thrown up from the lower arc, recedes, especially due to the length of holding the ball. In handball, there is also a method of shooting so-called shot and undershot. When shooting with a shot or undershot, the dominant arm with the ball during the stretch phase gets back to maximum extension (Šibila, Pori, & Bon, 2003).

Due to the nature of volleyball and handball, a significant burden is placed on external rotation. Wilk et al. (2011) described that there is a significant difference in the ROM between the external and internal rotators on the dominant shoulder joint. This author described that overhead athletes usually have a full ROM, but on the dominant arm the external rotation is increased by 10° to 15° and the internal rotation is reduced by 10° to 15° compared to the non-dominant arm. The results of this research agree with this statement.

The scarf test showed an increased range of the control group compared to overhead athletes, the difference was clear between the rating “A”, ie the physiological range, and the rating “B” mild hypermobility. However, this test is not only affected by the hypermobility of the shoulder joint, but especially by muscle hypertrophy (mainly pectoralis major and biceps humeri) and also by muscle tension, which is significantly higher in athletes than in the control group not performing any sport at the performance level. For this reason, the control group appears to be more hypermobile in this test.

A comparison of the symmetry of the ROM of the shoulder joints in the Sachse arm test was also performed. When inserted into the created scale and graphical comparison, it can be seen that the group of overhead athletes has, according to this measurement, significantly greater asymmetry between the shoulder joints than the control group. In athletes, 10 participants received a “D” rating, the highest degree of asymmetry in this test. In the control group, this evaluation was not achieved in any of the participants. This test confirms the difference in the ROM of the dominant arm between the athletes and the control group, but also between the dominant and non-dominant arm of the overhead athletes. When testing hypermobility of joints in overhead athletes with a control group on a Telos device, Borsa did not report any difference between these groups. The results of our research do not agree with this statement (Borsa et al., 2005).

Examination of the scapulohumeral joint is the most important test for this study in terms of hypermobility. The results of this research agree with the statement of Wilk and Arrigo (1992) that overhead athletes have a significant laxity of the scapulohumeral joint. These authors mentioned the hypermobility of this joint in overhead athletes as a “thrower’s laxity”. In the Sachse scapulohumeral joint test, the phenomenon of muscle tension mentioned in the scarf test can be eliminated. This test showed that overhead athletes are highly hypermobile in the scapulohumeral joint. 79% of overhead athletes had the highest “C” rating. In contrast, only 5% had a physiological range. In contrast, the control group had an absolute majority (59%) with a physiological score of “A”. From my point of view, this test is the most accurate evaluation, it targets exactly the given joint and the result of the examination cannot be significantly skewed, because the therapist actively participates in the examination with a clearly defined fixation.

The Beighton score was also measured when testing participants. According to the scale of this testing, it can be said that both sets were balanced in terms of generalised hypermobility.

The results show that the increased ranges of motion in extension and external rotation in goniometric measurements, as well as the increased frequency of hypermobility in the scapulohumeral joint is caused by the practice of overhead sport and is not caused by generalised hypermobility of the individual.

When comparing the ranges of movement of the dominant arms of athletes performing handball and volleyball, there was no significant difference.

When comparing the dominant and non-dominant arms in our study in overhead athletes, it was confirmed that the ranges of movement of the dominant and non-dominant arms differ significantly statistically. Compared to the Seabra study, however, the ROM in other directions differs in our study, namely in extension in the sagittal plane

and in external rotation (Seabra et al., 2017). The increased active ROM to external rotation coincides with the Saccol study from 2016 (Saccol et al., 2016).

Extension in the sagittal plane was more pronounced in non-dominant shoulder joints. At first glance, this is a surprising measurement result, which in overhead athletes was caused mainly by volleyball participants. In my opinion, the result is caused by the stereotype of a smashing step. During the smash run, both arms, as already mentioned, get to the maximum extension, then the arms swing into the flex to allow the maximum vertical jump and the player obtains optimal conditions for attack. At the moment of contact with the ball, the dominant shoulder joint must stabilize more due to the impact of the hand on the ball. The non-dominant shoulder joint in a volleyball attack may not have this need and for this reason the non-dominant shoulder joint has a greater ROM in this direction.

External rotation was increased in the dominant shoulder joints. To achieve game goals in volleyball and handball, the shoulder dominant joint gets into extreme positions in external rotation compared to the non-dominant joint, so the ROM in this direction between the shoulders is different.

CONCLUSION

The altered ROM of the dominant arm of the sports group in two directions was demonstrated. Furthermore, local hypermobility of the scapulohumeral joint, asymmetry of the ROM of the shoulder joints and the Beighton score for generalised hypermobility were demonstrated in athletes, which was represented in both groups evenly.

The comparison of female and male athletes in the active ranges of movement measured goniometrically turned out in such a way that women showed a higher significant range in the internal rotation of the dominant and non-dominant arm.

The comparison between volleyball and handball participants turned out without a statistically significant difference. Thus, essential for a physiotherapist regarding the ROM of the shoulder joints is the fact that the athlete performs an overhead sport, in this case a ball overhead sport, rather than a specific sport.

In the last part, the work was devoted to comparing the dominant and non-dominant arms in each participant, ie athletes, but also in the control group. No significant difference in movement between the arms was found in the control group. In the group of athletes, there was a significant difference in extension in the sagittal plane and in external rotation. A higher extent was measured in the extension in the non-dominant arm and in the external rotation in the dominant arm.

Author contributions

PB, TN and LŽ contributed to the initial development of research, its preparation and implementation, PB led the measurements and contributed to statistical analysis.

Institutional review board statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by Ethics Committee (EC of Charles University, FTVS, EK 149/2019). Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

REFERENCES

- Beighton, P. H., Grahame, R., & Bird, H. (2011). *Hypermobility of joints*. Springer Science & Business Media.
- Bigliani, L. U., Codd, T. P., Connor, P. M., Levine, W. N., Littlefield, M. A., & Hershon, S. J. (1997). Shoulder motion and laxity in the professional baseball player. *The American Journal of Sports Medicine*, 25(5), 609–613.
- Borsa, P. A., Wilk, K. E., Jacobson, J. A., Scibek, J. S., Dover, G. C., Reinold, M. M., & Andrews, J. R. (2005). Correlation of range of motion and glenohumeral translation in professional baseball pitchers. *The American Journal of Sports Medicine*, 33(9), 1392–1399.
- Janda, V. (2004). *Muscle function tests (in Czech)*. Prague: Grada Publishing.
- Jobe, F. W., & Pink, M. (1993). Classification and treatment of shoulder dysfunction in the overhead athlete. *Journal of Orthopaedic & Sports Physical Therapy*, 18(2), 427–432.
- Lewit, K. (2009). *Manipulative therapy: Musculoskeletal medicine*. Elsevier Health Sciences.
- Norkin, C. C., & White, D. J. (2016). *Measurement of joint motion: a guide to goniometry*. F.A. Davis.
- Pappas, A. M., Zawacki, R. M., & Sullivan, T. J. (1985). Biomechanics of baseball pitching: A preliminary report. *The American Journal of Sports Medicine*, 13(4), 216–222.
- Russek, L. N. (1999). Hypermobility syndrome. *Physical therapy*, 79(6), 591–599.
- Saccol, M. F., Almeida, G. P. L., & de Souza, V. L. (2016). Anatomical glenohumeral internal rotation deficit and symmetric rotational strength in male and female young beach volleyball players. *Journal of Electromyography and Kinesiology*, 29, 121–125.
- Sachse, J., & Janda, V. (2004). Constitutional hypermobility: a review. *Manuelle Medizin*, 42(1), 33–40.
- Satrapová, L., & Nováková, T. (2012). Hypermobility in sport (in Czech). *Rehabilitace a fyzikální lékařství*, 19(4), 199–202.
- Seabra, P., Van Eck, C. F., Sá, M., & Torres, J. (2017). Are professional handball players at risk for developing a glenohumeral internal rotation deficit in their dominant arm?. *The Physician and Sportsmedicine*, 45(2), 77–81.
- Šibila, M., Pori, P., & Bon, M. (2003). Basic kinematic differences between two types of jump shot techniques in handball. *Universitatis Palackianae Olomucensis Gymnica*, 33(1), 19–26.
- Wilk, K. E., & Arrigo, C. (1992). An integrated approach to upper extremity exercises. *Orthopaedic Physical Therapy Clinics of North America*, 1(2), 337–360.
- Wilk, K. E., Macrina, L. C., Fleisig, G. S., Porterfield, R., Simpson, C. D., Harker, P., ... & Andrews, J. R. (2011). Correlation of glenohumeral internal rotation deficit and total rotational motion to shoulder injuries in professional baseball pitchers. *The American Journal of Sports Medicine*, 39(2), 329–335.
- Wilk, K. E., Meister, K., & Andrews, J. R. (2002). Current concepts in the rehabilitation of the overhead throwing athlete. *The American Journal of Sports Medicine*, 30(1), 136–151.

Effect of high protein diet in activity of antioxidants and level of inflammation on sprint athlete

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ABSTRACT

This study aims to analyze the effect of a low-carbohydrate high-protein diet to increase the level of antioxidant, decrease inflammation and improve performance of athlete. The research was carried out by experimental research methods, within the design of "Randomized Control Group Pretest Posttest Design". A sample was taken from 20 people who met the inclusion and exclusion criteria from 30 teenage athletes in PASI East Java sprints. The Data were collected by measuring the sprint results by finish photo camera and laboratory examinations to determine the levels of antioxidants (SOD) and the inflammation degree (TNF- α) in blood. The data were analyzed using multivariate technique (Manova) Hotelling's method (T2). Hypothesis testing using $\alpha = 0.05$. The results and conclusions of the study stated that the normal diet had no effect on the variables of sprint running speed, SOD and TNF- α levels. While low-carbohydrate and high-protein diet can increase SOD levels of 211.44/gHb, reduce (TNF- α) at least 0.309 pg/ml, and the average increase in antioxidant activity caused by low-carbohydrate-high-protein diet is 24.989/gHb higher than normal diet, the decrease in the degree of inflammation is 0.196 pg/ml, however, it has no effect on the speed of sprint.

KEYWORDS

inflammation; SOD; TNF; food; diet

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INTRODUCTION

The results of several physical tests on athletes, which were held by the central KONI in order to face the Asean Games and Sea Games, indicated that their physical condition was still inadequate. Physical condition is an important element and becomes the basis for developing techniques, tactics, strategies and mental development (Santoso, 2007). One of the important factors to achieve optimal physical condition is a proper nutrition (Wilmore & Costil, 2004). An athlete who is talented and motivated to

train will not reach his optimal potential without making the right diet/eating choices (Maughan, 2009). It shows that the nutritional aspect is very supportive to achieve an optimal performance (Wilmore & Costill, 2004), one of the efforts to maintain health is to observe the effect of diet on free radicals that occur due to physical exercise, it is expected that the nutritional intake contains high levels of antioxidants. Thus, it can counteract the free radicals that occur and reduce the inflammation degree. A high amount of free radicals will cause the damage of cell and tissue, therefore it can interfere with the health of an athlete and reduce the athlete's performance, it can be seen by measuring the effect on running speed.

Exercise can cause an increase in the use of oxygen, especially by contracting muscles, it cause an increase in electron leakage from mitochondria which will become ROS/RONS (radical compounds) and followed by oxidative with every possible negative consequences such as pain, damage cell and performance (Harijanto, 2006; Powers & Jackson, 2008; Souza et al., 2005). A form of anaerobic exercise is sprint. Sprint is running at maximum speed, regardless of the covered distance (Williams, 2009). As reported by (Jówko et al., 2015) that sprinting, is a maximal exercise in short time, it causes considerable cell damage that stimulates oxidative stress, it can be prevented by antioxidants supplements (Hammouda et al., 2012; Jówko et al., 2015).

It has been explained above, that free radicals stimulate inflammation. Inflammation is a form of the body's defense system or immune system that is needed in body's defense framework to overcome infection or the entry of microbes into the body that can cause disease. However, excessive inflammation will actually interfere with the body's physiological processes. A symptoms of inflammation is indicated by the production of cytokines, one of which is TNF- α (Djauzi, 2002). In strenuous exercise there is an increase in cytokines of blood circulation. Muscle contraction stimulates the production and release of cytokines, which can affect metabolism and modify cytokine production in other organs (Pedersen et al., 2009). Beside the physical exercise, the release of TNF- α is also increased due to a high-carbohydrate diet (Gonzalez et al., 2012). A high intake of fruits and vegetables can reduce plasma levels of cytokines as a symptom of inflammation and oxidative stress (Root et al., 2012).

The total calories recommended by most people is a diet that contain 55–60% carbohydrates, not more than 35% fat (less than 10% saturated fat) and 10–15% protein, and it turns out that the ingredients of this diet are the most suitable support for Athletes (Kusnanik et al., 2011; Maughan, 2009; Wilmore & Costill, 2004).

Nowadays, low-carbohydrate diet with high protein or fat is widely recommended. The use of this diet among athletes can help to change human body composition, however the effect of every athlete performance is different. The Diet Zone is a low-carb, high-protein diet to improve athletic performance. in case of swimmers at Stanford University, he won 8 gold medals in Barcelona and various swimming championships in US (Sears, 1997). This Diet zone contains macronutrients with a composition of 40% carbohydrates, 30% protein, and 30% fat, rich of fruits and vegetables, within an amount of 1735 calories, for athletes (Sears, 2001). A Research by Burke indicated that an athlete's performance will be good for high-carbohydrate diet (Burke et al., 2011). Moreover, Bosse et al's study found that, there is no significant differences between

the control group and diet zone on blood glucose, blood lipids and treadmill exercise (Bosse et al., 2004). Based on the different opinion above, modifications were made for the diet zone, is a diet with low-carbohydrates and high-protein related to the required calories of athletes and a suitable menu for Indonesians, with a ratio of 30% carbohydrates, 40% protein 30% fat, and rice which is a source of carbohydrate replaced with vegetables and fruit, while protein is obtained from animal and vegetable proteins, by the total of 3000 calories/day.

The diet used in this study is a diet with low carbohydrates, high in protein and rich of fruits and vegetables, while antioxidants are generally enzymes formed by protein as a protection of free radicals (Ikram et al., 2009).

This study aims to determine the effect of giving a low-carbohydrates and high protein diet which can be seen in sprinter athletes by increasing running speed of laboratory for increasing antioxidant activity (SOD), decreasing inflammation (TNF- α).

RESEARCH METHODOLOGY

This research is a quasi-experimental study using a research design of “*Randomized Pretest-Posttest Control Group Design*”. The target population is every youth short-distance runner, aged 13–15 years from Indonesian Athletics Association (PASI) East Java, both male and female, within an amount of 30 people.

Due to the small amount of population, the samples in this study were those who met the following inclusion and exclusion criteria. The Inclusion criteria: Male or female sprint athlete, aged 13–15 years, non-smoker, did not suffering from diabetes mellitus, have no plan for specific diet for three months before the beginning of the research and not taking any drugs that will affect neuromuscular and metabolic. Non-verbally, they are willing to take part in the research and fulfill the prescribed procedures, and sign the consent form. The number of samples obtained is the sample that meet the inclusion criteria, then divided into 2 groups with the same number or maximum difference of a sample, and the balance on the number of men and women is balanced.

The athlete’s performance data was obtained by testing the 60 m sprint with 2 repetitions. The tool used to determine the speed is the finish photo, with the units of measurement in seconds. While the antioxidant activity data (SOD) was obtained by laboratory tests using blood serum, with laboratory examination equipment using RX Monza SD 125 manuals of μ /ml and the inflammation degree with laboratory tests of blood serum and the TNFSF1 Immunoassay of μ /pg.

Data analysis technique

Based on the examined problems, which considering the design form in *Randomized Pretest-Posttest Control Group Design*, the data were analyzed using the Multivariate Analysis of Variance technique in form of Paired Comparison Hotelling’s (T2) method (Johnson & Wichern, 1992).

RESULT AND DISCUSSION

Descriptive data of actual intake subject.

Table 1 The subject of actual intake

Nutrients	Normal Diet		Low-carbohydrate, high protein diet	
	Average menu/day	Actual intake/day	Average menu/day	Actual intake/day
Energy (cal)	2235.3	2191.62	3035.93	2927.65
Protein (gram)	146.0	142.69 (26.2%)	216.28	205.61 (30.2%)
Fat (gram)	90.7	89.84 (37.2%)	155.08	151.63 (50.2%)
Carbohydrate (gram)	204.7	198.80 (36.6%)	141.82	132.99 (19.2%)

Table 2 Descriptive analysis result of post-test differences and pre-test bound variables for normal diet and low-carbo high-protein diets

	Variant	Difference posttest-pretest Normal Diet	Difference between posttest-pretest Low-carbo, high protein diet
1	Athlete Performance (60 m sprint)	0.3090 second	0.1460 second
2	Antioxidant activities (SOD)	36.73 µ/gHb	216.79 µ/gHb
3	Inflamation degree (TNF-α)	-0.3004 pg/ml	-0.8317 pg/ml

Data analysis

To observe the changes in dependent variables due to normal diet, paired comparison technique analysis was performed. Based on the results of analysis on paired comparison technique Hotelling’s method, it is obtained $T^2 = 0.5141$, while $T_{\alpha} (p, N-1) = T^{0.05} (4.9) = 27.202$. Because $T^2 = 0.05141 < 27.202 = T^{0.05} (4.9)$, it is concluded that there is no increase in the variables of athletes performances, antioxidants and there is no decrease in inflammatory symptoms due to the normal diet.

To observe the change of dependent variable as a result of low carbo-high protein diet, paired comparison analysis technique was done. Based the analysis of paired comparison technique Hotelling’s method, it is obtained $T^2 = 33.326$, while $T^{0.05} (4.9) = 27.202$. Because $T^2 = 33.326 > 27.202 = T^{0.05} (4.9)$. To investigate which components of are not 0.95% simultaneous confidence intervals are used. The results of the analysis are presented in the following table below:

Table 3 The results of simultaneous confidence intervals analysis ($\alpha = 0.05$) dependent variables on low carbo, high protein diet

Diet Variant	Dependent variable	Mean difference Coefficient	Simultaneous Confidence Intervals 95%	
			Lower limit	Upper limit
Low Carbo – High protein diet	Athlete performances (60m sprint)	0.146 second	-0.3852 second	0.6772 second
	Antioxidant activity (SOD)	216.79 µ/gHb	211.44 µ/gHb	222.1359 µ/gHb
	Inflamation degree (TNF-α)	-0.8315 pg/ml	-1.354 pg/ml	-0.309 pg/ml

Based on table 3, it can be seen that the average antioxidant value for the population begin from 211.44/gHb to 222.1359/gHb, it means that the antioxidant activity

increases at least 211.44/gHb. for the inflammation degree of the average value of population, ranges from -1.354 to -0.309 pg/ml, it means that there is a minimum decrease of 0.309 pg/ml. Therefore, low carbo, high protein diet is effective to increase an activity of antioxidant and reducing inflammation.

The result of similarity test of bound variables

The results for Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root criteria, was obtained sig. $0.037 < \alpha = 0.05$. Thus, the mean vector for Normal diet (μ_1) is not the same as mean vector for a low-carbo, high-protein diet (μ_2). It means that there are components which the vector μ_1 and vector μ_2 have different values. To find out which components are different, simultaneous confidence intervals are used with a 95% confidence level obtained from the results of computer software is obtained as the following table below:

Table 4 Results of simulated confidence intervals analysis (0.05) dependent variables on normal diet and low carbo, high protein diet

Independent Variable	Dependent Variable	Mean difference Coefficient	Simultaneous Confidence Intervals 95%	
			Lower limit	Upper limit
Diet	Athlete performances (60 m sprint)	-0.129 second	-0.798 second	1.416 second
	Antioxidant (SOD)	126.76 μ /gHb	24.989 μ /gHb	228.531 μ /gHb
	Inflamation Degree (TNF- α)	-0.566 pg/ml	-0.936 pg/ml	-0.196 pg/ml

Based on table 4. the analytical results as shown in the table can be concluded as: there is no significant difference between Normal diet and low-carbo, high-protein diet in terms of improving athlete performance. There is a significant difference between Normal diet and low-carbo high-protein diet in terms of increased antioxidant activity. Furthermore, the average increase in antioxidant activity caused by the low-carbo high-protein diet is higher than what caused by normal diet. The average increase in antioxidant activity caused by low-carbo, high-protein diet at least 24.989/gHb more than the average increase in antioxidant activity caused by normal diet. There is a significant difference between Normal diet and the low-carbo, high-protein diet in terms of decreasing the inflammation degree. Furthermore, the average decrease in inflammation degree caused by the low-carbo, high-protein diet is higher than what it caused by Normal diet. The average decrease in the inflammation degree caused by low Carbo, high protein diet at least 0.196 pg/ml lower than the average decrease in inflammation degree caused by Normal diet.

DISCUSSION

Food intake analysis

The results of the study showed that the actual intake of food consumed by the sample was lower than what was planned before, for example, the expected amount of energy in treatment group was 3035.95 cal/day, however the actual intake was 2927.65 cal/day,

and it also happen on carbohydrates, fats and proteins, in normal diet group and the treatment group, as shown in table 1 before.

Diet is influenced by several factors, including socio-cultural factors, public knowledge about healthy and balanced food consumption patterns, types of available food, food promotion factors, the acceptance of trained sensory and also psychological factors (Sirajuddin et al., 2018). There seems to be a cultural difference between participants and the arrangement of the served menu. Because mainly, the menu consists of side dishes and vegetables, without rice or it substitutes for the treatment group, and there are always leftovers on their plates. It is known that traditional foods have a high in fiber in form of vegetables and fruit which are less attractive to children and teenager. It was found that 93.6% of Indonesia's population aged over 10 years did not eat enough vegetables and fruits (Sirajuddin et al., 2018). And the psychological factor, where participants get bored quickly with the menu that is served and have to be spent, seems to be quite influential on the actual intake of participants. And psychological factor, where participants quickly get bored over the served menu that have to be spent, seems to be quite influential on the actual intake of participants. Therefore, the food intake actually consumed by the lower than the expected sample.

The effect of diet analysis

The results of the study on samples receiving normal diet treatment, within the length of treatment given in this study for 15 days, both for nutrition and exercise because it is stated that after 2-weeks training program there will be an increase in athlete performance (Bompa & Haff, 2009). The results of other studies also state that the length and intensity of exercise causes neural adaptation that can increase muscle strength start from 15–20 days of training (Hayashida et al., 2014). However, the results of the study by Van Zant et al. (2002) in which study subjects received a high-carbohydrate, low-fat and low-carbohydrate, high-protein diet who received moderate-intensity exercise for 6 weeks, did not show significant changes in the strength of knee at the end of the study (Van Zant et al., 2002). It is similar to the research by Fleming et al. (2003) that has the length of treatment for 6 weeks and Vogt et al. (2003), by 5 weeks of treatment. It's also known that training for a competition takes a whole year, six months, or twelve weeks (Thompson, 1991). Furthermore, the required time for training program to produce an improvement of performance, takes a long time.

It has been explained that in the first 2 weeks of the change or improvement in physical performance, it is possible that the participants have not experiences any change, and it takes longer times for the changes to be appear.

Nutritional conditioning and exercise have no visible effect on the athlete's running speed. The results of SOD measurement levels in normal diet category were much lower than low-carbohydrate high-protein diet. Also the levels of TNF- α which is one of the cytokine markers of inflammation did not experience significant changes after the sample received a normal diet and exercise, which means it was unable to reduce the inflammation degree in athletes.

The effect of a low-carbohydrate high-protein diet on increasing athlete performance and antioxidant levels and the decrease of inflammation degree obtained the average value of antioxidant activity, and the population increased at least 211.44 μ /gHb, the degree of inflammation decreased at least 0.309 pg/ml. Thus, this diet is effective on

increasing antioxidant activity and reducing the inflammation degree, however there is no change in variable of athlete's running speed.

In low-carbohydrate high-protein diet group, the time required to run 60 m did not show a statistical significant change. However, in this treatment group, they could cover a distance of 60 m in a shorter time, which experience a decreased in speed 2.8% than normal diet group, which experienced a decrease in speed of 4.06%. It indicated that high-protein diet has positive effect on running speed, because the exercise that given to both groups is the same exercise.

The decrease in speed of both normal diet group and the low carbohydrate and high protein diet is probably happen due to the lack of training time, therefore the physical condition of participants has not reached the peak yet, and the low volume and exercise intensity (Thompson, 1991). Beside, psychological factors may have a role. It is said that victory and defeat in sports often depend on the mental quality of the athlete (Raglin & Hanin, 2000). If it is considered that psychological factors are relative same in both of the groups, then physical factors happen due to the provision of diet that supports the performance in treatment group can be understood.

In low carbohydrates, high protein diet, it has the effect of increasing the antioxidant status of the body as indicated by significant increase in SOD of 24.989 $\mu\text{g}/\text{Hb}$, thus it can counteract free radicals, especially due to the carried out physical exercise.

For antioxidant activity (SOD) in low carbohydrates high protein diet group, the results of the analysis showed that high protein and high vegetable and fruit diet was able to increase antioxidant activity in human body. Beside vegetables and fruit provided in fairly large portions, which are a fairly high source of antioxidants, the provided protein is also quite high. It is well known that an important line of defense against harmful oxidants are enzymes including glutathione peroxidase, superoxide dismutase and catalase (Powers & Jackson, 2008). Enzymes are formed from the availability of protein. With high antioxidant activity, it can reduce free radicals formed due to strenuous physical exercise, therefore it can improve the performance of athlete.

Some facts indicated that giving antioxidant supplements can protect the body from the muscle damage caused by the process of oxidation (Nakhostin-Roohi et al., 2008; Silva et al., 2010). It will accelerate the athlete's recovery phase, especially from endurance training and consequently improve the athlete's performance. Supplements are not a substitute for dietary fiber. Including the use of FVB (*Fruit vegetable and Berry*) (Bloomer & Goldfarb, 2004). This supplement cannot replace the daily intake of fiber, which is 20–35 g each day (Lamprecht, 2015). Therefore, the intake of foods that rich in vegetables and fruit is much safer and recommended as a daily source of antioxidants.

The results of statistical analysis indicated that a low-carbo high-protein diet was able to reduce the inflammation degree (TNF- α) of 0.196 pg/ml. It shows that food intake in this diet group is able to reduce the inflammation process that can be formed due to the exercise. A community study indicated that consumption of a fruit and vegetables combination associated with the decreased plasma levels of five proinflammatory cytokines and biomarkers of oxidative stress and increased the capacity of antioxidant (Root et al., 2012).

Oxidative stress causes an inflammatory response of the immune system to protect body tissues. Strenuous physical exercise will cause neutrophilia and lymphopenia,

the decrease of NK cell activity and T cell function, the decrease of salivary IgA and increase pro-inflammatory cytokines and chemokines (Nieman & Bishop, 2006). Antioxidant diets or antioxidant supplements are known to reduce the inflammation in the athletes respiratory (Wood et al., 2012). Generally, the research used supplement which proven to reduce any inflammation (Arent et al., 2010).

Complete foods that contain more than an antioxidant are more effective at increasing the capacity of antioxidant capacity (Wood et al., 2012). Therefore, a diet that contains high natural antioxidants, is better than the use of supplements for athlete.

The analysis result on the difference of normal diet and low-carbohydrate high-protein diet on increasing athlete performance and antioxidant levels also decreasing the inflammation degree indicated significant difference between normal diet and a low-carbo high-protein diet in terms of increasing the activity of antioxidant (SOD) within the increase of average at least 24.989 μ /gHb more than the increase in SOD caused by normal diet, and the decrease in inflammation degree (TNF- α) with an average decrease of 0.196 pg/ml lower than the average decreased in TNF- α caused by normal diet. This is related to the previous studies, which indicated that after 6 months of a high-protein diet compared to a high-carbohydrate diet, without physical exercise, it has an effect on the decrease in oxidative stress, higher decrease in pro-inflammatory cytokines in high-protein diet (Kitabchi et al., 2013). The decrease in TNF- α of low-carbohydrate high-protein group was happen due to a high-glucose diet that increase the expression of *monocyte chemoattractant protein - 1* (MCP-1) (Shanmugam et al., 2003). In humans MCP-1 induces chemotaxis, calcium entry into cells, upregulates adhesion molecule expression and cytokine production. In humans MCP-1 induces chemotaxis, calcium entry into cells, upregulates adhesion molecule expression and the production of cytokine. The cytokines are TNF alpha and IL 1 β (Shanmugam et al., 2003). Therefore, this low carbohydrates diet group, can reduce TNF alpha levels.

CONCLUSION

Low-carbohydrate, high-protein diet can increase antioxidant activity by 211.44 μ /gHb, reduce the inflammation degree by 0.309 pg/ml. however, it has no effect on sprint athletes running speed.

Therefore, low carbohydrates, high protein diet that rich in fruits and vegetables can be recommended for athletes, to increase running speed and improve body health by increasing antioxidant activity and reducing inflammation, it means that the level of cell damage due to free radicals that was formed during the exercise can be lowered, thereby reducing fatigue, recovery time, injuries, can support athletes to achieve the highest achievement.

REFERENCES

- Arent, S. M., Pellegrino, J. K., Williams, C. A., DiFabio, D. A., & Greenwood, J. C. (2010). Nutritional Supplementation, Performance, and Oxidative Stress in College Soccer Players. *Journal of Strength and Conditioning Research*, 24(4), 1117–1124.
- Bloomer, R. J., & Goldfarb, A. H. (2004). Anaerobic Exercise and Oxidative Stress: A Review. *Canadian Journal of Applied Physiology*, 29(3), 245–263.
- Bompa, T. O., & Haff, G. G. (2009). *Periodization: Theory and Methodology of Training*. 5th ed. Champaign, IL: Human Kinetics.

- Bosse, M. C., Davis, S. C., Puhl, S. M., Pedersen, M., Low, V., Reiner, L., Dominguez, T., & Seals, N. (2004). Effects of Zone diet macronutrient proportions on blood lipids, blood glucose, body composition, and treadmill exercise performance. *Nutrition Research*, 24(7), 521–530.
- Burke, L. M., Hawley, J. A., Wong, S. H. S., & Jeukendrup, A. E. (2011). Carbohydrates for training and competition. *Journal of Sports Sciences*, 29(Supl. 1), S17–S27.
- Djauzi, S. (2002). *Kursus Immunologi Dasar Penyakit Infeksi*. Malang: Universitas Brawijaya.
- Fleming, J., Sharman, M. J., Avery, N. G., Love, D. M., Gómez, A. L., Scheett, T. P., Kraemer, W. J., & Volek, J. S. (2003). Endurance Capacity and High-Intensity Exercise Performance Responses to a High-Fat Diet. *International Journal of Sport Nutrition and Exercise Metabolism*, 13(4), 466–478.
- Gonzalez, Y., Herrera, M. T., Soldevila, G., Garcia-Garcia, L., Fabián, G., Pérez-Armendariz, E. M., Bobadilla, K., Guzmán-Beltrán, S., Sada, E., & Torres, M. (2012). High glucose concentrations induce TNF- α production through the down-regulation of CD33 in primary human monocytes. *BMC Immunology*, 13(1), 19.
- Hammouda, O., Chtourou, H., Chaouachi, A., Chahed, H., Ferchichi, S., Kallel, C., Chamari, K., & Souissi, N. (2012). Effect of Short-Term Maximal Exercise on Biochemical Markers of Muscle Damage, Total Antioxidant Status, and Homocysteine Levels in Football Players. *Asian Journal of Sports Medicine*, 3(4), 239–246.
- Hariyanto (2006). Antioksidan dan Latihan Olahraga. *Jurnal Kedokteran YARSI*, 14(1), 70–77.
- Hayashida, I., Tanimoto, Y., Takahashi, Y., Kusabiraki, T., & Tamaki, J. (2014). Correlation between Muscle Strength and Muscle Mass, and Their Association with Walking Speed, in Community-Dwelling Elderly Japanese Individuals. *PLoS ONE*, 9(11), e111810.
- Ikram, E. H. K., Eng, K. H., Jalil, A. M. M., Ismail, A., Idris, S., Azlan, A., Nazri, H. S. M., Diton, N. A. M., & Mokhtar, R. A. M. (2009). Antioxidant capacity and total phenolic content of Malaysian underutilized fruits. *Journal of Food Composition and Analysis*, 22(5), 388–393.
- Johnson, R., & Wichern, D. (1992). *Applied Multivariate Statistical Analysis*. Prentice Hall.
- Jówko, E., Długolecka, B., Makaruk, B., & Cieśliński, I. (2015). The effect of green tea extract supplementation on exercise-induced oxidative stress parameters in male sprinters. *European Journal of Nutrition*, 54(5), 783–791.
- Kitabchi, A. E., McDaniel, K. A., Wan, J. Y., Tylavsky, F. A., Jacovino, C. A., Sands, C. W., Nyenwe, E. A., & Stentz, F. B. (2013). Effects of High-Protein Versus High-Carbohydrate Diets on Markers of -Cell Function, Oxidative Stress, Lipid Peroxidation, Proinflammatory Cytokines, and Adipokines in Obese, Premenopausal Women Without Diabetes: A randomized controlled trial. *Diabetes Care*, 36(7), 1919–1925.
- Kusnanik, N., Nasution, J., & Hartono, S. (2011). *Dasar-dasar Fisiologi Olahraga*. Unesa: Unesa University Press.
- Lamprecht, M. (2015). *Antioxidants in Sport Nutrition*. Boca Raton.
- Maughan, R. J. (2009). Nutrition Needs of Athletes. In: *The Olympic Textbook of Science in Sport*. Wiley-Blackwell.
- Nakhostin-Roohi, B., Babaei, P., Rahmani-Nia, F., & Bohlooli, S. (2008). Effect of vitamin C supplementation on lipid peroxidation, muscle damage and inflammation after 30-min exercise at 75% $\dot{V}O_{2max}$. *The Journal of Nutrition*, 48(2), 217–224.
- Nieman, D. C., & Bishop, N. C. (2006). Nutritional strategies to counter stress to the immune system in athletes, with special reference to football. *Journal of Sports Sciences*, 24(7), 763–772.
- Pedersen, B. K., Ostrowski, K., Rohde, T., & Bruunsgaard, H. (2009). The cytokine response to strenuous exercise. *Canadian Journal of Physiology and Pharmacology*, 76(5), 505–511.
- Powers, S. K., & Jackson, M. J. (2008). Exercise-Induced Oxidative Stress: Cellular Mechanisms and Impact on Muscle Force Production. *Physiological Reviews*, 88(4), 1243–1276.

- Raglin, J. S., & Hanin, Y. L. (2000). Competitive anxiety. In: Y. L. Hanin (Ed.), *Emotions in sport* (pp. 93–111). Human Kinetics.
- Root, M. M., McGinn, M. C., Nieman, D. C., Henson, D. A., Heinz, S. A., Shanelly, R. A., Knab, A. M., & Jin, F. (2012). Combined Fruit and Vegetable Intake Is Correlated with Improved Inflammatory and Oxidant Status from a Cross-Sectional Study in a Community Setting. *Nutrients*, 4(1), 29–41.
- Santoso, S. (2007). *Kondisi Fisik Prima Sama Dengan Emas PON?* Buletin KONI DIY.
- Sears, B. (1997). *Mastering The Zone*. HarperCollins Publishers, Inc.
- Sears, B. (2001). *The Top 100 zone foods*. Harper Collins Publisher, Inc.
- Shanmugam, N., Reddy, M. A., Guha, M., & Natarajan, R. (2003). High Glucose-Induced Expression of Proinflammatory Cytokine and Chemokine Genes in Monocytic Cells. *Diabetes*, 52(5), 1256–1264.
- Silva, L. A., Pinho, C. A., Silveira, P. C. L., Tuon, T., De Souza, C. T., Dal-Pizzol, F., & Pinho, R. A. (2010). Vitamin E supplementation decreases muscular and oxidative damage but not inflammatory response induced by eccentric contraction. *The Journal of Physiological Sciences*, 60(1), 51.
- Sirajuddin, Surmita, & Astuti, T. (2018). *Survey Konsumsi Pangan* (Rezkinia (ed.)).
- Souza, T., Oliviera, Pereira, B. (2005). Physical exercise and oxidative stress, effect of intense physical exercise on urinary chemiluminescence and plasmatic malondialdehyde. *Revista Brasileira de Medicina do Esporte*, 11(1), 97–101.
- Thompson, P. (1991). *Introduction to Coaching Theory*. International Amateur Athletic Federation.
- Van Zant, R. S., Conway, J. M., & Seale, J. L. (2002). A moderate carbohydrate and fat diet does not impair strength performance in moderately trained males. *The Journal of Sports Medicine and Physical Fitness*, 42(1), 31–37.
- Vogt, M., Puntchart, A., Howald, H., Mueller, B., Mannhart, C., Gfeller-Tuescher, L., Mullis, P., & Hoppeler, H. (2003). Effects of Dietary Fat on Muscle Substrates, Metabolism, and Performance in Athletes. *Medicine & Science in Sports & Exercise*, 35(6), 952–960.
- Williams, C. (2009). Physiological Demands of Sprinting and Multiple-Sprint Sports. In: Maughan, R. J. (Ed.), *Olympic Textbook of Science in Sport* (pp. 25–42). Wiley-Blackwell.
- Wilmore, J. H., & Costill, D. L. (2004). *Physiology of sport and exercise*. Champaign, IL: Human Kinetics.
- Wood, L. G., Garg, M. L., Smart, J. M., Scott, H. A., Barker, D., & Gibson, P. G. (2012). Manipulating antioxidant intake in asthma: a randomized controlled trial. *The American Journal of Clinical Nutrition*, 96(3), 534–543.

Market potential of TikTok in the context of the communication range of soccer players on social networks

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ABSTRACT

The study aims to put the social network TikTok into the context of the marketing attractiveness and potential of soccer players in terms of communication range through social networks. Soccer clubs can assess the expenses of gaining additional followers through a purchased player by an evaluation of the market efficiency of individual soccer players' followers. The study also documents positive effects ensuing from the acquisition of further followers thanks to the purchase of such a player including image, connection with fans, global reach, additional external funds through sponsorship and the sale of television rights, loyal fans and other so-called "extra-football qualities". The study thus brings new perspectives on TikTok, as a network which has so far not been thoroughly researched, in the field of the most popular sport in the world, soccer.

KEYWORDS

TikTok; soccer players; social media; market value; market efficiency; penetration of social network

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INTRODUCTION

TikTok is a social network which is currently experiencing a considerably higher growth in popularity, users and number of downloads than other contemporary social networks, primarily Facebook, Twitter and Instagram (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020), where purely communication platforms used by these networks, such as WhatsApp and Facebook Messenger, are not taken into consideration. The use of Twitter is, unlike Facebook and Instagram (networks which are the subject of research), vastly different in various countries, as Özsoy (2011) and Yoon, Petrick, & Backman (2017) have shown in studies from Turkey and the USA. Nevertheless, it ranks together with these among the three most used social networks for communicating with sports fans (Mogale, 2020;

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Yoon, Petrick, & Backman, 2017). TikTok currently has around 800 million users (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020). TikTok has a strong influence on people's behaviour, especially those of a young age (Mogale, 2020), much as has long been the case for other social networks (Shoham et al., 2012). With regard to the expected development on social networks (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020) it is desirable to include TikTok among relevant social network-based communication channels, both from the perspective of marketing communication in general, and from the perspective of marketing communication of the most widespread and most popular sport in the world, i.e., football/soccer (Müller, Simons, & Weinmann, 2017; WorldAtlas.com, 2020; TotalSportek.com, 2020; BiggestGlobalSports.com, 2020). Soccer players, as the sport's main participants, are thereby provided with another means of communicating directly with their supporters, fans and the public without misrepresentation of information by the mass media (Gibbs, O'Reilly, & Brunette, 2014; Özsoy, 2011; Hambrick, et al., 2010). The study actually focuses on the inclusion of the social network TikTok, as the currently fastest growing form of social media, in the context of marketing attractiveness and potential of soccer players in terms of communication range through social networks.

THEORETICAL BACKGROUND

Today, social networks are an inseparable part of the marketing communication of not only all professional sports teams and clubs (Anagnostopoulos, Parganas, Chadwick, & Fenton, 2018; Watanabe, Yan, & Soebbing, 2016; Vale & Fernandes, 2018; Yoon, Petrick, & Backman, 2017), but also of individual athletes themselves, soccer players in particular (Li & Huang, 2015; Sanderson, 2013; Müller, Simons, & Weinmann, 2017; Pérez, 2013; Gibbs, O'Reilly, & Brunette, 2014; Tiago, et al., 2016). Within the scope of sporting entity marketing communication, social networks can be used for various marketing objectives. Anagnostopoulos, Parganas, Chadwick, & Fenton (2018) point out the effect of Instagram for strengthening the brand performance of soccer clubs in the English Premier League through considerable and increasing fan engagement, and thereby increasing congruence between a soccer club's desired and perceived brand image. As well as brand image, the need for information on the brand, brand empowerment and love for a brand are other driving forces for the use of social networks in sports marketing for building a fan base (Vale & Fernandes, 2018). Information directly from sports brands (clubs, teams and individuals), and the associated increase of credibility, involvement and attractiveness, significantly strengthens fan loyalty to the brand (Yoon, Petrick, & Backman, 2017). The more fans a sporting entity has, the more attractive it will be for obtaining external sources of funding, which are provided by sponsors/business partners, the media through the purchase of broadcasting rights, and other spectators and potential fans (Pieters, Knobens, & Pouwels, 2012). Followers on social networks also act as further opinion leaders and propagators of communications, through their contacts, to other recipients, thus increasing communication ranges through the profiles of athletes in social networks even further (Araujo, 2019). Followers and fans are essentially "co-producers" of a sports product and salient stakeholders in the value co-creation process (Zagnoli & Radicchi, 2010).

Since interaction and communication on social networks is a very dynamic process, sporting entities have to work with these tools both strategically and in view of the overall organisational goals of the team, club or individual (Watanabe, Yan, & Soebbing, 2016). When strategically planning communication on social networks, it is important to pay particular attention to the production of creative content relating to specific events on the particular entity's sporting calendar, and also to pay attention to perspectives and reviews after such events, as these are important factors for the positive development of the number of followers on social networks (Watanabe, Yan, & Soebbing, 2015). Creative content is also important during sporting events themselves, because spectators and fans today often make use of media multitasking while following a sports match or the performance of an athlete (Weimann-Saks, Ariel, & Elishar-Malka, 2020).

The above facts primarily present the positives of communication of sports subjects on social networks, however, Waters et al. (2011) remind us of the limited control over content on the profiles of sports organisations and the insufficient provability of return on investment. They therefore point all the more to the need for administration of profiles on social networks, especially if they have as many followers as soccer clubs and individual soccer players do (Waters et al., 2011).

Social networks in the marketing communication of soccer players

Just like sporting entities in general, individual athletes (for the purpose of this study soccer players) use social networks as a platform for communication, media ownership and content, their own publicity (marketing communication) and their own brand building (Gibbs, O'Reilly, & Brunette, 2014). But they also add a behind-the-scenes look at their professional and personal lives (Gibbs, O'Reilly, & Brunette, 2014; Caslavova & Voracek, 2019; Voracek, 2019). Direct individual communication between players and fans via social networks facilitates a greater connection between fans and the whole team, for which the particular soccer player plays, thereby creating closer and more connected interactive communication between players, fans and teams (Watanabe, Yan, & Soebbing, 2016; Williams & Chinn, 2010; Gibbs, O'Reilly, & Brunette, 2014). Teams which then buy individual players have the opportunity to obtain and expand their own fan base online, representing a significant opportunity for team managers (Vale & Fernandes, 2018). Fans also function as a means of support and defence of athletes and by extension also their teams against unauthorised communication attacks from other parties, whether they are from the media, the general public, or fans of other players and teams (Sanderson, 2013). Mutual interaction and communication is thus referred to as the core of the relationship between fans (followers) and an athlete on social networks (Witkemper, Lim, & Waldburger, 2012).

Fans (followers) on social networks can ultimately have such power that they become part of an athlete's decision-making process regarding which team they should join or play for. This has been shown, for example, in a study of Chris Bosh, a basketball player in the NBA (Sanderson, 2013). Bosh and the agency representing him let his followers on Twitter vote for which team he should move to from the Toronto Raptors for the 2010/2011 season (Sanderson, 2013).

Of course, mutual communicative relationships require the creation of high-quality content, as has already been stated (Watanabe, Yan, & Soebbing, 2015). In sport,

especially for professional sports teams and individuals, particular attention must be paid to the authenticity and scope of engagement, as these are very important aspects for communicating on social networks (Pronschinske, Groza, & Walker, 2012). Immediacy and exclusivity of information and content have also proved to be important factors, particularly, for example, for women's soccer players (Coche, 2014), though this can also apply to men's players. Each social network is suited to a different kind of content or, as the case may be, fans use each of them for a different purpose and need for information, as stated by Lock (2019). Facebook, for example, focuses more on support from fans, Instagram is aimed more at fun, and Twitter is a centre for up-to-date information (Lock, 2019; Gibbs, O'Reilly, & Brunette, 2014). Information and entertainment appear to be important factors for motivating followers on the social network pages of individual athletes (Witkemper, Lim, & Waldburger, 2012).

Social networks and the market value of soccer players

Herm, Callsen-Bracker, & Kreis (2014, p. 484) define the market value of a professional athlete, such as a soccer player, as “an estimate of the amount of money a club would be willing to pay in order to make this athlete sign a contract, independent of an actual transaction.” Therefore, even though the actual final transfer fee may be different (Moreno-Jiménez & Zaragoza, 2011; Herm, Callsen-Bracker, & Kreis, 2014; Müller, Simons, & Weinmann, 2017), market value is a relevant variable for the conducted study, because it remains a basic monetary value for subsequent transfer negotiations for both the selling and buying club (Müller, Simons, & Weinmann, 2017).

Numerous studies and authors have dealt with the influence of various factors on the final market value of soccer players (Majewski, 2016; Kologlu, et al., 2018; Aregall Abadias, 2016; Moreno-Jiménez & Zaragoza, 2011; Müller, Simons, & Weinmann, 2017; Singh & Lamba, 2019; He, Cachucho, & Knobbe, 2015; Bolgova, et al., 2018; Richau, Follert, & Emrich, 2010; Kiefer, 2012; Herm, Callsen-Bracker, & Kreis, 2014; Goff, Kim, & Wilson, 2017; Kanyinda, Bouteiller, & Karyotis, 2012). According to Majewski (2016), the factors that most influence a soccer player's market value are total goals and “assists”, the value of the club that the player plays for, and the player's goodwill and “brand”. Goodwill and brand can be significantly influenced by the activity and communication of players on social networks (Gibbs, O'Reilly, & Brunette, 2014). Aregall Abadias (2016) shows the significant influence of social networks on the market value of soccer players (specifically, a 1% increase in followers on Facebook means an increase in market value of €3,567,000, while a 1% increase in followers on Twitter equals an increase in market value of €3,109,000). Conversely, Moreno-Jiménez & Zaragoza (2011) state that the influence of external relationships (which include fans and the mass media) on market value and on transfer fees is not particularly significant (specifically carrying a weight of 1.3%). Müller, Simons, & Weinmann (2017) also present a summary of the many factors that have an influence on the market value of soccer players, among them internet popularity, which also makes use of social media (specifically Facebook, Reddit and YouTube). Their effect on market value, however, is minimal (Müller, Simons, & Weinmann, 2017). A soccer player's overall popularity, image and brand can also be referred to as “extra-soccer qualities”, which undoubtedly have a major or minor influence on market value (Kanyinda, Bouteiller, & Karyotis, 2012). Bolgova, et al. (2018) even point out the indirect influence of

physical attractiveness on player transfers, and thus on the players' market value. On the other hand, a soccer player's current market value can also manifest itself in his image and his ability to attract crowds, because of his personality and the original and even exotic way in which he dresses or sports more or less fashionable hair styles (Kanyinda, Bouteiller, & Karyotis, 2012). This can then mean additional income for the club generated by merchandising (Kanyinda, Bouteiller, & Karyotis, 2012). Social networks and media in general are suitable tools which both soccer clubs and individual players use to propagate such "extra-soccer qualities", not only on the local but also on the global market (Rowe & Gilmour, 2010; Wagg, 2007; Sondaal, 2013). The number of followers on such social media is considered to be one of the most important KPIs in the soccer industry for social media marketing (Podobnik, 2013).

RESEARCH OBJECTIVES

The main objective of the study is to research the inclusion of the social network TikTok, as the currently fastest growing form of social media, in the context of the marketing attractiveness and potential of soccer players in terms of communication range through social networks.

The TikTok social network currently appeals primarily to the younger generation of soccer fans and recipients of communications from the world's most popular soccer players. It has already taken its place among large social media, which primarily include Facebook, Twitter and Instagram. Today, these social media form a basic communication framework for direct communication between soccer players and their fans from all over the world. The main aim of the work concentrates the following partial research objectives (RO's):

RO1: an analysis of the market efficiency of soccer players from the point of view of the market value of followers for individual players on individual social networks (Facebook, Twitter, Instagram and TikTok)

RO2: an analysis of the market efficiency of soccer players from the point of view of the market value of followers for individual players on the overall communication range of profiles on social networks

RO3: an estimate of the market potential of TikTok in the context of the communication range of soccer players on social networks

METHODS

Participants/Research sample

The basic research sample chosen for the research is the top 100 soccer players according to their current market value (as per the website Transfermarkt.com) as of 18 March 2020. The top 100 soccer players have also been chosen because they have the greatest communication range via social networks and they use (with just a few exceptions) all three of the most widespread networks – Facebook, Twitter and Instagram – at the same time. The research therefore counts a total of 100 observations, or 100 observed subjects ($N = 100$), whose current market value ranges from €200 million (maximal MV – Kylian Mbappé) to €50 million (minimal MV – Nicolò Zaniolo).

Procedure

The first stage of the study consists in monitoring the official profiles of all 100 soccer players on selected social networks – Facebook (FB), Twitter (TW), Instagram (IG) and TikTok (TT). Important figures for the collection of data are the number of followers of each soccer player and the subsequent sum of figures from individual networks as the so-called Social Network Reach (hereinafter referred to as “SN reach”) – all data as of 18 March 2020.

The second stage then calculates the market efficiency of soccer players from the point of view of the market value of followers for individual players on individual social networks (Facebook, Twitter, Instagram and TikTok) and on the total SN reach. This calculation is always performed by computing the ratio between the player’s market value and the number of followers. It is thus possible to obtain an interesting overview of the potential attractiveness and, above all, the potential effectiveness of funds spent on the purchase of a player (here expressed as the market value) for gaining more fans for a soccer club through the social network profiles of soccer players. In addition to the resulting individual values, the values of the basic statistical description for the entire research sample are calculated here (mean, valid mean, median and standard deviation).

The third stage focuses on an estimate of the market potential of TikTok in the context of the communication range of soccer players on social networks. Market potential is estimated on the basis of existing figures of followers and users on social networks in 2020 (specifically from the most up-to-date data from Statista.com and the individual profiles of soccer players as of 18 March 2020). As a benchmark value for the estimate, the study uses the soccer player with the greatest number of followers on Facebook, Twitter and Instagram and who, at the same time, shows the greatest market efficiency from the perspective of the market value of followers. In this case, it is Cristiano Ronaldo (for values see Results). The number of followers that he has achieved are related (by ratio) to the total number of users of individual social networks (Facebook, Twitter and Instagram), the sum of the users of the three mentioned networks (*modified SN reach*) and the total number of unique social network users. The current number of TikTok users is multiplied by the obtained penetration indices (referred to in the study as the *CR indices*). This creates a battery of five numerical (number of followers) estimates, from which the *mean potential* (including the average *CR index*) is then determined. The *CR indices* are also interpreted as the potential penetration of TikTok in the case of the expected and forecasted growth (and thus changes) in the number of users (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020).

RESULTS

(R01, R02) Market efficiency of soccer players in terms of the market value of followers on social networks

The overall main results of the market efficiency of soccer players in terms of market values of followers on social networks are clearly specified and presented in Appendix 1. The overall results are supplemented by Appendix 2, in which a logarithmic scale is again used for the *y-axis* because of the possibility of displaying significantly different values. Market efficiency is only calculated here for the valid research sample for individual social networks, so only valid descriptive statistics are presented.

The overall results indicate the dominance of Instagram (similarly to the number of followers) even in terms of market efficiency of communication on social networks, where the hypothetical costs (for a potential buyer from a club) for gaining another follower are $Valid\ M = €535.73$. The standard deviation for Instagram is also the lowest ($Valid\ SD = €4,722.10$) among the individual networks. Instagram surpasses the other social networks even more noticeably in median value ($Valid\ Med = €26.04$). It can therefore be noted that the hypothetical costs (for a potential buyer from a club) for gaining another follower on Instagram are equal to or lower than €26.04 for 50% of soccer players (from the studied top 100 players according to market value). A significant point of interest is the clear similarity of Instagram results to the efficiency of the overall SN reach ($Valid\ M = €500.07$, $Valid\ SD = €4,526.74$ and $Valid\ Med = €20.35$). From this perspective, Instagram is the most important of all four studied social networks.

Other social networks in terms of the researched and measured efficiency lag behind Instagram and, as a consequence, also the overall SN reach. Facebook lags behind the least ($Valid\ M = €1,469.94$, $Valid\ SD = €5,653.46$ and $Valid\ Med = €154.72$). It is followed by Twitter ($Valid\ M = €28,559.15$, $Valid\ SD = €173,950.53$ and $Valid\ Med = €134.23$), albeit with a lower and therefore more efficient median than Facebook. TikTok so far appears to be a highly inefficient communication network ($Valid\ M = €3,132,639.05$, $Valid\ SD = €6,899,395.12$ and $Valid\ Med = €22,102.94$), however the thus far low use of the network by the top 100 soccer players ($Valid\ N = 25$) must be taken into account.

An interesting comparison is also provided in Appendix 1 when looking at the results of individual players. The current relatively low market value of Cristiano Ronaldo ($MV = €75,000,000$, which is his lowest since 7 January 2010 according to Transfermarkt.com) further increased the market efficiency of the communication range with a *total SN value* of €0.18. In addition to TikTok ($TT\ value = €386.00$), the hypothetical cost (for a potential buyer from a club) for gaining another follower through C. Ronaldo (as the only one of the top 100 surveyed) on all social networks is less than €1.00 ($FB\ value = €0.60$, $TW\ value = €0.90$, and $IG\ value = €0.36$). Cristiano Ronaldo and his attained values (both communication range and market efficiency of communication on social networks) can therefore be seen as a benchmark for a subsequent estimate and calculation of the market potential of TikTok in the context of the communication range of soccer players on social networks.

In contrast, Rodri (Manchester City) has a relatively high market value for his age ($age = 23$, a young player with good prospects) $MV = €80,000,000$ (even higher than C. Ronaldo), but his total SN reach is only 1,757 people (followers on social networks). In terms of communication range on social networks, this means hypothetical costs for Manchester City with a *total SN value* of €45,532.16 per follower. In comparison with the *total SN value* of other soccer players, Rodri is highly inefficient among the research sample, with orders of magnitude worse than other players in the sample (the second worst efficiency is shown by Mikel Oyarzabal of Real Sociedad with a *total SN value* of €748.13). It is important to note, however, that both players (Rodri and Mikel Oyarzabal) only use two of the four social networks for communication, Twitter and Instagram. In the case of Rodri, it is therefore clear that his market value ($MV = €80,000,000$ – currently ranking him as the 32nd best player in terms of market value) reflects entirely different aspects of the player (e.g., performance in the

game) to a much greater extent than marketing and communication attractiveness. Even so, this result can be viewed positively from the perspective of significant future marketing and communication potential, which could be significantly influenced by his currently high market value.

(R03) Estimate of the market potential of TikTok in the context of the communication range of soccer players on social networks

The results of the calculation of an estimate of the market value of TikTok in terms of the communication range of soccer players on social networks is presented in Appendix 3. For comparison, Appendix 3 also presents the current greatest communication range on TikTok from the ranks of soccer players, specifically Mohamed Salah (*TT followers* = 530,700), Alphonso Davies (*TT followers* = 427,200) and Cristiano Ronaldo (*TT followers* = 194,300).

The estimated market potential of number of followers of soccer players on TikTok has multiple variants, depending on which social network or what number of users the estimate is based on. An estimate (index and number of followers) calculated on the basis of Instagram can particularly be considered to produce important and relevant values. Current statistics on TikTok users are very similar to the other studied social networks in terms of age and gender of users (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Statista.com, 2020). However, the relevance of an estimate based on Instagram is based on the form and style of posts (TikTok – 15s videos, Instagram – Insta Stories short videos), the largest average use of Instagram (and number of followers) for soccer players, and the fact that according to the study Datareportal: Digital 2020 (2020), up to 500 million people watch short videos on Instagram on at least a monthly basis.

The estimated potential number of followers of soccer players on TikTok is therefore 166,400,000, while the average estimate from the studied social networks is 115,796,545 followers. Of course, attaining these values will only be realistic for exceptionally popular soccer players of the future, following the example of contemporary players C. Ronaldo, L. Messi, or Neymar Jr. However, a more important figure than the estimate of the absolute number of followers, which can be found in Appendix 3, is the so-called CR index, which expresses the ratio of the number of followers of C. Ronaldo (the chosen benchmark for estimating potential) to the number of users on the social network. This index is then applicable for the future development (increase/decrease) of the number of users of the selected social networks, including TikTok. An estimate based on Instagram attains a CR index of 0.208 (20.8%). An estimate based on the studied social networks produces an average CR index of 0.14475 (14.475%). For the top 100 soccer players (according to market value), the estimated market potential (number of followers) of TikTok is therefore up to 14.5–21% (115.8–166.4 million in 2020) from the total number of TikTok users (800 million in 2020).

DISCUSSION AND IMPLICATIONS

This study presents the currently fastest growing social network, TikTok (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020), in the overall context of the communication range of soccer players on social networks. The social networks that form the overall context for this study are Face-

book, Twitter and Instagram, which are currently the most popular and most widely used by athletes (Mogale, 2020; Yoon, Petrick, & Backman, 2017) and especially by soccer players. For this reason, the study does not cover other social media such as YouTube, Reddit and Pinterest, which some athletes and sports clubs also use for their marketing communications. In addition, each social network is suited to and used for different kinds of content (Lock, 2019; Gibbs, O'Reilly, & Brunette, 2014). The soccer players who have been selected for the study are currently in the top 100 by market value according to the Transfermarkt.com website. The use of market values from Transfermarkt.com is justified by the fact that Transfermarkt.com is "*the leading website on the soccer transfer market*" according to Müller, Simons, & Weinmann (2017, p. 612). "*The site offers general soccer-related data, such as scores and results, soccer news, transfer rumours, and estimations of market value at the individual and team levels for most professional soccer leagues.*" The results of the study show that not all soccer players in the top 100 (according to market value) use all three of the currently most widely used social networks. Based on this fact, we have derived so-called *valid* quantities, which only include those players who have their own official profile on a particular social network. For different networks, N therefore varies – for Facebook $N = 96$, for Twitter $N = 94$, and for Instagram $N = 98$. Despite the currently high number of TikTok users, which is around 800 million (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020), very few players from the research sample have their own official profile, $N = 25$. TikTok is not yet at the centre of attention of soccer players as much as other networks.

One of the significant benefits of the study is an evaluation of the market efficiency of soccer players in terms of the market value of followers on social networks. For each of the top 100 soccer players (according to market value on Transfermarkt.com), the ratio between market value and the number of followers is calculated. This provides soccer clubs with an overview of the attractiveness of a player in terms of communication range, which a potential buying club also pays for (in addition to the player himself and his performance in the game) when purchasing a player. It is therefore another aspect that a player brings to a club. Attractiveness (Kanyinda, Bouteiller, & Karyotis, 2012), image (Anagnostopoulos, Parganas, Chadwick, & Fenton, 2018; Kanyinda, Bouteiller, & Karyotis, 2012), connection with fans (Watanabe, Yan, & Soebbing, 2016; Williams & Chinn, 2010; Gibbs, O'Reilly, & Brunette, 2014), fan base (Vale & Fernandes, 2018), support and defence (Sanderson, 2013), opinion leadership (Araujo, 2019), global reach (Rowe & Gilmour, 2010; Wagg, 2007; Sondaal, 2013), sufficient external sources of funding via sponsoring and sales of television rights (Pieters, Knobens, & Pouwels, 2012), and loyal fans (Yoon, Petrick, & Backman, 2017) are all aspects which create so-called "extra-soccer qualities" (Kanyinda, Bouteiller, & Karyotis, 2012) which a soccer player brings to the club that purchases him for a certain monetary value. This can then mean additional income for the club generated by merchandising (Kanyinda, Bouteiller, & Karyotis, 2012). All of the mentioned "extra-soccer qualities" reflect the communication range (number of followers) of a soccer player on social networks; the higher the number of followers and the lower the market value, the cheaper and more attractive a soccer player is in this regard for a buying club. That is why the ratio between market value and number of followers has been chosen. The purchasing club therefore at least gains a rough idea of the efficiency

of investments, thereby partially reducing the disadvantage mentioned by Waters, et al. (2011) on the insufficient provability of return on investment into communication via social networks. In addition, followers on social networks can have the power to influence the resulting transfer fee through their own opinion on the choice of the club that a player is going to play for, as Sanderson (2013) shows.

A discussion about the choice of the variable “market value” is then well motivated, because in the end market value (on Transfermarkt.com) is not the price a soccer player is actually bought for. It would therefore be more appropriate to choose the transfer fee, as used by Moreno-Jiménez & Zaragoza (2011). As is shown in the theoretical background, however, (Moreno-Jiménez & Zaragoza, 2011; Herm, Callsen-Bracker, & Kreis, 2014; Müller, Simons, & Weinmann, 2017) market value is a basic monetary value for subsequent transfer negotiations. Müller, Simons, & Weinmann (2017, p. 611) also state that “*Market values can be understood as estimates of transfer fees – that is, prices that could be paid for a player on the soccer market – so they play an important role in transfer negotiations.*” In view of the time that this study has been conducted (during the COVID-19 pandemic) and the termination or suspension of soccer competitions, the current market values (listed on Transfermarkt.com) are a more than relevant estimate of players’ current values. That is one reason why they have been used in the study, even though they may ultimately be different to transfer fees, which will only become relevant after the restart of soccer competitions and the transfer market.

In terms of achieved results, Instagram is again the most effective social network for communication, where every follower costs on average *Valid M* = €535.73, which is very similar to the average efficiency of the total SN reach, where *Valid M* = €500.07. Among soccer players, the most efficient is Cristiano Ronaldo with the values *FB value* = €0.60, *TW value* = €0.90, *IG value* = €0.36, *TT value* = €386.00, and *Total SN value* = €0.18. His efficiency and total attained number of followers then represent the chosen benchmark for estimating the market potential of TikTok.

An estimate of the market potential of TikTok in the context of the communication range of soccer players on social networks has been calculated using the currently attained number of followers (of Cristiano Ronaldo) and users of individual networks, as well as the total number of unique users of all social media according to figures from Statista.com (January 2020) – see Appendix 3. The study thus brings another aspect for TikTok in the overall context of social network profiles of soccer players. TikTok (in a similar way to Instagram) has mostly a younger group of users (in terms of age), and it is therefore possible to consider the impact of communication by soccer players on young fans, with whom it is then possible to build a strong relationship and love for a brand, as Vale & Fernandes (2018) say. However, for soccer players and/or their marketing agency or manager representation, an additional social network means more work (Waters, et al., 2011), activities, effort and time (Waters, et al., 2011), because communication should be creative (Watanabe, Yan, & Soebbing, 2015), authentic (Pronschinske, Groza, & Walker, 2012), immediate (Coche, 2014; Witkemper, Lim, & Waldburger, 2012) and with a high quantity of engagement (Pronschinske, Groza, & Walker, 2012). It thereby places demands on systematic and strategic activities regarding the planning and implementation of communication on another social network like TikTok (Watanabe, Yan, & Soebbing, 2016).

TikTok is a network based primarily on sharing original content by way of short videos with a wide range of editing and creative options (TikTok, 2020). For soccer players, such short videos are a very attractive form of communication with fans. Particularly at times of an unexpected large-scale event such as the COVID-19 pandemic (when the study was conducted), TikTok provides a possibility to present creative content from the privacy of the players' own homes, a fact which is supported by the authors Watanabe, Yan, & Soebbing (2015), Gibbs, O'Reilly, & Brunette (2014), Čáslavová & Voráček (2019) and Voráček (2019). Short videos are also suitable for authenticity and a high level of engagement (Pronschinske, Groza, & Walker, 2012). The ease and speed with which videos can be edited meets the requirement for immediacy, exclusivity and rapidity of the content of communications (Coche, 2014; Witkemper, Lim, & Waldburger, 2012).

Given the characteristics of TikTok, the study uses Cristiano Ronaldo (as a benchmark) and Instagram for the resulting relevant estimate of the market potential of soccer players' communication range. Instagram is indeed the most widely used network by soccer players, as the results of this study show. In addition, its content is particularly oriented towards entertainment (Lock, 2019; Gibbs, O'Reilly, & Brunette, 2014), which proves to be an especially important factor for motivating followers on the social network profiles of individual athletes (Witkemper, Lim, & Waldburger, 2012). The resulting relevant estimate of TikTok's market potential in the context of the communication range of soccer players on social networks is up to 14.5–21% of followers (115.8–166.4 million in 2020) from the total number of TikTok users (800 million in 2020). At present, the penetration of soccer players with the largest number of followers on TikTok is only 0.066% (530,700 followers) of the total number of users (800 million). There is therefore a great, as yet unfulfilled and unused future potential for the growth of communication on this social network.

Limitations and future research

The presented study naturally has certain restrictions and limitations. One of the most important restrictions is the already mentioned use of market values in spite of the fact that the resulting value at which a soccer player is traded between teams is different and depends on individual negotiations of the soccer clubs involved (Moreno-Jiménez & Zaragoza, 2011; Herm, Callsen-Bracker, & Kreis, 2014; Müller, Simons, & Weinmann, 2017). The study is then further limited to the use of Facebook, Twitter and Instagram, although both soccer clubs and players themselves use other social media, such as YouTube, Reddit and Pinterest. However, these other networks are not as widespread and widely used as Facebook, Twitter and Instagram (Statista.com, 2020). The study includes only the top 100 soccer players according to their current market value (on Transfermarkt.com), which excludes even players of such popularity (in terms of communication range and brand image or brand awareness) as Daniel Carvajal, Isco, Jordi Alba, David de Gea, Georginio Wijnaldum, Mateo Kovačić, Karim Benzema, Gareth Bale, Luis Suárez, and others. The last limitation is the performance of static analyses that do not reflect the dynamic development over time in recent years. If this was taken into account, an even more sophisticated and accurate estimate of the market potential of TikTok could be made.

The above-mentioned limitations are an opportunity for further future research dealing with the market efficiency of social networks not only of soccer players, but

also of individual athletes in other sports branches or entire sports clubs. That being said, the social network TikTok as a whole provides a primary stimulus for future research. Not only is it the currently fastest growing social network in terms of user numbers (Omnicores.com, 2020; Datareportal: Digital 2020, 2020; Socialbakers.com, 2020; Statista.com, 2020), but it is also a thus far rather unexplored network in sport and in many other possible areas in general.

CONCLUSION

The study puts the TikTok social network, as the currently fastest growing form of social media, into the context of marketing attractiveness and potential of soccer players in terms of communication range through social networks. According to the ascertained results, TikTok is currently a minimally used social network among soccer players. The largest number of followers is only 530,700 (Mohamed Salah), while on Facebook it is 126,023,622 (Cristiano Ronaldo), on Twitter 83,100,000 (also C. Ronaldo), and on Instagram 208,000,000 (again C. Ronaldo). On the other hand, there is all the more space for producing something new, attractive and creative, and for taking advantage of potential such as that offered by TikTok. All of this is demonstrated by the ascertained market efficiency values of followers of individual players. The conclusion is a final estimate of the market potential of TikTok in the context of the communication range of soccer players on social networks. According to the method used to calculate this estimate, followers range from 14.5–21% (115.8–166.4 million in 2020) of the total number of TikTok users.

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REFERENCES

- Anagnostopoulos, C., Parganas, P., Chadwick, S., & Fenton, A. (2018). Branding in pictures: using Instagram as a brand management tool in professional team sport organisations. *European Sport Management Quarterly*, 18(4), 413–438.
- Araujo, T. (2019). The impact of sharing brand messages: How message, sender and receiver characteristics influence brand attitudes and information diffusion on Social Networking Sites. *Communications*, 44(2), 162–184.
- Aregall Abadias, Ó. (2016). Econometric model for the valuation of football players. *BiggestGlobalSports.com: A statistics-based analysis of the world's most popular sports* (2020). Retrieved from <http://www.biggestglobalsports.com>.
- Bolgova, V., Vinopal, M., Nikitina, N., & Pustokhina, T. (2018). Pretty is as pretty plays: the influence of physical attractiveness on the transfer value of football players. Available at SSRN 3203312.
- Datareportal: Digital 2020 – global digital overview (2020). Retrieved from <https://datareportal.com/reports/digital-2020-global-digital-overview>.
- Caslavova, E., & Voracek, J. (2019). Marketing Trends in Social Networking Sites Usage in Sport. *International Journal of Sport Communication*, 3(4), 396–400. UT-WOS: 000467818300003.
- Coche, R. (2014). What women's soccer fans want: A Twitter study. *Soccer & Society*, 15(4), 449–471.

- Gibbs, C., O'Reilly, N., & Brunette, M. (2014). Professional team sport and Twitter: Gratifications sought and obtained by followers. *International Journal of Sport Communication*, 7(2), 188–213.
- Goff, B. L., Kim, H. Y., & Wilson, D. P. (2017). Estimating the market value of collegiate football players from professional factor shares. *Applied Economics Letters*, 24(4), 233–237.
- Hambrick, M. E., Simmons, J. M., Greenhalgh, G. P., & Greenwell, T. C. (2010). Understanding professional athletes' use of Twitter: A content analysis of athlete tweets. *International Journal of Sport Communication*, 3(4), 454–471.
- He, M., Cachucho, R., & Knobbe, A. J. (2015). Football Player's Performance and Market Value. In: *MLSA@ PKDD/ECML* (pp. 87–95).
- Herm, S., Callsen-Bracker, H. M., & Kreis, H. (2014). When the crowd evaluates soccer players' market values: Accuracy and evaluation attributes of an online community. *Sport Management Review*, 17(4), 484–492.
- Kanyinda, A., Bouteiller, C., & Karyotis, C. (2012). Human capital: assessing the financial value of football players on the basis of real options theory. *Investment management and financial innovations*, (9, Iss. 4), 27–37.
- Kiefer, S. (2012). *The impact of the Euro 2012 on popularity and market value of football players* (No. 11/2012). Diskussionspapier des Instituts für Organisationsökonomik.
- Kologlu, Y., Birinci, H., Kanalmaz, S. I., & Ozyilmaz, B. (2018). A Multiple Linear Regression Approach For Estimating the Market Value of Football Players in Forward Position. arXiv preprint arXiv:1807.01104.
- Li, Z., & Huang, K. W. (2015). The monetary value of twitter followers: Evidences from NBA players.
- Lock, L. B. (2019). Join Our Team: How sports organizations satisfy the needs of sports fans on Twitter. *2019 NCUR*.
- Majewski, S. (2016). Identification of factors determining market value of the most valuable football players. *Journal of Management and Business Administration. Central Europe*, 24(3), 91–104.
- Mogale, S. U. (2020). A study on impact of Social Media on adolescent and youth. *Studies in Indian Place Names*, 40(42), 80–87.
- Moreno-Jiménez, J. M., & Zaragoza, G. D. M. (2011). An AHP/ANP multicriteria methodology to estimate the value and transfers fees of professional football players. *Proceedings ISAHF 2011*.
- Müller, O., Simons, A., & Weinmann, M. (2017). Beyond crowd judgments: Data-driven estimation of market value in association football. *European Journal of Operational Research*, 263(2), 611–624. doi: <http://dx.doi.org/10.1016/j.ejor.2017.05.005>.
- Omnicores.com: TikTok by the Numbers – Stats, Demographics & Fun Facts* (2020). Retrieved from <https://www.omnicoreagency.com/tiktok-statistics>.
- Özsoy, S. (2011). Use of new media by Turkish fans in sport communication: Facebook and Twitter. *Journal of Human Kinetics*, 28, 165–176.
- Pérez, L. (2013). What drives the number of new Twitter followers? An economic note and a case study of professional soccer teams. *Economics Bulletin*, 33(3), 1941–1947.
- Pieters, M., Knobben, J., & Pouwels, M. (2012). A social network perspective on sport management: The effect of network embeddedness on the commercial performance of sport organizations. *Journal of Sport Management*, 26(5), 433–444.
- Podobnik, V. (2013). An analysis of facebook social media marketing key performance indicators: The case of premier league brands. In: *Proceedings of the 12th International Conference on Telecommunications* (pp. 131–138). IEEE.
- Pronschinske, M., Groza, M. D., & Walker, M. (2012). Attracting Facebook'fans': The importance of authenticity and engagement as a social networking strategy for professional sport teams. *Sport Marketing Quarterly*, 21(4), 221.

- Richau, L., Follert, F., & Emrich, M. F. (2010). Performance indicators in football: The importance of actual performance for the market value of football players. *Sonderausgabe zur 23. Jahrestagung des Arbeitskreises Sportökonomie 2019*, 41.
- Rowe, D., & Gilmour, C. (2010). Sport, media, and consumption in Asia: A merchandised milieu. *American Behavioral Scientist*, 53(10), 1530–1548.
- Sanderson, J. (2013). From loving the hero to despising the villain: Sports fans, Facebook, and social identity threats. *Mass Communication and Society*, 16(4), 487–509.
- Shoham, D. A., et al. (2012). An actor-based model of social network influence on adolescent body size, screen time, and playing sports. *PloS one*, 7(6). doi: 10.1371/journal.pone.0039795.
- Singh, P., & Lamba, P. S. (2019). Influence of crowdsourcing, popularity and previous year statistics in market value estimation of football players. *Journal of Discrete Mathematical Sciences and Cryptography*, 22(2), 113–126.
- Socialbakers.com* (2020). Retrieved from <https://www.socialbakers.com>.
- Sondaal, T. (2013). Football's globalization or globalisation? The lessons of Liverpool Football Club's evolution in the Premier League era. *Soccer & Society*, 14(4), 485–501.
- Statista.com* (2020). Retrieved from <https://www.statista.com>.
- Tiago, T., Tiago, F., Faria, S. D., & Couto, J. P. (2016). Who is the better player? Off-field battle on Facebook and Twitter. *Business Horizons*, 59(2), 175–183.
- TikTok* (2020). Retrieved from <https://www.tiktok.com/home>.
- TotalSportek.com: 25 World's Most Popular Sports (Ranked by 13 factors)* (2020). Retrieved from <https://www.totalsportek.com/most-popular-sports>.
- Transfermarkt.com* (2020). Retrieved from <https://www.transfermarkt.com>.
- Vale, L., & Fernandes, T. (2018). Social media and sports: driving fan engagement with football clubs on Facebook. *Journal of strategic marketing*, 26(1), 37–55.
- Voracek, J. (2019). Trends and Tools in Marketing Communication in Today's Sport. In: *Proceedings of the Marketing Identity 2019: Offline Is the New Online* (pp. 390–400). UCM Trnava.
- Wagg, S. (2007). Angels of us all? Football management, globalization and the politics of celebrity. *Soccer & Society*, 8(4), 440–458.
- Watanabe, N. M., Yan, G., & Soebbing, B. P. (2016). Consumer interest in major league baseball: An analytical modeling of Twitter. *Journal of Sport Management*, 30(2), 207–220.
- Watanabe, N., Yan, G., & Soebbing, B. P. (2015). Major League Baseball and Twitter usage: The economics of social media use. *Journal of Sport Management*, 29(6), 619–632.
- Waters, R. D., Burke, K. A., Jackson, Z. H., & Buning, J. D. (2011). Using stewardship to cultivate fandom online: Comparing how National Football League teams use their web sites and Facebook to engage their fans. *International Journal of Sport Communication*, 4(2), 163–177.
- Weimann-Saks, D., Ariel, Y., & Elishar-Malka, V. (2020). Social Second Screen: WhatsApp and Watching the World Cup. *Communication & Sport*, 8(1), 123–141.
- Williams, J., & Chinn, S. J. (2010). Meeting relationship-marketing goals through social media: A conceptual model for sport marketers. *International Journal of Sport Communication*, 3(4), 422–437. doi: <https://doi.org/10.1123/ijsc.3.4.422>.
- Witkemper, C., Lim, C. H., & Waldburger, A. (2012). Social media and sports marketing: Examining the motivations and constraints of Twitter users. *Sport Marketing Quarterly*, 21(3), 170–183.
- WorldAtlas.com: The Most Popular Sports in the World* (2020). Retrieved from <https://www.worldatlas.com/articles/what-are-the-most-popular-sports-in-the-world.html>.
- Yoon, S., Petrick, J. F., & Backman, S. J. (2017). Twitter power and sport-fan loyalty: The moderating effects of Twitter. *International Journal of Sport Communication*, 10(2), 153–177.
- Zagnoli, P., & Radicchi, E. (2010). The football fan community as a determinant stakeholder in value co-creation. *Physical Culture and Sport. Studies and Research*, 50(1), 79–99.

APPENDIX 1

Descriptive statistics of market efficiency in terms of the market value of followers on social networks

	Market value	FB value	TW value	IG value	TT value	Total SN value
<i>Valid N</i>	100	96	94	98	25	100
<i>Valid M</i>	79 550 000 €	1 469.94 €	28 559.15 €	535.73 €	3 132 639.05 €	500.07 €
<i>Valid SD</i>	28 223 173.1 €	5 653.46 €	173 950.53 €	4 722.10 €	6 899 395.12 €	4 526.74 €
<i>Valid Med (Q2)</i>	70 000 000 €	154.72 €	134.23 €	26.04 €	22 102.94 €	20.35 €
<i>Top 3</i>	Kylian Mbappé	Cristiano Ronaldo	Cristiano Ronaldo	Cristiano Ronaldo	Alphonso Davies	Cristiano Ronaldo
	Raheem Sterling	Lionel Messi	Neymar	Lionel Messi	Mohamed Salah	Lionel Messi
	Neymar	Neymar	Sergio Agüero	Paulo Dybala	Cristiano Ronaldo	Toni Kroos
<i>Valid Bottom 3 (without non-profile soccer players)</i>	Rodrygo	Alphonso Davies	Joshua Kimmich	Ferran Torres	Thibaut Courtois	Ferran Torres
	Ferran Torres	Ferran Torres	Jan Oblak	Mikel Oyarzabal	Roberto Firmino	Mikel Oyarzabal
	Nicolo Zaniolo	Erling Haaland	Rodri	Rodri	Lautaro Martínez	Rodri

Note: N = number of soccer players; M = mean; SD = standard deviation; Med (Q2) = median; second quartile; Valid = without non-profile soccer players.

APPENDIX 2

Descriptive statistics of market efficiency in terms of the market value of followers on social networks

Market value rank	Player	Market value	Age	Club	FB followers	FB value
1	Kylian Mbappé	200 000 000 €	21	Paris Saint-Germain	2 526 784	79,15 €
2	Raheem Sterling	160 000 000 €	25	Manchester City	2 318 995	69,00 €
3	Neymar	160 000 000 €	28	Paris Saint-Germain	59 364 955	2,70 €
4	Sadio Mané	150 000 000 €	27	Liverpool FC	1 256 243	119,40 €
5	Mohamed Salah	150 000 000 €	27	Liverpool FC	12 651 322	11,86 €
6	Harry Kane	150 000 000 €	26	Tottenham Hotspur	1 958 259	76,60 €
7	Kevin De Bruyne	150 000 000 €	28	Manchester City	3 475 017	43,17 €
8	Lionel Messi	140 000 000 €	32	FC Barcelona	93 675 335	1,49 €
9	Jadon Sancho	130 000 000 €	19	Borussia Dortmund	85 329	1 523,51 €
10	Antoine Griezmann	120 000 000 €	28	FC Barcelona	10 821 929	11,09 €
11	Trent Alexander-Arnold	110 000 000 €	21	Liverpool FC	341 575	322,04 €
12	Bernardo Silva	100 000 000 €	25	Manchester City	363 666	274,98 €
13	N'Golo Kanté	100 000 000 €	28	Chelsea FC	1 130 926	88,42 €
14	Leroy Sané	100 000 000 €	24	Manchester City	720 381	138,82 €
15	Virgil van Dijk	100 000 000 €	28	Liverpool FC	453 479	220,52 €
16	Paul Pogba	100 000 000 €	27	Manchester United	10 318 977	9,69 €
17	Jan Oblak	100 000 000 €	27	Atlético Madrid	52 496	1 904,91 €
18	Eden Hazard	100 000 000 €	29	Real Madrid	10 023 105	9,98 €
19	João Félix	90 000 000 €	20	Atlético Madrid	146 538	614,18 €
20	Frenkie de Jong	90 000 000 €	22	FC Barcelona	278 165	323,55 €
21	Kai Havertz	90 000 000 €	20	Bayer 04 Leverkusen	43 294	2 078,81 €
22	Paulo Dybala	90 000 000 €	26	Juventus FC	7 652 069	11,76 €
23	Serge Gnabry	90 000 000 €	24	Bayern Munich	580 578	155,02 €
24	Saúl Ñíguez	90 000 000 €	25	Atlético Madrid	480 178	187,43 €
25	Roberto Firmino	90 000 000 €	28	Liverpool FC	1 240 474	72,55 €
26	Alisson	90 000 000 €	27	Liverpool FC	1 541 706	58,38 €
27	Marc-André ter Stegen	90 000 000 €	27	FC Barcelona	3 240 389	27,77 €
28	Romelu Lukaku	85 000 000 €	26	Inter Milan	2 934 461	28,97 €
29	Christian Eriksen	85 000 000 €	28	Inter Milan	145 271	585,11 €
30	Erling Haaland	80 000 000 €	19	Borussia Dortmund	1 553	51 513,20 €
31	Lautaro Martínez	80 000 000 €	22	Inter Milan	123 466	647,95 €
32	Rodri	80 000 000 €	23	Manchester City	0	
33	Sergej Milinkovic-Savic	80 000 000 €	25	SS Lazio	32 654	2 449,93 €

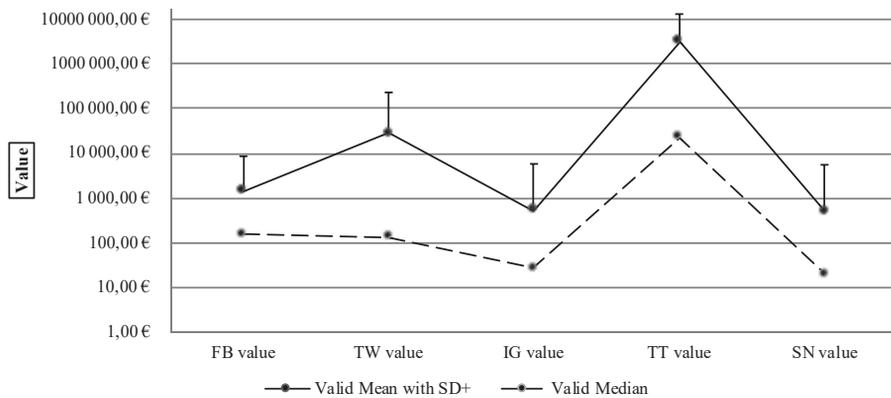
TW followers	TW value	IG followers	IG value	TikTok followers	TT value	SN Reach	SN value
3 900 000	51,28 €	39 600 000	5,05 €	28 500	7 017,54 €	46 055 284	4,34 €
2 300 000	69,57 €	6 800 000	23,53 €	0		11 418 995	14,01 €
45 700 000	3,50 €	2 000 000	80,00 €	57 900	2 763,39 €	107 122 855	1,49 €
22 700	6 607,93 €	6 900 000	21,74 €	0		8 178 943	18,34 €
11 500 000	13,04 €	37 300 000	4,02 €	530 700	282,65 €	61 982 022	2,42 €
2 800 000	53,57 €	9 500 000	15,79 €	0		14 258 259	10,52 €
2 100 000	71,43 €	10 400 000	14,42 €	33	4 545 454,55 €	15 975 050	9,39 €
2 900 000	48,28 €	145 000 000	0,97 €	18 500	7 567,57 €	241 593 835	0,58 €
266 300	488,17 €	3 600 000	36,11 €	1 868	69 593,15 €	3 953 497	32,88 €
6 800 000	17,65 €	30 000 000	4,00 €	4 576	26 223,78 €	47 626 505	2,52 €
1 100 000	100,00 €	3 900 000	28,21 €	0		5 341 575	20,59 €
755 900	132,29 €	2 000 000	50,00 €	0		3 119 566	32,06 €
891 100	112,22 €	6 700 000	14,93 €	0		8 722 026	11,47 €
1 500 000	66,67 €	4 900 000	20,41 €	176	568 181,82 €	7 120 557	14,04 €
1 600 000	62,50 €	8 900 000	11,24 €	0		10 953 479	9,13 €
7 300 000	13,70 €	39 800 000	2,51 €	1 617	61 842,92 €	57 420 594	1,74 €
108	925 925,93 €	1 200 000	83,33 €	0		1 252 604	79,83 €
6 700 000	14,93 €	26 800 000	3,73 €	5 687	17 583,96 €	43 528 792	2,30 €
159 600	563,91 €	2 900 000	31,03 €	22 300	4 035,87 €	3 228 438	27,88 €
456 800	197,02 €	6 500 000	13,85 €	3 201	28 116,21 €	7 238 166	12,43 €
43 600	2 064,22 €	633 000	142,18 €	0		719 894	125,02 €
1 900 000	47,37 €	36 700 000	2,45 €	15 400	5 844,16 €	46 267 469	1,95 €
595 500	151,13 €	1 500 000	60,00 €	0		2 676 078	33,63 €
426 200	211,17 €	1 200 000	75,00 €	0		2 106 378	42,73 €
1 626	55 350,55 €	12 900 000	6,98 €	4	22 500 000,00 €	14 142 104	6,36 €
928 000	96,98 €	6 600 000	13,64 €	0		9 069 706	9,92 €
1 800 000	50,00 €	10 900 000	8,26 €	48 200	1 867,22 €	15 988 589	5,63 €
1 900 000	44,74 €	5 900 000	14,41 €	37 200	2 284,95 €	10 771 661	7,89 €
729 600	116,50 €	2 000 000	42,50 €	0		2 874 871	29,57 €
221 700	360,85 €	3 500 000	22,86 €	0		3 723 253	21,49 €
0		2 800 000	28,57 €	3	26 666 666,67 €	2 923 469	27,36 €
56	1 428 571,43 €	1 701	47 031,16 €	0		1 757	45 532,16 €
1 279	62 548,87 €	470 000	170,21 €	0		503 933	158,75 €

Market value rank	Player	Market value	Age	Club	FB followers	FB value
34	Marcus Rashford	80 000 000 €	22	Manchester United	3 254 096	24,58 €
35	Andrew Robertson	80 000 000 €	26	Liverpool FC	235 387	339,87 €
36	Dele Alli	80 000 000 €	23	Tottenham Hotspur	681 573	117,38 €
37	Timo Werner	80 000 000 €	24	RB Leipzig	157 963	506,45 €
38	Raphaël Varane	80 000 000 €	26	Real Madrid	8 451 352	9,47 €
39	Joshua Kimmich	80 000 000 €	25	Bayern Munich	549 655	145,55 €
40	Heung-min Son	80 000 000 €	27	Tottenham Hotspur	1 085 823	73,68 €
41	Casemiro	80 000 000 €	28	Real Madrid	6 249 420	12,80 €
42	Matthijs de Ligt	75 000 000 €	20	Juventus FC	213 269	351,67 €
43	Aymeric Laporte	75 000 000 €	25	Manchester City	163 013	460,09 €
44	Marco Verratti	75 000 000 €	27	Paris Saint-Germain	2 088 835	35,91 €
45	Mauro Icardi	75 000 000 €	27	Paris Saint-Germain	617 614	121,44 €
46	Cristiano Ronaldo	75 000 000 €	35	Juventus FC	126 023 622	0,60 €
47	Gabriel Jesus	70 000 000 €	22	Manchester City	2 835 225	24,69 €
48	Arthur	70 000 000 €	23	FC Barcelona	1 682 361	41,61 €
49	Ousmane Dembélé	70 000 000 €	22	FC Barcelona	517 859	135,17 €
50	Lucas Hernández	70 000 000 €	24	Bayern Munich	92 313	758,29 €
51	José Giménez	70 000 000 €	25	Atlético Madrid	310 400	225,52 €
52	Ederson	70 000 000 €	26	Manchester City	328 893	212,84 €
53	Fabinho	70 000 000 €	26	Liverpool FC	184 523	379,36 €
54	Harry Maguire	70 000 000 €	27	Manchester United	307 207	227,86 €
55	Kalidou Koulibaly	70 000 000 €	28	SSC Napoli	192 073	364,44 €
56	Phillipe Coutinho	70 000 000 €	27	Bayern Munich	2 515 546	27,83 €
57	Pierre-Emerick Aubameyang	70 000 000 €	30	Arsenal FC	993 716	70,44 €
58	Robert Lewandowski	70 000 000 €	31	Bayern Munich	9 034 468	7,75 €
59	Tanguy Ndombélé	65 000 000 €	23	Tottenham Hotspur	33 516	1 939,37 €
60	Richarlison	65 000 000 €	22	Everton FC	106 841	608,38 €
61	Nicolas Pépé	65 000 000 €	24	Arsenal FC	28 764	2 259,77 €
62	Marquinhos	65 000 000 €	25	Paris Saint-Germain	774 286	83,95 €
63	Jorginho	65 000 000 €	28	Chelsea FC	30 209	2 151,68 €
64	David Alaba	65 000 000 €	27	Bayern Munich	4 460 805	14,57 €
65	Miralem Pjanic	65 000 000 €	29	Juventus FC	999 625	65,02 €
66	Sergio Agüero	65 000 000 €	31	Manchester City	10 803 257	6,02 €
67	Achraf Hakimi	60 000 000 €	21	Borussia Dortmund	388 567	154,41 €
68	Federico Valverde	60 000 000 €	21	Real Madrid	216 888	276,64 €
69	Mikel Oyarzabal	60 000 000 €	22	Real Sociedad	0	
70	Fabián Ruiz	60 000 000 €	23	SSC Napoli	0	

TW followers	TW value	IG followers	IG value	TikTok followers	TT value	SN Reach	SN value
2 400 000	33,33 €	8 100 000	9,88 €	0		13 754 096	5,82 €
1 100 000	72,73 €	2 400 000	33,33 €	0		3 735 387	21,42 €
937 000	85,38 €	0		18	4 444 444,44 €	1 618 591	49,43 €
24 900	3 212,85 €	716 000	111,73 €	0		898 863	89,00 €
5 800 000	13,79 €	14 000 000	5,71 €	0		28 251 352	2,83 €
657	121 765,60 €	2 600 000	30,77 €	0		3 150 312	25,39 €
16 400	4 878,05 €	3 900 000	20,51 €	0		5 002 223	15,99 €
1 900 000	42,11 €	11 900 000	6,72 €	0		20 049 420	3,99 €
48 300	1 552,80 €	4 900 000	15,31 €	0		5 161 569	14,53 €
240 900	311,33 €	783 000	95,79 €	0		1 186 913	63,19 €
286 000	262,24 €	4 700 000	15,96 €	0		7 074 835	10,60 €
1 300 000	57,69 €	6 400 000	11,72 €	0		8 317 614	9,02 €
83 100 000	0,90 €	208 000 000	0,36 €	194 300	386,00 €	417 317 922	0,18 €
1 000 000	70,00 €	14 300 000	4,90 €	0		18 135 225	3,86 €
582 800	120,11 €	4 400 000	15,91 €	0		6 665 161	10,50 €
912 200	76,74 €	8 300 000	8,43 €	0		9 730 059	7,19 €
293 300	238,66 €	1 400 000	50,00 €	0		1 785 613	39,20 €
514 100	136,16 €	991 000	70,64 €	0		1 815 500	38,56 €
220 200	317,89 €	1 800 000	38,89 €	0		2 349 093	29,80 €
635 200	110,20 €	1 700 000	41,18 €	0		2 519 723	27,78 €
742 200	94,31 €	1 700 000	41,18 €	0		2 749 407	25,46 €
285 000	245,61 €	1 400 000	50,00 €	0		1 877 073	37,29 €
2 000 000	35,00 €	22 200 000	3,15 €	0		26 715 546	2,62 €
1 400 000	50,00 €	9 300 000	7,53 €	0		11 693 716	5,99 €
1 200 000	58,33 €	16 700 000	4,19 €	3 167	22 102,94 €	26 937 635	2,60 €
39 100	1 662,40 €	442 000	147,06 €	0		514 616	126,31 €
224 300	289,79 €	2 400 000	27,08 €	0		2 731 141	23,80 €
0		940 000	69,15 €	0		968 764	67,10 €
367 300	176,97 €	3 100 000	20,97 €	0		4 241 586	15,32 €
0		1 200 000	54,17 €	0		1 230 209	52,84 €
1 800 000	36,11 €	4 800 000	13,54 €	0		11 060 805	5,88 €
502 500	129,35 €	4 900 000	13,27 €	0		6 402 125	10,15 €
13 400 000	4,85 €	12 700 000	5,12 €	0		36 903 257	1,76 €
362 200	165,65 €	2 700 000	22,22 €	0		3 450 767	17,39 €
365 800	164,02 €	2 400 000	25,00 €	0		2 982 688	20,12 €
16 000	3 750,00 €	64 200	934,58 €	0		80 200	748,13 €
74 700	803,21 €	416 000	144,23 €	0		490 700	122,27 €

Market value rank	Player	Market value	Age	Club	FB followers	FB value
71	Davinson Sánchez	60 000 000 €	23	Tottenham Hotspur	47 248	1 269,90 €
72	Federico Chiesa	60 000 000 €	22	ACF Fiorentina	29 536	2 031,42 €
73	Christian Pulisic	60 000 000 €	21	Chelsea FC	307 946	194,84 €
74	James Maddison	60 000 000 €	23	Leicester City	16 678	3 597,55 €
75	Bruno Fernandes	60 000 000 €	25	Manchester United	274 991	218,19 €
76	Milan Skriniar	60 000 000 €	25	Inter Milan	52 096	1 151,72 €
77	Clément Lenglet	60 000 000 €	24	FC Barcelona	127 360	471,11 €
78	Anthony Martial	60 000 000 €	24	Manchester United	1 263 300	47,49 €
79	Riyad Mahrez	60 000 000 €	29	Manchester City	2 100 000	28,57 €
80	Niklas Süle	60 000 000 €	24	Bayern Munich	8 817	6 805,04 €
81	Marcelo Brozovic	60 000 000 €	27	Inter Milan	57 325	1 046,66 €
82	Lorenzo Insigne	60 000 000 €	28	SSC Napoli	329 698	181,98 €
83	Stefan de Vrij	60 000 000 €	28	Inter Milan	239 325	250,71 €
84	Thibaut Courtois	60 000 000 €	27	Real Madrid	5 275 691	11,37 €
85	Alexandre Lacazette	60 000 000 €	28	Arsenal FC	552 123	108,67 €
86	Koke	60 000 000 €	28	Atlético Madrid	1 262 457	47,53 €
87	Thiago	60 000 000 €	28	Bayern Munich	3 360 310	17,86 €
88	Toni Kroos	60 000 000 €	30	Real Madrid	12 301 800	4,88 €
89	Houssem Aouar	55 000 000 €	21	Olympique Lyon	49 397	1 113,43 €
90	Declan Rice	55 000 000 €	21	West Ham United	0	
91	Gianluigi Donnarumma	55 000 000 €	21	AC Milan	15 243	3 608,21 €
92	Donny van de Beek	55 000 000 €	22	Ajax Amsterdam	69 837	787,55 €
93	Youri Tielemans	55 000 000 €	22	Leicester City	115 267	477,15 €
94	Memphis Depay	55 000 000 €	26	Olympique Lyon	2 864 782	19,20 €
95	Wilfried Zaha	55 000 000 €	27	Crystal Palace	430 779	127,68 €
96	Luis Alberto	55 000 000 €	27	SS Lazio	7 354	7 478,92 €
97	Alphonso Davies	50 000 000 €	19	Bayern Munich	5 734	8 719,92 €
98	Rodrygo	50 000 000 €	19	Real Madrid	1 977 454	25,29 €
99	Ferran Torres	50 000 000 €	20	Valencia CF	2 814	17 768,30 €
100	Nicolò Zaniolo	50 000 000 €	20	AS Roma	6 574	7 605,72 €
	Mean	79 550 000 €			4 497 404,69	1 469,94 €
	Valid Mean with SD+	79 550 000 €			4 684 796,55	1 469,94 €
	Valid Median	70 000 000 €			409 673,00	154,72 €
	Valid Standard deviation	28 223 173,10 €			16 847 980,19	5 653,46 €
	Valid Standard deviation +	107 773 173,10 €				7 123,40 €
	Valid Standard deviation -	51 326 826,90 €				-4 183,53 €

TW followers	TW value	IG followers	IG value	TikTok followers	TT value	SN Reach	SN value
151 700	395,52 €	601 000	99,83 €	0		799 948	75,00 €
4 214	14 238,25 €	340 000	176,47 €	0		373 750	160,54 €
382 300	156,94 €	2 400 000	25,00 €	14 800	4 054,05 €	3 105 046	19,32 €
209 600	286,26 €	709 000	84,63 €	0		935 278	64,15 €
377 000	159,15 €	1 700 000	35,29 €	0		2 351 991	25,51 €
0		707 000	84,87 €	0		759 096	79,04 €
166 000	361,45 €	1 600 000	37,50 €	0		1 893 360	31,69 €
2 000 000	30,00 €	5 600 000	10,71 €	0		8 863 300	6,77 €
2 100 000	28,57 €	5 000 000	12,00 €	0		9 200 000	6,52 €
2 414	24 855,01 €	618 000	97,09 €	0		629 231	95,35 €
5 978	10 036,80 €	867 000	69,20 €	0		930 303	64,50 €
52 900	1 134,22 €	1 200 000	50,00 €	0		1 582 598	37,91 €
184 500	325,20 €	552 000	108,70 €	0		975 825	61,49 €
2 400 000	25,00 €	6 500 000	9,23 €	5	12 000 000,00 €	14 175 696	4,23 €
1 300 000	46,15 €	3 100 000	19,35 €	32	1 875 000,00 €	4 952 155	12,12 €
954 900	62,83 €	2 100 000	28,57 €	0		4 317 357	13,90 €
3 200 000	18,75 €	4 900 000	12,24 €	0		11 460 310	5,24 €
8 000 000	7,50 €	23 700 000	2,53 €	11	5 454 545,45 €	44 001 811	1,36 €
75 500	728,48 €	335 000	164,18 €	0		459 897	119,59 €
84 600	650,12 €	229 000	240,17 €	0		313 600	175,38 €
141 200	389,52 €	1 700 000	32,35 €	0		1 856 443	29,63 €
34 400	1 598,84 €	1 000 000	55,00 €	0		1 104 237	49,81 €
0		286 000	192,31 €	0		401 267	137,07 €
1 400 000	39,29 €	9 200 000	5,98 €	0		13 464 782	4,08 €
884 400	62,19 €	999 000	55,06 €	0		2 314 179	23,77 €
262 100	209,84 €	0		0		269 454	204,12 €
49 200	1 016,26 €	632 000	79,11 €	427 200	117,04 €	1 114 134	44,88 €
352 200	141,96 €	2 700 000	18,52 €	0		5 029 654	9,94 €
21 700	2 304,15 €	129 000	387,60 €	0		153 514	325,70 €
0		907 000	55,13 €	0		913 574	54,73 €
2 561 879,32	28 559,15 €	9 487 679,01	535,73 €	14 153,98	3 132 639,05 €	16 561 117,00	500,07 €
2 725 403,53	28 559,15 €	9 681 305,11	535,73 €	56 615,92	3 132 639,05 €	16 561 117,00	500,07 €
441 500,00	134,23 €	2 700 000,00	26,04 €	0,00	22 102,94 €	3 729 320,00	20,35 €
9 768 434,23	173 950,53 €	26 004 044,99	4 722,10 €	131 302,39	6 899 395,12 €	49 173 993,99	4 526,74 €
	202 509,68 €		5 257,84 €		10 032 034,17 €		5 026,81 €
	-145 391,38 €		-4 186,37 €		-3 766 756,06 €		-4 026,66 €



APPENDIX 3

Estimates of the Potencial TikTok followers for soccer players

2020	Cristiano Ronaldo followers	Users	CR index	Potential TikTok followers for soccer players
Facebook	126 023 622	2 449 000 000*	0.05146	41 167 373
Twitter	83 100 000	340 000 000*	0.24441	195 529 412
Instagram	208 000 000	1 000 000 000*	0.20800	166 400 000
Modified SN reach	417 123 622	3 789 000 000	0.11009	88 070 440
Unique social media users		3 800 000 000*	0.10977	87 815 499
Mean potential			0.14475	115 796 545
TikTok users		800 000 000*		
Mohamed Salah TT followers		530 700	0.00066	
Alphonso Davies TT followers		427 200	0.00053	
Cristiano Ronaldo TT followers		194 300	0.00024	

Note: * – Statista.com (January 2020); *CR index* = Cristiano Ronaldo followers/Users.

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