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The current issue is the second of the nineth volume of the *Athens Journal of Sports,* published by the Sport, Exercise, & Kinesiology Unit of the ATINER under the aegis of the Panhellenic Association of Sports Economists and Managers (PASEM).

Gregory T. Papanikos, President, ATINER.

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Making Sense of Decision Making in Invasion Team Sports - A Teaching/Learning Perspective in Physical Education

By Paul Godbout[*] & Jean-Francis Gréhaigne[±]

Since the 1990s, decision making (DM) in sports has been extensively investigated, particularly through expert players' decisions made mostly in standardized contexts but also, to a lesser extent, in naturalistic settings. The purpose of this article is to re-examine the teaching/learning of decision making in invasion team sports in light of the contemporary research conducted with high-level performers. First, following a brief overview of the situation awareness (SA) construct, three decision making (DM) perspectives are presented: information processing (IP), naturalistic DM, and ecological dynamics (EcoD). In a second major section, invasion-team-sports (ITS) SA in PE is examined with regard to SA components and the differentiation of five SA facets. In a third major section, presenting implications for ITS DM learning in PE, the teaching/learning of ITS-DM is discussed with regard to beginner- and novice-level players in Physical Education. Constructing a shared reference-framework for DM through team reflection on game-play situations is also considered, namely with regard to critical-incidents analysis and unexpected play-occurrences. In a context of the teaching/learning of DM in ITS in school, the authors submit that precedence should be given to information processing and to recognition-primed perspectives. Resort to mental representation networks and recognition of familiar configurations of play is critical to establish situation awareness and learn to make appropriate decisions. Such an option fits well with a social constructivist view of DM learning.

Keywords: *invasion team sports, decision making, situation awareness, information processing, recognition-primed process*

Introduction

While many authors advocate a broad exposure of students to different situated physical activities (PA) throughout their physical education (PE) journey (Godbout 2021), there is no doubt that sports and games remain very present in numerous PE curricula. In relation to such activities, PE curricula recommend that students develop, among other skills, knowledge and competencies with regard to related strategies and tactics (e.g., Australian Curriculum, Assessment and Reporting Authority 2012, Department for Education [England] 2014, Ministère de l'Éducation Nationale 2010, Society of Health and Physical Educators [SHAPE] America 2014). While strategy and tactics do apply to various extents in individual and dual sports, these two constructs bear a particular significance in team sports,

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involving cooperation with teammates and opposition to opponents, both during attack and defense. Underlying and intimately linked to strategy and tactics is the notion of decision making; either while preparing for or during a match, players cannot avoid making choices, taking and enacting decisions.

In France, systematic interest for tactics and decision making in sports, as they relate to PE, can be traced back to the 1960s under the impetus of informed practitioners and PE teacher educators such as Robert Mérand, Justin Tessier and René Deleplace, themselves influenced by the German Friedrich Mahlo (1965, 1969) and the Romanian Leon Teodorescu (1965, 2013) (Bouthier 2016, Gréhaigne and Nadeau 2015). In England, the progressive development of the game-centered approach appears to have occurred in the 1970s (Thorpe and Bunker 1986), leading to the teaching games for understanding model and its "tactical awareness" and "making appropriate decisions" components (Bunker and Thorpe 1982). From then on, numerous game-centered approaches were developed in various countries (see Li et al. 2018, for a listing). In such student- and game-centered models, priority is given to game play in small-sided game setups and to tactical learning, technical skills being worked on as the need arises (Gréhaigne and Godbout 2021a). Before the 1980s, to the authors' knowledge, there was no formal and systematic PE instructional model for the teaching/ learning of tactical knowledge and decision making in sports in the USA, despite the fame of Muska Mosston's spectrum of teaching styles (Moston 1966) which could have opened a door, for instance, for the application of guided discovery and/or problem solving (now divergent discovery [Sicilia-Camacho and Brown 2008]) with regard to tactical/strategic learning in team sports.

Along with the development of game-centered instructional models, two student-centered pedagogical approaches have increasingly gained the attention of sport pedagogy researchers and practitioners, namely social constructivism (Bada 2015, Godbout and Gréhaigne 2021, Yvon and Zinchenko 2011) and nonlinear pedagogy (Chow 2013, Chow et al. 2007, Tan et al. 2012, see also an overview by Godbout and Gréhaigne 2020b, pp. 431–432).

In the 1980s, along with the increase of game-centered approaches, there developed a research area focused on decision making (DM) in sports and differences between expert and novice players with regard to knowledge-related sport performance (McPherson 1987). This era marks the beginning of an extensive and ongoing research undertaking to comprehend high-level players' decision-making process in sports. Over the last 40 years or so, there have been abundant publications on the subject as evidenced by reviews (e.g., Ashford et al. 2021b, Macquet 2016, Macquet and Fleurance 2006, McPherson 1994, Williams and Jackson 2019, Williams and Ward 2007).

The purpose of this article is to re-examine the teaching/learning of DM in invasion team sports (ITS) in light of the contemporary research conducted with high-level performers. First, following a brief overview of the situation awareness (SA) construct, three decision making (DM) perspectives are presented: information processing (IP), naturalistic DM, and ecological dynamics (EcoD). In a second major section, ITS SA in PE is examined with regard to SA components and the differentiation of five SA facets. In a third major section, presenting

implications for ITS-DM learning in PE, the teaching/learning of ITS-DM is discussed with regard to beginner- and novice-level players. Constructing a shared reference-framework for DM through team reflection on game-play situations is also considered, namely with regard to critical-incidents analysis and unexpected play-occurrences.

Three Decision-Making Theoretical Models

With regard to the decision-making domain in sports, in an extensive review, Ashford et al. (2021b) recognized that three clear perspectives have emerged, born from different views of players' behavior: (a) information processing (IP); (b) ecological dynamics (EcoD; and (c) naturalistic decision-making (NDM). They wrote: "The crux of the debate typically revolves around a player's access to memory representations in the decision-making process" (p. 1). While granting that both IP and NDM perspectives are based on a cognitive interpretation of the world, the authors felt that the two perspectives are sufficiently different to justify considering them as separate approaches with regard to DM in team sports (see authors' note 1). In this article, we will consider the three perspectives mentioned above, namely IP, NDM, and EcoD (Ashford 2021a, 2021b, 2021c). Readers will keep in mind, concerning such models, that conclusions were reached and reported with reference to diverse areas of endeavors including diverse sports, generally based on controlled situations as required by research standards to ensure internal validity of the results. With regard to sports, the models were developed to explain and predict decision making performed by expert players in high-level performance contexts. As stated by Ashford et al. (2021b, p. 2), "The presence of the three theoretical perspectives and their associated narratives presents problems for coaches [as well as PE teacher educators and PE teachers] attempting to use theory to inform their practice".

In coming sections of the article, the authors will attempt to present the core of each perspective. Readers will note that in each case, decision makers rely one way or the other on information perceived in their environment.

Situation Awareness: A Premise to Decision Making

Whatever the DM model considered, there has to be, as a prerequisite, some perception of a reality of interest calling for some remedial, maintaining or reinforcing action. Based on the work of Endsley (1995, [see also 2015]), Bedny and Meister (1999), and Smith and Hancock (1994), Macquet (2016) explored the notion of SA in sports. The SA construct relates to an individual's level of consciousness of the particular situation he is involved in, given that the situation calls for some action based on this individual's decision. As stated by Macquet (2016, p. 23), "Given an individual's limited perceptual and cognitive capacities (Simon 1996), this individual cannot understand all elements of the situation. He must interpret elements that appear essential (Norman 1981). The SA concept

makes it possible to highlight these essential elements taken into consideration by the individual at every instant" (translated in English by leading author).

Macquet's statement is closely related to Ochanine's (1978) operative-representation construct (Gréhaigne 2018, Gréhaigne and Godbout 2021c, Holgado 2011, Ochanine 1978, Weill-Fassina 2013/2016). Ochanine (1978, p. 63) wrote:

> The representation is a certain informational complex attributed to an object. It is possible to see a same object in different ways. During action, the performer does not reflect an object in all the complexity of its properties, its attributions; from his informational baggage, the performer only actualizes relevant information that corresponds to the purpose of a given action (especially in the case of a performer faced with time constraints). This reflection that corresponds to the representation in action, I call it the operative representation. (Translated from French by the lead author) (see authors' note 2)

Whereas the complete reflection of objects in all the diversities of their accessible properties has been called *cognitive representation*, the construct *operative representation* relates to selected properties likely to ensure the best task result. In this case, the operative representation is considered to be a reflection of the *operative structure*, that is the most reliable structure of the object for a given task, meaning the structure that offers, with a minimum of possible relations, the maximum relevant information on the object. Should there be several possibilities for completing the task, experienced subjects will tend toward the most efficient operative structure called *optimal operative structure* (Holgado 2011).

Coming back to SA, Endsley (1995) operationally defined it as made of three hierarchical levels: "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future" (Endsley 1995, p. 36). Perception, understanding and projection lead to decision and action. In the context of ITS, elements of the environment to be perceived relate to position and movement (direction, speed, trajectory) of partners, opponents and the ball (or any analogous object) on the area of play. Understanding the meaning of the reality perceived calls for a frame of reference. Projecting (expecting, anticipating) the future status of selected elements calls for long-term memory and information-processing mechanisms or automaticity (Endsley 1995). Thus, the value of the decision made rests, for a great part, on the value of each of the three SA levels. In a sense, one may consider that a scaffold of the DM teaching/learning process rests on these three SA levels.

SA may be considered not only as an individual state but also as a shared or socially shared state at the team level. This construct has been addressed in relation with several labels: shared situation awareness (ShSA) (Endsley 2015), shared knowledge (Araújo and Bourbousson 2016), shared and coordinated cognition (Reimer et al. 2006), team situation awareness (TSA) (Macquet 2016), team cognition (Bourbousson et al. 2019, McNeese et al. 2015, Richards and Collins 2020), team coordination (Gesbert and Hauw 2019). More will be discussed in a later part of the article (see section on differentiating facets of SA in ITS).

The Information Processing Perspective

The IP perspective considers DM as a conscious selection-process during which players display more or less efficiency in (a) extracting and processing cues from the environment, (b) recognizing and deciphering familiar configurations of play, and (c) anticipating probable changes in the environment. Players make decisions through a process of selection from mental representations (schemas), which have been formed over time and are stored in long-term memory (Araújo and Bourbousson 2016, Ashford et al. 2021b, 2021c, Moran et al. 2019). Such representations are described as chunks of procedural and conditional knowledge (or conceptual networks) representing collections of elements that have strong 'if-then' associations with each other (Moran et al. 2019). As stated in Araújo and Bourbousson (2016, p. 126), "... a key principle of cognitive science [is] that performance (whether individual or collective) is underpinned by the existence of a representation or schema, responsible for the organization and regulation of behaviours (e.g., Rentch and Davenport 2006)."

Based on a review of 16 IP studies, Ashford et al. (2021b, p. 12) reported that the decision-making process is encompassed by a player's possession of specific key perceptual–cognitive skills, namely: "(a) the utilization of domain knowledge in perceiving informational cues ...; (b) the identification of global, salient and predictive cues ...; (c) rapid retrieval of knowledge from memory representations ...; (d) option generation ...; and (e) the role of intuition in the form of the take the first heuristic ...".

As defined by Musculus (2018, p. 272), a simple heuristic is "a strategy that ignores part of the information, with the goal of making decisions more quickly, frugally and/or accurately than more complex methods". The use of heuristics plays a crucial role in time-constrained situations.

The Naturalistic Decision-Making Perspective

Naturalistic DM is meant to explain performance in time-constrained situations. Klein and his collaborators (Klein 1997, Klein et al. 2010) submitted that "decisions are made through a recognition-primed process that alters from situation to situation according to the decision maker's familiarity with the perceptual information available (visual, auditory, olfactory, etc.) and their context relevant knowledge base" (Ashford et al. 2021b, p. 2). The level of similarity between the perceived situation and a reference mental-representation of a situation is based on past experience. According to this theory, depending upon the extent to which the goals, cues, expectations and action responses are clear, DM may occur through one of three levels (Ashford et al. 2021b, Macquet 2016).

- *Acknowledge a distinct or obvious correspondence* (simple match): the decision maker recognizes a situation as typical, goals, cues, expectations, and action response presenting themselves in an obvious fashion.
- *Diagnose the situation*: the information not being provided in a typical fashion, the decision maker, through mental simulation, needs to clarify

the goals, cues, and expectations through a process of diagnosis to restore typicality and come to a decision.

- *Evaluate a course of action*: the information available (goals, cues and expectations) is recognized but a course of action does not immediately present itself. A solution is rapidly mentally simulated considering intended and unintended consequences, followed by a disregard or select decision.

Revisiting the RPD model with respect to high-level sport, Macquet (2016) considered two distinct DM contexts, one when a decision is not planned ahead, another when a decision is planned ahead. She also proposed to consider the DM process based on two distinct rationales: (a) adapting the decision to the context (whether the decision was planned or not); (b) adapting the context to the decision (when the decision was planned). Within this revisited RPD model, the three initial levels (or functions) defined above are integrated under a single rationale, adapting the decision to the context. A fourth level or function is called *modify the situation*, associated to a context when a decision was planned ahead (see Macquet 2016, Figure 6, p. 74). Thus, when a decision was planned ahead based on good anticipation, the typicality of the situation is recognized as a simple match; if on the other hand, the perceived situation is not as expected, there is a need for modifying the situation so it becomes typical. Such considerations bear consequences for strategic DM and tactical DM as will be discussed in a further section of the article.

The Ecological Dynamics Perspective

From an EcoD perspective, DM continually emerges from interactions between players and their environment, due to an ongoing reciprocal relationship between *perception of information*, which hampers or delays subsequent movement, and *action*, which provides new information. This interplay (coupling of perception and action) occurs in a dynamical context where decision-makers simultaneously face or manage *constraints* while staying watchful for or taking advantage of *affordances* (readers will note a connection with nonlinear pedagogy constructs [Araújo et al. 2006, Chow et al. 2007]). The school of EcoD contends that at the time of competitive performance, decision makers, under time constraint and others, react directly to information received from the environment rather than relying on a reference to mental representations retrieved from long-term memory (Gesbert and Hauw 2019). As stated by Buekers et al. (2020, p. 6), "an ecological-dynamical approach to tactics in sports rejects the representational notions of internal models and motor commands ... In contrast, it defines tactics as behavioral settings characterized by the set of prevailing affordances or action possibilities to achieve the tactical goals".

From an EcoD point of view, team coordination may be interpreted in terms of collective affordances. "Collective affordances are sustained by the common goals of team members who cooperate to achieve group success. From this perspective, team coordination depends on the team's collective attunement to shared affordances founded on a prior platform of (mainly nonverbal)

communication or information exchange (Silva et al. 2013)" (Araújo and Bourbousson 2016, p. 133).

Invasion-Team-Sports Situation-Awareness in Physical Education

Students construct their SA based on various cues drawn from their knowledge of the internal logic of ITSs and may experience different SA facets.

Components of Situation Awareness in Invasion Team-Sports

Invasion team-sports are among the most non-linear sport activities considered in the PE curriculum, to the point they may at times appear to be chaotic (Gréhaigne and Godbout 2014). As stated by Gréhaigne et al. (1999, p. 63): "Expressed in a nutshell, the idea for each player is to cooperate with partners in order to better oppose the opponents either while attacking (keeping one's defense in mind) or while defending (getting ready to attack)". Consequently, the DM process concerns both attack and defense and so does SA.

Due to their dynamic nature, ITSs have often been looked at as complex and dynamic systems (e.g., Stöckl et al. 2017). Gréhaigne and his collaborators discussed on several occasions the challenge of teaching and learning DM in team sports, offering the point of view of complex system analysis (e.g., Gréhaigne and Godbout 2014, Gréhaigne et al. 2001, Gréhaigne et al. 2010). While considering students' SA, it may be useful to refer to three different organizational levels: (1) the match organizational (MO) level, involving both teams; (2) the partial-forefront organizational (P-FO) level, involving some of the players from both teams; (3) the primary organizational (PO) level, linking the ball holder and a direct opponent (Gréhaigne and Godbout 2013, Gréhaigne et al. 1999). Thus, the *rapport de forces*, which "refers to the antagonist links existing between several players or groups of players confronted by virtue of certain rules of a game that determine a pattern of interaction" (Gréhaigne and Godbout 2014, p. 98), may be looked at as involving both teams, two sub-groups of players, or eventually two specific players. Obviously, the more players are involved in the organizational level of interest, the more difficult it becomes to target specific meaningful clues in time-constrained conditions. Readers will note that in small-sided games involving 4 or 5 active players, we will consider only two levels, the MO level and the PO level.

Figure 1. *Components of SA in ITS with Time Constraint at Play (Adapted from Gréhaigne 2018)*

Having in mind (decision wise)	Dynamics of play organization (Arrows indicate potential evolutions in play sequence)	Observable elements at match and primary organization levels
Background references - particular rules of game play in small-sided format - offensive and defensive matrices of play - prototypical configurations of play - tactical representation library - player's physical resources - competency networks - agreed upon strategy - common frame of reference - actual rules of the game ***Evolution of game play*** - score - time to play - attacking - counterattacking - defending - losing or regaining possession of the ball		***At MO level*** **Opposition rapports** - advance / delay - block / pursuit - location and elasticity of EP-S on court - interpenetration and position of DEP-S and OER-S **Play in movement** - position, movement, direction and speed of all players - path, speed and trajectory of the object fought for - actual configuration of play ***At PO level*** - opponent's posture, speed, direction - feints - eye movements - pass opportunity

In the context of ITS, at the match organizational level, students' SA may concern the position (on the pitch or court), movement, trajectory and speed of all players and the object fought for (be it a ball, a hockey puck, a frisbee, etc.). Related constructs are: the actual configuration (play patterns); the effective play-space (EP-S) (defensive [DEP-S] and offensive [OEP-S]); the elastic state of the system (contraction, expansion); the collective strategy agreed upon; the rapport de forces and the competency network of each team; the actual rules of the game, given that it is generally played in a small-sided format (Figure 1). At the partial forefront and/or primary organizational levels (Gréhaigne et al. 2001), more direct confrontations may take place and bring about more focused SA on the part of the players directly involved, watchful of opponents' posture, moves (feints), eye

movements, in addition to background knowledge of immediate opponents' and partners' competencies and of predetermined strategies. Depending upon who becomes aware of a particular situation, the importance or significance of different aspects may vary depending on the individual concerned, as we will see below.

Differentiating Facets of Situation Awareness in Invasion Team-Sports

At this point, SA will be examined from two distinct perspectives: (a) its time dimension, considering tactical DM (concurrent to game play) and reflection on prior DM (done after actual game play); (b) its social dimension, considering students' individual SA and shared or socially shared SA (a collective SA involving several members of a team). Thus, on the one hand, one may speak of *current SA* and *reflected SA;* on the other hand, one may speak of *individual SA*, *shared/distributed SA*, and *socially-shared SA*.

- *Current Situation Awareness* (CSA). Unless specified otherwise, discussions about SA usually concern current SA leading to tactical DM. Although CSA is primarily thought of with regard to players actually involved in game play, it may also concern outside interested observers, such as teammate-observers from both teams and the teacher (see Figure 1). In competitive contexts, CSA might also concern independent informed onlookers (scouts and analysts for instance).
- *Reflected (Deferred) Situation Awareness* (RSA). Reflecting on prior game play is a pedagogical strategy that makes it possible for players to evoke reminiscences of last encounters and, through convergent and/or divergent thinking (Godbout and Gréhaigne 2021), assess the strategic or tactical efficiency of choices made. In order to do that, learners need to visualize significant game-play situations encountered, creating a form of reflected SA (Figure 2). Feedbacks from involved observers will provide additional cues to support players' RSA, as it has been seen during student debates-of-ideas following game play (Gréhaigne and Godbout 2021).
- *Primary Situation Awareness*. SA experienced by decision-makers (the players in action) may be considered primary in the sense that it bears a significant weight on the decision that needs to be made (current-related SA) or the decision being reflected on (reflected-related SA).
- *Distributed Situation Awareness*. SA independently experienced by observers and communicated to the decision maker(s) will be considered as distributed. Obviously, given the unlikelihood or impossibility to do so concurrently to actual game play, sharing one's SA with teammates will occur at times of further reflection on past situations and decisions. Although occurring after action, this shared SA may be seen as a form of distributed SA (Endsley 2015, Salmon and Plant 2021).
- *Socially Shared Situation Awareness*. "... socially shared regulation of learning refers to processes by which group members regulate their collective activity. This type of regulation involves interdependent or collectively shared regulatory processes, beliefs, and knowledge (...

metacognitive decision making) orchestrated in the service of a co-constructed or shared outcome" (Järvelä et al. 2013, p. 269). By analogy, one may envision the progressive development of team SA (see earlier discussion in section "Situation awareness: a premise to decision making"), or socially shared SA within a group of student-players who construct their decision-making capacity through successive debates interspaced with game-play setups and concurrent observation by teammates (Godbout and Gréhaigne 2020a, Godbout and Gréhaigne 2021, Gréhaigne and Godbout 2021a).

Figure 2. *Reflected SA Involving Players and Teammates Observers, from Teams E and S, with no Time Constraint (Adapted from Godbout and Gréhaigne 2021)*

Focus of reflection	Reflection on situation awareness (deferred awareness) (grey zone illustrates the reminiscence of the situation reflected on)
Specific reference situation - ball loss - ball recovery - attack - counterattack - defense - point(s) scored by the team - point(s) scored against the team - etc. ***Awareness contribution to the exchange*** - primary SA (specific player) - distributed SA (from teammate player and/or observer) - building S-Sh SA from common cues - teacher's SA	

Students' reflection on their SA level and the cues that draw their attention may lead to a metacognitive dimension of SA. Students may think back on the more or less effectiveness of their SA depending upon the organization level they

tend to focus on and the clues that prove to be both most useful and less time demanding. Time constraint is a major characteristic of ITS, particularly at the forefront and primary organizational levels. Time management is also crucial in the case of current SA in the sense that if players do not remain dynamically aware of the evolution of game play, they will pay a high price for reading the play in the last instant. This dynamic dimension of SA is discussed hereafter.

Implications for Invasion Team-Sports Decision-Making Learning in Physical Education

Considering students' learning of ITSs in school implies a beginner/novice perspective and having students develop a common frame of reference through reflection on their team SA.

A Perspective with Regard to Beginner- and Novice-Level Players

Given the characteristics of the three DM approaches discussed earlier, we submit that in a school teaching/learning context, both IP and NDM perspectives may be of interest. The instinctual level of DM considered in the EcoD perspective does not, in our view, fit with the social constructivist feature of DM development in beginner and novice players. It may well be indeed that endowed with hundreds if not thousands of hours of practice, expert players have developed, experienced repeatedly and embodied so many representations that these have become part of a sub-conscious level of awareness leading to what we have labeled instinctual. Having beginners and novice players develop decision-making capacities in a PE context represents a totally different challenge. In a learner-centered and social constructivist context, we will consider that three complementary teaching/ learning strategies are concerned (Gréhaigne and Godbout 2021a):

- A game-play setup, where matches are played in a small-sided game format with adaptations implemented in order to modify various constraints of game play.
- A student-observer setup, where teammates observe the unfolding of the game-play setup, based on agreed upon observational variables.
- A subsequent debate-of-idea or student-exchange setup, where players and observers of a same team reflect on the last match and plan future actions.

Through alternatively and purposefully experiencing game play, observing it and verbalizing about it (sharing reflectingly SA episodes, reflecting on decisions made and related results, planning game-play actions), students collectively regulate their learning and construct mental-representation networks to be used for further DM.

We have mentioned earlier that a scaffold of the DM teaching/learning process may rest on the three SA levels laid out by Endsley (1995), meaning perception, comprehension, and projection. Achieving meaningful **perception** of game play

implies a frame of reference, hopefully shared among teammates, players and observers. While after years of practice expert players base their perception on a selected number of clues, students need to construct such a frame of reference based on successive iterations of game-play/observation, verbalization, strategy planning, testing and reflecting. Stored representation knowledge about constructs such as offensive and defensive matrices of play, dynamic organization of play (prototypical configurations of play, effective play-spaces), competency networks, (Gréhaigne and Godbout 2014) will serve as background to analyze and eventually give precedence to and focus on specific elements of the situation. **Comprehending** (understanding, making sense of) the situation at hand implies making connections between mental representations, taking notice of momentary dynamic constraints and affordances (interpreting perceived realities as good or bad, promising or unfavorable). Through these successive iterations mentioned above, students accommodate and adapt, two meaningful steps in the construction of tactical knowledge and DM competency. As stated by Godbout and Gréhaigne (2021, p. 54), "Through exchanges with teammates, hypotheses, verifications and confirmation through game play, players *understand* that a given reality differs from what they thought and readjust their schemas accordingly; they learn through accommodation". Finally, **projection** implies a willingness and capacity to visualize the consequences of plausible decisions. Memory stored if-then algorithms (conditional knowledge) solicited through convergent thinking will be used to make a decision. Gréhaigne and Godbout (2021a, p. 562) have recently written "During the match, faced with unexpected evolution of game play and under time constraints, students can no longer rely on thoughtful tactical reasoning. They need to resort to stored procedural tactical knowledge and be able to anticipate opponents' and/or teammates' moves (Gréhaigne et al. 2001, Taylor 2016)". Readers may refer to Godbout and Gréhaigne (2021, pp. 54–58) for a more elaborate discussion on understanding game play, game-play intelligence and tactical thinking.

Team Reflection on Game-Play Situations: Constructing a Socially Shared Reference Framework for Decision Making

<u>Narrowing the Range of Information Cues</u>

One key aspect of developing SA is learning not to get flooded with information. Research has repeatedly shown that experts players make decisions based on much less cues than beginners or even novices. Inversely, one may conclude that beginners and even novices need to learn focusing on a limited number of cues. As mentioned before, learners need to progressively evolve from a cognitive representation of situations of play, overflowed with cues of all kinds, toward an operative representation ridden of accessory information and limited to the most meaningful (given the task at hand) and the less numerous cues, a characteristic labeled terseness by Ochanine (Holgado 2011). For instance, discussing the reference to experienced configurations of play (a primed-recognition process), Caty et al. (2007, p. 106) wrote "A good solution implies pinpointing a few characteristics of the configurations of play, a partial arrangement of elements that will assemble all essential relations and only those".

Moreover, in an ITS context, having each player and teammate-observer develop an individual operative representation, thus an individual SA, would soon lead to havoc. There is need for the development of a common SA reference framework.

Constructing a Socially-shared SA Reference-framework

In a PE context, ITS-SA concerns student players, student observers, and their teacher (Godbout and Gréhaigne 2021, Figure 1, Gréhaigne et al. 2001, Figure 4). Given the student-centered and socio-constructivist perspective of this article, we will focus more particularly on student-players' and student-observers' SA although, in reflected SA situations, the teacher may at times contribute to the exchange (see Figure 2 in this article). Considering the dynamic nature of ITSs, it is understood from the start that players' and observers' SA is also a dynamic state. As stated by Endsley (2000, p. 6), "The dynamic aspect of real-world situations is a third important temporal aspect of SA. The rate at which information is changing is a part of SA regarding the current situation, which also allows for projection of future situations." It follows that while one's SA at a given instant leads to a decision "a" and an action, it will evolve to another SA following the action. It also follows that this new SA may serve to make a further decision "b" and/or to reflect on the appropriateness of decision "a". The dynamic SA players and, to a lesser extent, teammates-observers, are involved with may be analogically compared to a car driver's SA as this individual keeps constantly glancing around, keeping informed of the dynamic environment and ready to take action if and when appropriate.

In teaching/learning setups where all teammates engage in a debate or an exchange following game play, reflection on action may well be conducive to the building of shared reflected SA among members of a same team. Then, respective players' and observers' frames of reference may progressively include common elements, leading to team cognition and team coordination (see references in earlier section "Situation awareness: a premise to decision making"). Reflection on action may be enhanced with the use of critical incident theory. As stated by Kain (2004), "it is interesting that the critical incident technique has been used as a means for reflection and enhanced understanding apart from its use as a research tool". Its framework is aimed at elucidating decision-making processes and increasing problem-solving skills (Wijaya and Kuswandono 2019). Examples of critical incidents may concern ball losses, ball recoveries, goals (pro or against), etc. The quality of the team's reflection on selected play-situation will rest on students' language and tactical understanding (see Godbout and Gréhaigne 2021 for a discussion on game-play language and game-play intelligence).

As discussed by Godbout and Gréhaigne (2020a), students' learning style (in terms of level of field dependency / independency) may influence their SA. Also, students may metacognitively react differently to various aspects of the game-play situation reflected on, sensing or realizing that, in their mind, some cues bear more significance than others (Cohen et al. 1996). Constructing a socially-shared SA reference-framework does not exclude a pairing with distributed SA.

Dealing with Unexpected Occurrences

An intrinsic characteristic of ITSs is the opposition relationship between the two teams involved in a match. The dynamic nature of the encounter entails, for instance, a constant reversibility of attack and defense, creating unexpected occurrences. Such occurrences have been labeled *emergent phenomena* in the French literature (Walliser 1977). Emergent phenomena are unexpected, even unexplained phenomena that take the shape of original entities (e.g., play actions in ITSs). Such an emergence (caused for instance by a ball loss for some players and a ball recovery for others) may bring about a more or less profound disturbance in the encounter. Unexpected game play occurrences constitute perfect examples of critical incidents that may be reflected on based on players' and observers' deferred SA. Sharing collectively individual SAs may then facilitate an understanding of the phenomenon.

Limitations

In our opinion, there are two limitations to this article. First, a discussion about the social construction of SA would normally deserve a more extensive analysis of the contribution of learners' game-play language and verbalization. Given elaborate discussions on student's exchanges, game-play language and game play intelligence related to ITSs published in recent years (namely by Godbout and Gréhaigne [2021], by Gréhaigne and Godbout [2021a], and in Gréhaigne and Godbout [2021b]) and cited in this article, the authors felt that covering this aspect of team SA construction would be redundant.

A second limitation lies in the fact that this article is focused on DM as a punctual moment in game play, along with its related SA. Reflecting repeatedly on such occurrences should hopefully bring students not only to make sense of particular game-play situations but to make sense of the game all together, meaning the internal logic of the sport concerned. Discussing sensemaking of the logic of the game as a whole, in addition to DM in game-play action, would have been much beyond the scope of a single article.

Conclusion

This article has examined three perspectives for decision making in sport. In a context of the teaching/learning of DM in ITS in school, the authors submit that precedence should be given to information processing and to recognition-primed perspectives. Resort to mental representation networks and recognition of familiar configurations of play is critical to establish situation awareness and learn to make appropriate decisions. Such an option fits well with a social constructivist view of DM learning. Reflected and socially-shared situation awareness may be seen as a powerful construct to make sense of one's DM and improve it. Iterations of (a) game play followed by (b) exchanges with teammate-observers and (c) reflection on both situation awareness experienced and related decisions are viewed as an

effective learning strategy to construct one's DM competence. All things considered, knowledge and understanding (or sensemaking) may be looked at as critical keys to learning, performance and performance appreciation with regard to ITS.

Authors' Note 1

In a PE teaching/learning context where learners must be considered at best as novices and probably most often as beginners with regard to ITSs, students will likely resort first to an information processing approach until they cumulate enough experience to build mental representations of game-play situations likely to be eventually recognized. At this time, a primed-recognition approach may be progressively put in place as a strong addendum to the information processing perspective. The evocative potential of the primed-recognition process appears sufficiently important to justify a separate treatment, a choice we have done in this article.

Authors' Note 2

Writing in French, Ochanine used the word '*image*' which we have translated by the word representation while a literal translation would have given 'picture', too physical a term to reflect the mental connotation of the concept concerned. The word 'schema' might also have been used.

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Esport Knowledge, Skills, and Abilities: Perspectives from Subject Matter Experts

By Kostas Karadakis[*] & Maria Manus Painchaud[±]

Esport is a growing form of entertainment because of technological advancements, increased online gaming participation and competition, and technology access. Esport shares traditional sport characteristics, with players, spectators, competition, and entertainment. As the esport industry continues to grow, career offerings in esport-specific and traditional positions has demonstrated an increase in need for trained and prepared individuals. Therefore, the purpose of this study was to identify the knowledge, skills, and abilities (KSA) an individual seeking employment in the esport industry should possess. Subject matter experts were interviewed to identify the KSAs one should possess for an esport career. Ten themes appeared: Business Acumen & Strategic Approach; Human Relations Skills; Relationship Management; Effective Communication; Technology Management; Legal and Ethical Practices; Research and Creative Problem Solving; Global and Cultural Orientation; Leadership; and Critical Evaluation and Analytical Skills. Additionally, esport specific KSAs and competencies aligned with three broad organization categories: people, structure, and goals. Traditional workplace knowledge is required as well as discipline specific knowledge. There is an expectation with industry evolution, functional areas (domains) within esport will continue to emerge. Lifelong learning skills, passion, and a desire to acquire advanced knowledge will be integral to success and sustainability of an esport career.

Keywords: *esport knowledge, skills, abilities, employment*

Introduction

Esport is organized video game competitions, also commonly referred to as cybersport, virtual sport, and competitive gaming (Jenny et al. 2017). In general terms, esport refers to "an organized and competitive approach to playing computer games" (Witkowski 2012, p. 350). Specifically, esports are defined as "electronic sports (esports) involves competitive, organized or technologically enabled activities encompassing varying degrees of physicality, virtuality and technological immersion." (Cranmer et al. 2021, p. 2).

Esport is a rapid growing form of digital entertainment and becoming increasingly popular because of technological advancements, such as the increased participation of online gaming (Hamari and Sjoblom 2017), access to technology, and elite competition (Jenny et al. 2017). Additionally, collegiate esport has seen an increase in interest and support from universities across North America. According to the National Association of Collegiate Esports (NACE), more than

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170 U.S. colleges/universities offer varsity esport programs with scholarships to the players and attracting more than 40,000 players (Venero 2020). As the esport industry continues to grow in general, so have the career offerings. Hitmarker, the largest esport jobs website posted 2,497 jobs in early 2018 and reported an 87% increase in jobs offered in 2019 of 11,027. Additionally, in their Esport Jobs Report, Hitmarker estimated over 22,500 jobs in 2020, although at the time of writing only 8,884 jobs were being advertised on their website (Hitmarker 2020).

There has been ongoing debate as to the definition of esport as well as whether esport are actual sports (Cranmer et al. 2021). Arguments for or against esport being considered a sport are centered around play, organization, competition, skill, physicality, following, and institutionalization (Jenny et al. 2017). Esport encompasses several characteristics of traditional sport, including players, spectators, competition, and entertainment (Jenny et al. 2018). The debate becomes more complex because esport is the merging of culture, technology, sport and business, and unlike traditional sports, esport is an interconnection of multiple platforms synonymous with gaming (Jin 2010). Chikish et al. (2019) maintained that esport has a more multifaceted ecosystem than traditional sports, because "agents can assume multiple roles, and in this way esport and sports play should be viewed as complementary. They proposed that the esport industry is opening the new era in the sports industry" (Chikish et al. 2019, p. 61).

The esport industry offers a multitude of opportunities for participation, employment, and profit for individuals that are trained and prepared to enter the industry. Reitman et al. (2020), provides respective areas where research has emerged because of esport including business, sports science, cognitive science, informatics, media studies, law, and sociology. Other areas identified are technical disciplines such as cloud computing, networking, programming, game design, graphic design, and computer hardware design and engineering (Reavis 2021, p. 180). With the potential for entering employment in the esport industry, "covering this broad spectrum of knowledge, it is clear that no single student could reasonably expect to be an expert in more than one or a few of the domains involved nor could an individual faculty member be able to support the expanse of knowledge across these many diverse knowledge domains" (Reavis 2021, p. 180). Thus, the purpose of this paper is to provide results on the knowledge, skills, and abilities that experts in the esport industry identified that someone wanting to enter the esport industry should focus on and develop.

Literature Review

Esport is receiving interest from various areas including academics, embraced by sport management, (Jang and Byon 2020) esport has also received interest from gaming and culture, psychology and philosophy, and computer science (Cranmer et al. 2021). Like traditional sports, esport has professional players, teams, uniforms, coaches, managers, agents, leagues, competitions, marquee events, endorsement deals, player transfer fees, color commentators (shout casters), highlight reels, college scholarships, and a darker side with match fixing, doping, and gender-

related issues (Jenny et al. 2017, Li 2017, Segal 2014). All of which are potential areas of employment. The esport industry offers several career paths for individuals with knowledge, skills, and abilities, in both traditional roles and unique to esport (Hedlund et al. 2021). Esport presents different opportunities and the possibility to "incorporate and exploit emerging technologies to create new play, participation and spectator experiences, reaching new global audiences" (Cranmer et al. 2021, p. 4).

Esport viewership has continued to grow with a global viewership estimated at 435 million, of which 22% are female, and revenues expecting to reach $1.8 billion (Israel et al. 2022, Andrews and Crawford 2021). Global viewership is expected to grow from 234 million to 285.7 million esport enthusiasts, and from 240 million to 291.6 million occasional viewers by 2024 (Israel et al. 2022). As the esport industry continues to grow there have been influences from other industries and conversely esport influencing other industries, leading to a multifaceted web of interconnected organization, activities, and stakeholders, with numerous goals and objectives (Hedlund et al. 2021). With so many facets, it becomes difficult to properly identify and define employment and career opportunities (Hedlund et al. 2021). To date, we have seen esport-specific (unique) and traditional positions being offered and needing to be filled. For example, Hitmarker reported that in 2019 the largest employment segments were software engineering, marketing, design, operations, and sales; while data, project management, education, art, and engineering had the largest percentage increase in total number of jobs available between 2018 and 2019 (Hedlund et al. 2021, Hitmarker 2020).

With job offerings and the esport industry growing, qualified individuals from other industries have entered the field to fill employment needs (Hedlund et al. 2021). The demand for individuals who can perform traditional roles (e.g., marketing, finance, sales, product management, service) in esport is growing. Hedlund et al. (2021), provide details of the various careers that are specific to esport. These include main areas for individuals that are involved with playing and coaching (college and professional); managing organizations and franchises; producing, managing, and running events; broadcasting and creating content; marketing; health and wellness; game development and design; and international careers. It is important to note, that although these roles can be similar in terms of responsibilities and essential skills, the jobs can vary because of the company's offerings, customers, policies, and the market (Hedlund et al. 2021). This is also true for traditional jobs found in esport, that need novel information and comprehension. Equally, unique and traditional esport careers present opportunities and challenges potential employees seeking to enter esport must understand (Hedlund et al. 2021).

Part of the issue in developing and training qualified candidates with the proper knowledge, skills, and abilities suited for the esport industry is where esport fits within the collegiate environment and curriculum development. Literature has examined esport' growth as an industry but also how university programs have entered and use esport as part of their sport offerings and where it should be housed (i.e., club sports or university athletic program) (Pizzo et al. 2019). This

debate centers on supporting esport on campuses. If it is deemed to be a sport, then the program will require funding, management, promotion, and governance like other official sport programs. If it is deemed to be a club then it falls under traditional student activities and management practices (Funk et al. 2018). As the debates concerning esport as sport or not persists (Pizzo et al. 2019), and how should college esport be treated/formatted/housed (Reavis 2021) there is the question of if esport can be a legitimate major for college students (Murray et al. 2021, Raupp 2020). The challenges with developing an esport program and its abilities to build successful esport degree programs and curriculum (Reavis 2021) are also of concern. Thus far information provided about knowledge and skills needed to succeed and enter the esport industry come from profiles of individuals and organizations currently working in esport (Hedlund et al. 2021). Therefore, it is important to identify knowledge, skills, and abilities from those who have entered the esport industry to develop curriculum/programs to help train knowledgeable and passionate people to benefit the industry (Hedlund et al. 2021) and help it continue to grow.

Knowledge, Skills, Abilities, and Competencies

The Society for Human Resource Management (SHRM) is a national professional human resource (HR) organization which conducts research; plays an active, leading role in workplace employment advocacy; has a credentialling arm that sets professional standards in the field based on a body of knowledge (SHRM BoCK); and adheres to the SHRM Code of Ethics and Professional Standards in Human Resource Management (SHRM 2018). According to SHRM (2021), when conducting job analysis and developing job descriptions, there are three key elements in the process that include the identification and inclusion of knowledge, skills, and abilities, commonly known as KSAs. SHRM defines these key elements as follows:

> "Knowledge – body of information necessary for task performance.
> "Skills – level of proficiency needed for task performance.
> "Abilities – capabilities necessary to perform the job." (SHRM 2021, p. 333)

For more than 20 years, formal research and surveys of business and industry organizations have attempted to identify the KSAs necessary and expected of college graduates. SHRM has consistently engaged in research regarding necessary KSAs for success in the workplace. At the turn of the 21st century, there was focus on the skilled workforce shortage. At a national symposium on the aging workforce in June 2005, Susan R. Meisinger, SPHR, former president and CEO of SHRM discussed the importance for HR professionals and their organizations to support and participate in local workforce training, school-to-work programs, and to implement job training which would include mentorship and professional development programs. The US Department of Education report, the American Management Association Study and research conducted by Porter and McKibbin discuss the importance of candidates possessing "soft skills" and strategies to help develop them in college students (Painchaud 2006, pp. 45–52).

When preparing for his article for SHRM, Mark Feffer interviewed senior HR managers, senior executives from consulting and training organizations, executives from staffing agencies, higher education business professors, along with analysis of recent research from the Hay Group and Adecco Staffing USA. The result was the identification that "soft skills" are becoming more important for success as the workplace evolves socially and technologically (Feffer 2016).

The Lumina Foundation released its Degree Qualification Profile which identified five areas of learning: specialized knowledge - knowledge acquired in a specialized field of study; broad, integrative knowledge - knowledge acquired in general education fields; intellectual skills - analytic inquiry, use of information resources, engaging diverse perspectives, quantitative fluency, and communication fluency; applied learning - ability to translate knowledge into action; and civic learning - sensitivity, awareness, understanding, and engagement in diversity, equity and inclusion in work, community service, and co-curricular activities (Lumina Foundation for Education 2011). These broad areas of learning align with the expected KSAs of college graduates.

In 2015, the Hart Research Associates released its findings from online surveys of employers and college students conducted on behalf of the Association of American Colleges and Universities (AAC&U). Some key findings of this research:

1. Employers believed that broad learning across areas including problem solving with people who have differing views, democratic institutions and values, civic capacity, liberal arts and sciences, and intercultural skills should be an expected part of college for all students, regardless of their chosen major or field of study.
2. Written and oral communication, teamwork, ethical decision-making, critical thinking, and the ability to apply knowledge in real world setting were the most highly valued skills identified.
3. Employers believe that engaging students in applied learning projects would improve learning and better prepare them for career success.
4. Many employers feel that college graduates fall short in their preparedness in several areas, including those the employers deem most important for workplace success. (Hart Research Associates 2015)

In 2019, SHRM published a five-part series on skill gap and readiness for work of college graduates. Part 1 (Wilkie 2019a) discussed the disconnect between higher education academic plans and what employers expect graduates to do; skills such as written communication, speaking persuasively, thinking critically, working independently, showing initiative, and interacting with others are lacking. Additionally, the research showed a big divide between how prepared students think they are for work and how prepared employers think they are. Significant gaps exist between students' and employers' perspectives in the following areas: professionalism/work ethic, oral/written communication, critical thinking/ problem-solving, teamwork/collaboration, leadership, career management, and global/ intercultural fluency. Part 2 (Wilkie 2019b) identified soft skills such as

adaptability, problem-solving, creativity, influence, drive, empathy, collaboration, critical thinking, and being willing to view issues from multiple perspectives as key missing elements. The four overarching soft skills categories identified were critical thinking, communication, listening, and interpersonal skills. In the 3rd part of the series, Wilkie (2019c) shares employers indicate hard skills are lacking also. There is a sense of college grads not possessing basic technical and practical skills. Advancements in technology is cited as a potential cause of this gap. The reality is students are not taught the foundation functionality and capability of software so that they can appreciate the transferability to upgraded and updated systems and softwares. Additionally, they prefer calling the help desk instead of accessing the tutorial or "googling it" to learn the process. In part 4, Wilkie (2019d) discusses the importance of business leaders engaging with higher education on curricula development. In doing so, a greater understanding between academia and real-world application could be developed and result in better prepared graduates. The last part in the series, part 5 (Wilkie 2019e), suggests it may be time to reengineer higher education and the 4-year college.

In chapter 2 of *Saving Higher Education* (Bradley et al. 2012), the authors discuss the evolution of competencies. During the 1960's through the end of the twentieth century, higher education focused on "learning objectives" (Bloom et al. 1971). As technology became the driver of change in business and industry, there has been a shift in traditional knowledge, skills, and abilities of the individuals graduating with baccalaureate degrees to a more complex application. In *Assessing Student Achievement in General Education,* Banta (2007) suggests the focus of learning objectives, what faculty believe students should know, is no longer enough for graduates to thrive in the work environment. There is a greater connection of the focus of competency-based education to what graduates need to be able to do in situations, customary/typical as well as unanticipated and/or complex.

Seidman and Bradley (2002) provided the following definition of "competency" in their paper presented at the Annual Meeting of the American Educational Research Association:

> "Competency proficiency refers to the ability of an individual to demonstrate the mastery of a skill and/or the application of a theory that leads to the successful attainment of performance-based outcome." (Seidman and Bradley 2002, p. 5)

The 3-Year Business Honors development team at Southern New Hampshire University (SNHU) further provided this working explanation of the definition:

> "A competency is a system of behavior that can be applied in a wide range of situations. To become competent in any skill or knowledge area {competency} a person needs to understand both conceptually and behaviorally; have opportunities to practice it; get feedback on how well he or she is performing the skill or applying the knowledge; and use the competency often enough so that it is integrated into his or her behavioral repertoire." (Seidman and Bradley 2002, p. 6)

In 2011, the Society for Human Resource Management (SHRM) began an extensive research project involving thousands of human resource (HR) professionals and senior leadership of global organizations to identify the critical competencies necessary for HR professionals' success. As part of the research, SHRM defined competency as follows:

> "A competency is a group of highly interrelated knowledge, skills, abilities and other characteristics (KSAOs) that give rise to the behaviors needed to perform a given job effectively." (SHRM 2018, p. 3)

The body of competency and knowledge (SHRM BoCK) was the result of the research project. In 2014, the SHRM BoCK was adopted as the professional standard for HR professionals to attain. The standard includes eight behavioral competencies and fifteen HR areas of expertise categorized under three knowledge domains, people, organization, and workplace. The behavioral competencies align with the broad integrative knowledge that is transferable to any career. The fifteen HR knowledge expertise relate to the specialized knowledge in the HR field (SHRM 2018).

It is clear, there are multiple definitions for competency. While most are in alignment for the purposes of clarity, this research defined competency as:

> What an individual knows (knowledge and ability) and the level of proficiency (skill) with which an individual can use that knowledge; it is a high proficiency level of the application (behavior) of one's knowledge, skills, and abilities.

As esport continues to grow and becomes more accepted it provides many opportunities for colleges, faculty, and students to reach goals related to recruitment, retention, and engagement (Murray et al. 2021). Additionally, colleges have the goal of fostering students' development to critically think and solve problems in addition to other desired KSA outlined above. However, universities are still hesitant to implement esport because of a lack of expertise around the infrastructure. The reality is, students are interested in esport being incorporated in their educational program; schools just need the correct tools to help them get it started (Andrews et al. 2021). Thus, this paper aims to identify the knowledge, skills, and abilities that experts in the esport industry indicated as being important for those studying and/or pursuing a career in the esport industry.

Methodology

The purpose of this study was to identify the knowledge, skills, and abilities an individual should seek to develop/provide competencies should they seek employment in the esport industry. Additionally, the purpose of this study is to help provide key/common areas in which experts from the esport industry suggest students/programs focus. To that end, 25 esport industry experts were interviewed to increase its relevance and validity (Cranmer et al. 2021). A semi-structure, virtual interview was conducted in which introductions, and the interviewer

purpose for contacting and interviewing participants where provided. Then each interviewee was asked the same questions. From their experience/perspective what are the knowledge, skills, and abilities someone that wants to enter the esport industry should focus on/or if they are studying esport should develop. Notes were taken and transcribed during the interview process. Each interviewee was sent their responses to either add/change/clarify any additional information.

Participants

The 25 interviewees of this study included 22 males and 3 females. They fell into four main categories: higher educational institutions, recognized governing authorities, existing esport organizations, and active participants in esport. Eight individuals fell into the category of the higher education institutions including faculty, administrators, authors, researchers, and coordinators. The recognized governing authorities included four interviewees holding positions of commissioners, executive directors, and legal expert. Seven of the research participants are representatives from the esport industry in senior leadership positions. Additionally, six individuals are active participants as coaches, streamers, competitive and casual players. (See Figure 1 for participant profiles.)

Figure 1. *Participant Profiles*
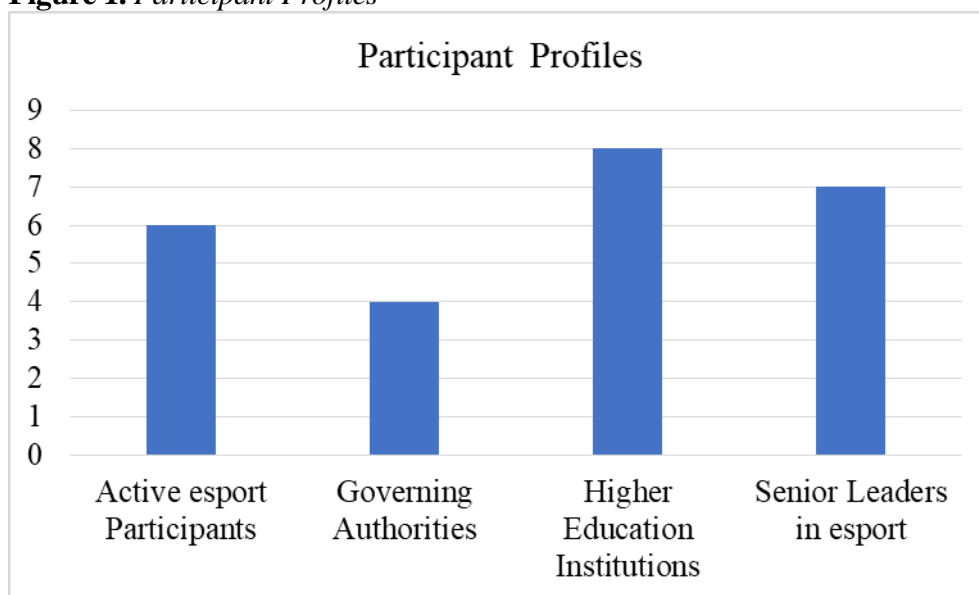
Data Collection and Analysis

The general inductive approach was used to analyze the qualitative data to identify themes in the text data that were related to the purpose of the study. Once the data files were cleaned and put into a common format, the analysis commenced with a close reading of the text, which was carried out by two members of the evaluation team. During the analysis, specific themes were developed, which in the view of the investigators captured core messages reported by participants.

General inductive approach was appropriate for this study given the purpose of the study and as Thomas (2006, p. 238) suggests using an inductive approach is suitable when the purpose is to:

(a) condense raw text data into a brief, summary format;
(b) establish clear links between the evaluation or research objectives and the summary findings derived from the raw data; and
(c) develop a framework of the underlying structure of experiences or processes that are evident in the raw data.

The following procedures were used to analyze the data as outlined by Thomas (2006, pp. 241–242):

1. Preparation of raw data files (data cleaning/scrubbing): Format the raw data files in a common format. Print and/or make a backup of each raw data file (e.g., each interview). Transcripts and notes taken during the interviews utilized Microsoft Word. Each participant was given a copy of their interview to review once all data was collected.

2. Close reading of text: Once text has been prepared, the raw text is read in detail until the evaluator is familiar with its content and gains an understanding of the themes and events covered in the text.

3. Creation of categories: The evaluator identifies and defines categories or themes. The upper-level or more general categories are likely to be derived from the evaluation aims. This was established with the purpose to identify the KSA's for esport. The lower-level or specific categories will be derived from multiple readings of the raw data. In inductive coding, categories are commonly created from actual phrases or meanings in specific text segments. Microsoft Excel was utilized to capture text/phrases that accompanied the themes/categories derived through the reading of the text.

4. Overlapping coding and uncoded text: Among the commonly assumed rules that underlie qualitative coding, two are different from the rules typically used in quantitative coding: (a) one segment of text may be coded into more than one category, and (b) a considerable amount of the text (e.g., 50% or more) may not be assigned to any category, because much of the text may not be relevant to the evaluation objectives. Text/phrases that were used were mapped and categorized under the KSA with specific themes under each of the main categories. Text that was included in the analysis was recorded in a Microsoft Excel sheet.

5. Continuing revision and refinement of category system: Within each category, search for subtopics, including contradictory points of view and new insights. Select appropriate quotations that convey the core theme or essence of a category. The categories may be combined or linked under a superordinate category when the meanings are similar. This was done with the KSA's, eventually once all the text was reviewed, coded, categories established, it was mapped back to HR literature, specifics presented in the results.

The categories resulting from the coding, followed key features suggested by Thomas (2006, p. 240):

1. Category label: a word or short phrase used to refer to the category. The label often carries inherent meanings that may or may not reflect the specific features of the category.

2. Category description: a description of the meaning of the category, including key characteristics, scope, and limitations.

3. Text or data associated with the category: examples of text coded into the category that illustrate meanings, associations, and perspectives associated with the category. Text/phrases/quotes were taken from the interviews and labeled with a theme or category that best captured the essence of what the interviewee was saying as interpreted by the researchers.

4. Links: Each category may have links or relationships with other categories. In a hierarchical category system (e.g., a tree diagram), these links may indicate superordinate, parallel, and subordinate categories (e.g., "parent, sibling" or "child" relationships). Links are likely to be based on commonalities in meanings between categories or assumed causal relationships. The hierarchical category system was the KSAs in which the raw data was analyzed with emerging themes being categorized under one of these general themes.

5. The type of model in which the category is embedded: The category system may be subsequently incorporated in a model, theory, or framework. Such frameworks include an open network (no hierarchy or sequence), a temporal sequence (e.g., movement over time), and a causal network (one category causes changes in another). To be consistent with the inductive process, such models or frameworks represent an end point of the inductive analysis. They are not set up prior to the analysis. It is also possible that a category may not be embedded in any model or framework. As a result of reviewing the literature and given that the purpose of inductive analysis is based on the experiences of the evaluators, it was clear once the analysis was finished and categories established, that the results could be supported and mapped back to HR literature. Specifically, this is due to the experience that one of the researchers has in developing HR policy, HR curriculum, and HR programs.

As Thomas explained, the intended outcome of the process for inductive analysis is to create a summary of categories that the evaluators' view represents the key aspects of the themes identified in the raw data in relation to the purpose of the study. For the purposes of this study, and consistent with Marshall and Rossman (1999), the transcribed interviews of the 25 participants were analyzed for emerging domains/topics, key themes and processes, interpretations, nonoverlapping components and the trustworthiness of findings (Marshall and Rossman, p. 154). The next step was to code the data by categorizing/labeling the words or phrase provided, set context for the category, establish links of the phrases to the category and ensure consistency with the coding (Marshall and Rossman, pp. 155–157). Results of the analysis are presented below.

Results

The purpose of the study was to identify the KSAs that students should develop if they want to pursue a career in the esport industry. For more than four decades, formal research efforts have transpired focusing on the knowledge, skills, abilities, and competencies that individuals should possess in order to be successful in various fields of work. During this time, higher education and educational foundations have engaged in several initiatives for the knowledge development of these skills by utilizing various experiences integrated throughout the curricula (Spady 1977, Lumina Foundation for Education 2011, Bell 2012, Bradley et al. 2012, Hart Research Associates 2015, Finley 2021).

While several industries have established certifications for professionals, with the turn of the 21st century, many of these certifications expanded beyond the technical competencies of the discipline to include the behavioral competencies. During this time, the Society for Human Resource Management (SHRM) had a well-established credentialling program for human resource (HR) professionals. In 2011, SHRM commenced its research project involving thousands of HR professionals and organizations' senior leadership worldwide to identify critical HR competencies. The result of that project is the SHRM Body of Knowledge and Competency™ (BoCK). The BoCK identifies eight behavior competencies and three technical competency domains that are made up of fifteen HR functional areas, five per domain.

Behavioral competencies:

1. Leadership: Leadership and Navigation, & Ethical Practice.
2. Business: Business Acumen, Consultation, & Critical Evaluation.
3. Interpersonal: Relationship Management, Communication, & Global & Cultural Effectiveness.

HR Domains and functional areas:

1. People: HR Strategic Planning, Talent Acquisition, Employee Engagement & Retention, Learning & Development, & Total Rewards.
2. Organization: Structure of the HR Function, Organization Effectiveness & Development, Workforce Management, Employee & Labor Relations, Technology Management.
3. Workplace: HR in the Global Context, Diversity & Inclusion, Risk Management, Corporate Social Responsibility, US Employment Law & Regulations.

For the purposes of this study, the SHRM BoCK was used as a reference for identifying K, S, A, and competencies. As recommended by Thomas (2006) the transcribed interviews of the 25 participants were analyzed for emerging domains/ topics, key themes and processes, interpretations, nonoverlapping components and the trustworthiness of findings. The next step was to code the data by categorizing/

labeling the words or phrase provided, set context for the category, establish links of the phrases to the category and ensure consistency with the coding.

It became apparent when establishing the domains and key themes that there were two broad categories: general, broad integrative competencies and internal esport organization skills.

The general, broad integrative competency categories that emerged were in alignment with the SHRM BoCK. The common themes that emerged, regardless of discipline (functional area) or industry fell into the following clusters:

1. Business Acumen and Strategic Approach
2. Critical Evaluation and Analytical Skills
3. Effective Communication
4. Global and Cultural Orientation
5. Human Relations Skills
6. Leadership
7. Legal and Ethical Practices
8. Relationship Management
9. Research and Creative Problem Solving
10. Technology Management

Figure 2 shows the importance of the 10 clusters based on participant interviews in terms of how frequent they were mentioned.

Figure 2. *Dominant Themes from Interviews*
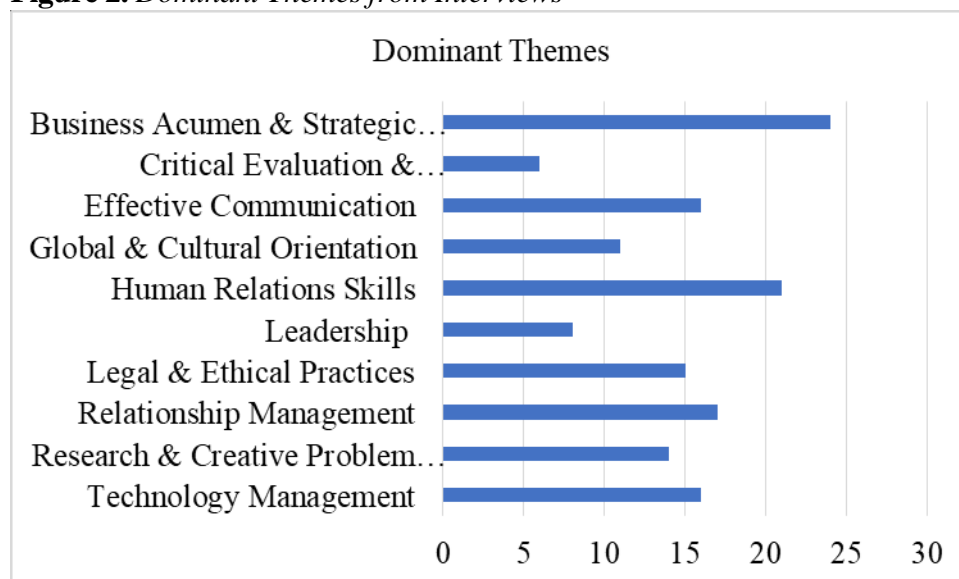
Business Acumen and Strategic Approach was identified by 24 of the 25 participants as a key competency required of individuals embarking on an esport career. The key characteristics to this cluster are knowledge of functional area relationships, business and competitive awareness, business analysis, strategic alignment, and assessment of resources. Participants identified themes and descriptors inclusive of understanding organizations' infrastructure, business

processes, financial management, mission, vision, values, business ecosystem and structure, evolution of the industry, industry knowledge, application and interpretation, external environment, an entrepreneurial mindset, business plans, principles of management, principles of marketing, sales management, operations management, ins and outs of gaming industry, and competitive analysis.

Of the 25 participants, 21 identified Human Relations Skills as a key competency for esport employees. This cluster is characterized by lifelong learning; interpersonal skills; character traits such as motivation, adaptability, reliability, and responsibility; personal/professional manners and development; and emotional intelligence. Interviewees provided descriptors such as flexibility, adaptability, working under pressure, tenacity, self-starters, self-motivated, self-awareness, time management, accountability, grit/endurance, genuine/authentic, passion, discipline, consistent, work ethic, coachable, soft skills, human relation skills, professionalism, need to be able to work with people, and utilize emotional intelligence.

Relationship Management was the third most common cluster with 17 of the 25 participants identifying it as a key competency. This competency is inclusive of networking, relationship building, teamwork/team membership, conflict management, consulting process, and negotiations. Descriptors provided by the participants included networking, player support, building relationships, partnership activation, community building, coaching, teamwork, team management, conflict resolution, and socialization.

Effective Communication tied for fourth most common cluster with 16 of the 25 participants identifying it as a key competency. In context of the organization, effective communication is focused on the exchange of organizational information as well as active listening. The interviewees highlighted the importance of active listening along with appropriate use of industry terminology; one participant indicated written and verbal communication is a skill that is essential; it is about making sure everyone is on the same page and striving for the same goal.

Also in fourth position is Technology Management with 16 of 25 participants identifying it as a key competency. Technology management encompasses general technology proficiencies, hardware, software, cybersecurity, and document management. Interviewees cited several applications and softwares such as Adobe, coding excel, streaming (i.e., Twitch, YouTube), casting, programming/game engines, as well as being aware of and the ability to adapt and quickly come up to speed on emerging esport applications (i.e., Discord).

Legal and Ethical Practices came in at sixth position with 15 of 25 participants identifying it as a key competency. Components of legal and ethical practices include domestic and international law, current and proposed legislation and regulations, personal and professional integrity, code of conduct, and being an ethical agent. Esport is an emerging industry and as such there are limited laws and regulations. Additionally, esport operates in a global market with limited borders. Employees in esport need to have a working knowledge of the General Data Protection Regulation passed by the European Union in 2016 and implemented in 2018 which deals with eight key areas including data sharing, data transfers, data breaches, accountability, and legality of processing. As the industry evolves more regulations and laws will be enacted. The interviewees identified

issues dealing with contracts, amateurism, governance, and legal liability which will come to the forefront.

Research and Creative Problem Solving was identified by 14 of the 25 participants. The themes and descriptors included being able to access subject matter experts (SMEs), decision making and creative problem-solving process, ability to validate data sources. The participants underscored the importance of possessing well developed problem solving and critical thinking skills along with proficient research and analytical skills.

Global & Cultural Orientation was a key competency for 11 of the 25 participants. This competency includes operating in a diverse workplace, operating in a global environment, and advocating for diverse and inclusive workplace. Diversity, equity, and inclusion practices were highlighted as important aspects of the esport industry. Additionally, concerns about access for underrepresented groups and a respectful work environment were expressed. Finally, the focus of health and wellness was underscored in this competency.

The Leadership competency resonated with 8 of the 25 participants. This competency deals with navigating the organization, communicating a shared vision, managing esport initiatives, engaging in change management, and influencing the direction of the organization. The interviewees noted several of the components as well as goal setting and trait leadership.

Critical Evaluation and Analytical Skills was identified by 6 of the 25 participants. Themes and descriptors included statistical principles, data measurement tools, and data analysis tools. While this cluster scored the lowest of all, there is a fine line between it and Research & Creative Problem Solving.

Further refined for esport careers, three internal domains emerged comprised of discipline specific/technical KSA and competencies. The three internal domains correlate to the three common elements in any organization: people, structure, and goals (Robbins et al. 2015, p. 5). Figure 3 depicts the number of participants cited items that fit the internal domains. There were 22 of the 25 participants who identified aspects of organization goals; 14 of 25 participants who identified aspects of people; and all 25 participants identified aspects of organization structure.

1. People
   a. Employee recruitment, engagement, retention
   b. Learning and Development
   c. Diversity, Equity, & Inclusion (DEI)
   d. Employee & Labor relations
2. Structure
   a. Technology Infrastructure
   b. Risk Management
   c. Organizational effectiveness & innovation
   d. Functional Discipline acumen & structure
   e. Product and/or Service knowledge & skills
3. Goals
   a. Alignment with the organization mission, vision, values

            b.   Alignment with laws and regulations
            c.   Corporate Social Responsibility

Figure 3. *Importance of the 3 Internal Domains Based on Participant Interviews*
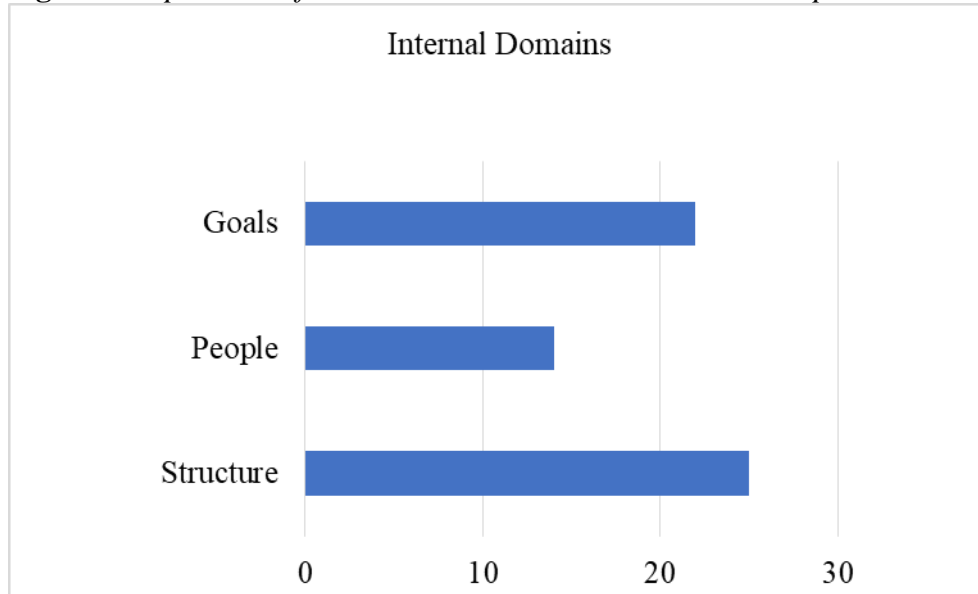
Figure 4 is the breakdown of the Goals domain which includes three functional dimensions as key knowledge areas: corporate social responsibility identified by 4 participants; alignment with laws and regulations were included with 11 of the interviewee's comments; and 22 interviewees identified alignment with the organization's mission, vision, and values.

Figure 4. *Goals Domain*
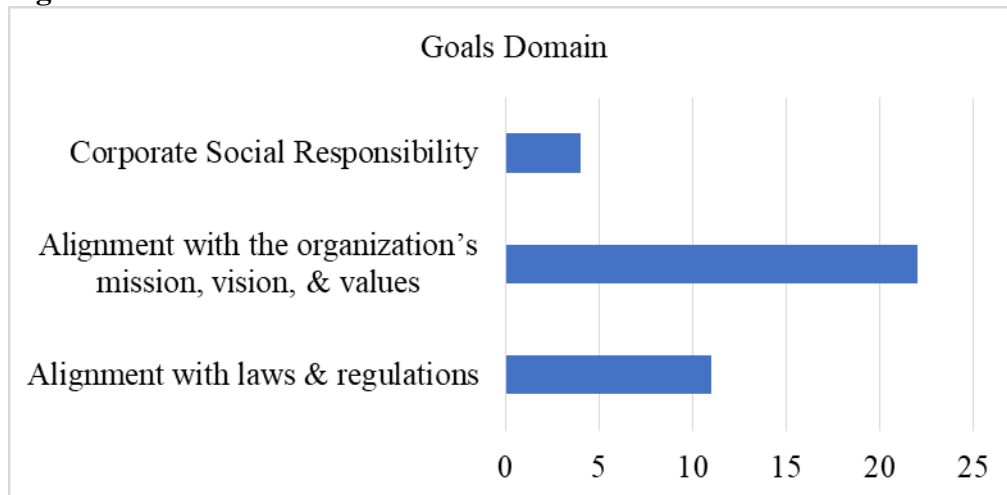
Corporate social responsibility (CSR) is assessed in three groups: economic, environmental, and social. Economic ties to ROI, profits, monetary flows, jobs created and supplier relations. Environmental deals with carbon footprint, pollutants emitted, recycling and reuse, water/energy use and product impacts.

Finally, social deals with health/safety record, community impacts, human rights/ privacy, product responsibility, and employee relations. While CSR was not seen as a critical dimension, as esport evolves through the industry life cycle, it will become more important.

Alignment with the organization's mission, vision, and values interviewees identified the components such as the esport business, industry knowledge, esport history, and innovation. The drill down for alignment with laws and regulations, participants identified governance, legal issues, and contracts.

Figure 5 illustrates the breakdown of the People domain which includes four functional dimensions as key knowledge areas: learning and development; diversity, equity, and inclusion (DEI); employee recruitment and engagement; and employee and labor relations. The technical area of learning and development was the most frequently mentioned, 11 of 25 participants, key knowledge area. Diversity, equity, and inclusion (DEI) was mentioned by 4 of the 25 participants. Identified by 2 of the 25 were both employee recruitment, engagement, and retention and employee and labor relations.

Figure 5. *People Domain*
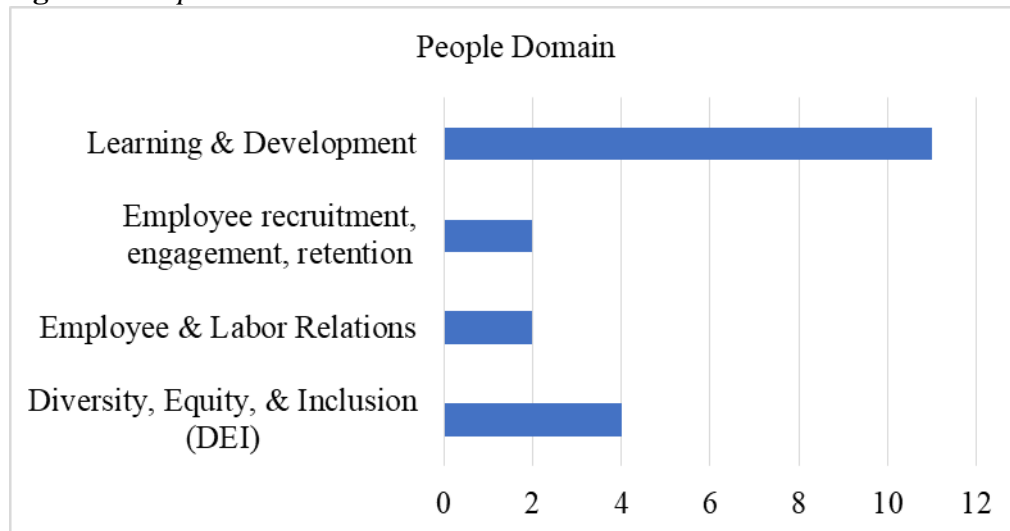
Learning and development included the components of applied learning, gaining esport industry experience, general work environment experience, internships, experiential learning, and gamification of esport learning to better prepare students for the work environment. Employee recruitment, engagement, and retention tied to career preparation and development, resumes, interviewing, and applying for jobs. Employee and labor relations requires an understanding of labor contracts. Diversity, equity, and inclusion (DEI) was underscored by participants as the need for people entering the esport industry to have a sensitivity to DEI issues and develop strategies to positively navigate the issues in the workplace.

Under the structure domain, there are five broad technical areas: functional discipline acumen and structure; organization effectiveness and innovation;

product and/or service knowledge and skills; risk management; and technology infrastructure. (See Figure 6.)

Figure 6. *Structure Domain*
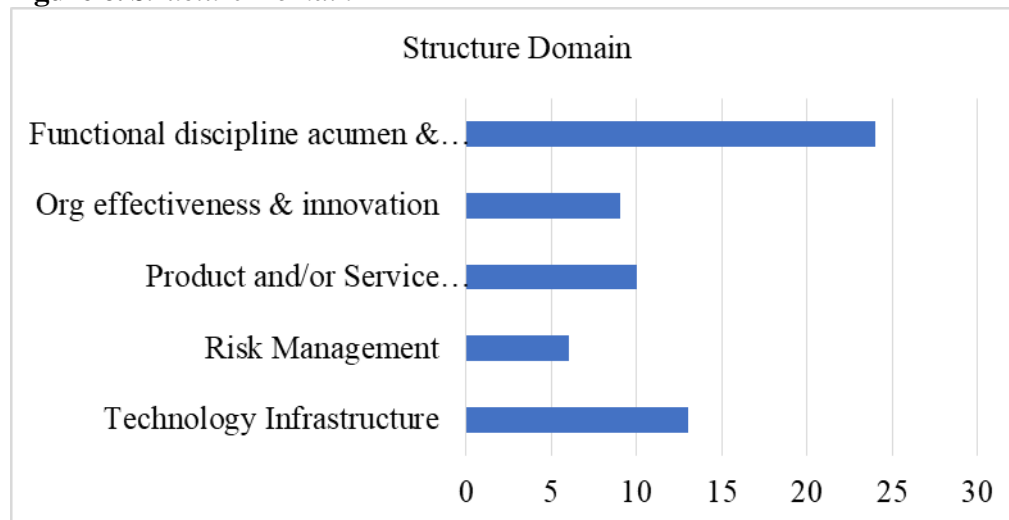
Functional discipline acumen and structure was identified by 24 of the 25 interviewees as essential technical skill area. This category includes working knowledge, skills, and abilities in the following noted infrastructure components: sales, player management, consumer behavior, customer service, operations/ projects/event management, hosting events, broadcasting/shout casting, game design & development, emerging technologies, digital marketing/social media marketing, SEO/SEM, finance/revenue, and sponsorships.

Technology infrastructure was the second critical technical skill area expressed by 13 of the 25 participants. Working knowledge, skills, and abilities of key technology areas such as capacity/capability for game design/development, streaming, content creation, Twitch, cloud computing, programming, Discord, software engineers, IT issues, YouTube, boosting, OBS, and new applications were indicated by the interviewees as integral to success in the esport industry.

The product and/or service knowledge and skills technical area was identified by 10 of the 25 participants. This requires knowledge, skills, and abilities to enable the employee to understand the ins and outs of proposals, sponsorships, esport betting/gambling, loot boxes and monetization.

Organization effectiveness and innovation deals with the alignment of people, structure, and goals to ensure optimum operation of the organization. Nine out of 25 participants highlighted this technical area citing the need for understanding and sensitivity in the areas of diversity, equity, and inclusion; health and wellness; the organization structure and business operations, along with best management practices as integral to success.

The least frequently noted functional area, identified by 6 of the 15 participants, was risk management. It is critical that individuals entering the esport industry have an understanding and continue to develop knowledge in this area. Key components of this functional area include compliance and regulations within

the industry; managing liability – organization, application, and individual; the implications of discrimination and how it manifests itself; cybersecurity and malware, along with other potential risks to the business.

Discussion

The esport industry is in the introductory phase. As such, there are many unknowns, the current operation of this industry will be fundamentally different as it grows and develops. To that end, the purpose of this study was to shed light, and identify knowledge, skills, and abilities someone should develop should they seek to explore the esport industry. One of the main drivers of the changes will be technology advancement and how these interfaces with the development of the esport industry.

An inductive approach was used to analyze the data resulting in themes. The scrubbed, formatted data was analyzed independently by an evaluation team; specific themes were developed that captured core messages reported by participants (Strauss and Corbin 1998). As a result, ten common themes appeared: Business Acumen and Strategic Approach (24); Human Relations Skills (21); Relationship Management (17); Effective Communication (16); Technology Management (16); Legal and Ethical Practices (15); Research and Creative Problem Solving (14); Global and Cultural Orientation (11); Leadership (8); and Critical Evaluation and Analytical Skills (6). Additionally, requisite esport specific KSAs and competencies aligned with three broad organization categories: People (14), Structure (25), and Goals (22). The results and categories of the current study are supported by previous studies regarding what employers desire in recent grads (Seidman and Bradley 2002, pp. 15–16) and an extensive global study conducted by SHRM (Society of Human Resource Management) to develop its BoCK™ (Body of Competency & Knowledge) for Human Resource professionals (SHRM 2018).

Results of the current study as it relates to gaining experience and problem solving is supported by the work of Banta (2007) that discusses students need to be able to show they can adapt to various situations and unanticipated situations. Given how new esport is, participants in the current study discussed how it is important that students learn to sink or swim by experiencing esport itself. Numerous participants discussed how when they hire people or have interns and a problem arises, they tell them to figure it out on their own. Therefore, gaining esport experience is important to develop problem-solving skills. This is further supported by the work of Seidman and Bradley as it relates to developing competencies in various areas. Additionally, as Murray et al. (2021) discussed, esport is in a position to have curriculum built around it, and as the themes/results of the current study suggest, esport offerings can also be embedded into traditional courses as participants identified KSA and competencies established by SHRM BoCK. Given the need to develop KSA, experience is a sought-after attribute and as Murray et al. (2021) suggest developing curriculum and embedding esport in traditional courses provides students the opportunity to engage in projects focused

on the esport ecosystem gaining exposure to skills and knowledge that rely on as Hedlund et al. (2021) identified as traditional and unique career opportunities.

Results of our study support previous research (Wilkie 2019b, Hart Research, 2015, Lumina Foundation for Education 2011) that college students seeking to enter the esport industry need to develop hard and soft skills. Therefore, curriculum does not necessarily need to be new for esport if the outcomes of existing courses address these gaps identified by participants and employers. Curriculum and programs need to be developed in which esport industry (specialized knowledge, broad, integrative knowledge, intellectual skills, civic learning, applied learning) are esport context specific to achieve this notion discussed by Hedlund et al. (2021). That is, esport careers are emerging that are being filled by traditional sport careers, but also unique to esport. As the interviewees discussed, and an important contribution from the current study, participants identified there is a gap in these areas (professionalism/work ethic, oral/written communication, critical thinking/ problem-solving, teamwork/collaboration, leadership, career management, and global/intercultural fluency), that they have people that either know esport but do not understand business/ management, or they know business/management and do not understand esport, results similarly reported and corroborated by the current study to those by Wilkie 2019d).

As previous research that outlines the needs for skills that can be developed through applied learning, those seeking to enter the esport space or develop programs should seek out experience in the industry. A sentiment shared by many of the participants. Therefore, curriculum should be developed in which hands-on learning occurs, this can be in small forms like learning to stream esport content, to hosting small, esport events at a local arena, and gradually growing the size of the events. This could help students develop the KSA outlined by the participants of the current study, but also from previous research (SHRM 2018, Wilkie 2019d).

In looking at the low responses related to the areas of diversity, equity, and inclusion, compliance and regulations within the industry, the implications of discrimination and how it manifests itself in esport, can be explained by the barriers to enter the esport space due to toxicity and gender bias reported by Andrews and Crawford (2021). The number of women playing games and participating in esport continues to grow and is estimated to be 49% of gamers in the United States under 30 years old, 30% of women are competitors in esport, and 22% of the global fanbase are female (Andrews & Crawford, 2021). Those wanting to enter the esport industry will need to understand these experiences and make efforts to mitigate. As Andrews and Crawford (2021, p. 40) suggest to address the negative female issues in entering esport "the need for education, awareness, and a rise in numbers of females within these sports, are fundamental to beginning to effect change in misconceptions and biased attitudes and beliefs." This issue was outside the scope of the current study, but warrants additional research for the future.

Conclusions

The interviewees identified many characteristics and phrases that aligned with the ten behavioral clusters developed as a result of this study. They were repeatedly underscored as integral to a strong foundation an individual needs to acquire that will allow continuous growth, development, and resiliency in the esport industry. The three internal domains with the twelve functional areas represent the broad-based knowledge, skills, and abilities essential when entering the esport industry. Understanding these functional areas allows the individual to perform in a more collaborative, integrative manner which ultimately benefits the organization overall.

When reviewing the data from the interviews, patterns and emerging themes were found to exist. While they were not identical to the SHRM BoCK there were many similarities and connections. The further delineation of the internal functional areas categorized under the three domains, people, structure, and goals, indicates the foundational technical knowledge, skills, and abilities necessary for success in an esport career.

While an individual requires competencies in traditional workplace knowledge as well as discipline specific, there is an expectation that with industry evolution, functional areas (domains) within esport will continue to emerge. Lifelong learning skills, passion, and a desire to acquire advanced knowledge will be integral to success and sustainability of an esport career.

Ongoing research is recommended, given the introductory phase of the esport industry life cycle, the research provides an initial framework for current KSAs and competencies desired. As the industry evolves, industry innovation, development, and technology advancements may result in a shift in importance of the KSAs and competencies identified. Therefore, it is recommended that more research is done to collect information on KSA from subject matter experts, but also to identify academic institutes that offer programs in order to gain data/perspectives from students. This way comparisons can be made by students in terms of their career preparedness and compared to perspectives from SMEs.

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Financial and Management Barriers to Safety Education in Youth Sports in the United States

By Amy S. Eperthener[*]

A problem exists with the lack of mandated health and safety training for youth sport coaches in the United States. Youth sport organizations rely heavily on volunteers to staff their programs, and lack of education leaves coaches unprepared to handle health and safety situations that arise. This study explored current practices in safety education for youth sport coaches in northwestern Pennsylvania. Youth sport coaches and administrators at three sites were interviewed. The results of the study showed an overall lack of consistency in health and safety education in the region. Youth sport coaches whose sport has a governing body or with additional coaching experiences had more health and safety education than those who did not. Administrators cited concerns that additional required training would deter volunteers from coaching, citing financial and management barriers. The coaches unanimously indicated additional education would not deter them from coaching. The participants viewed health and safety education as important and valuable for youth sport coaches to possess, as it increases the overall safety of youth sports.

Keywords: *youth sports, coach education, sports injuries, sports administration, injury prevention*

Introduction

Youth sports in the United States lack mandated and comprehensive health and safety training for youth sport coaches. Each organization that sponsors youth sports decides their coaching standards and any health and safety training they wish to require, as no minimum or universal requirements existed to become a youth sport coach (National Federation of State High School Associations 2020). Many youth sport coaches volunteer or are parents of participants and do not have any formal or informal coaching training (Merkel and Molony 2012). They lack the knowledge and skills of the sport itself, as well as how to handle the physical needs of youth participating in athletics (Quain 1989). This problem impacts youth athletes, parents, coaches, and youth sports administrators because youth coaches were not prepared to handle various health and safety issues associated with sports participation. More than 40 million children participate in organized community athletic programs in the United States each year (DiFiori et al. 2014, Glang et al. 2010, Swanson 2020). Parents trust that those responsible for youth sport programs have training to handle common injuries as well as weather emergencies such as lightening.

Physical activity is very important to many aspects of a child's development, yet participation is not without risk. The role of the youth sport coach is important

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in ensuring a safe athletic experience for young athletes. Despite the need for youth coaches to have such training to maintain the safe participation of young athletes, currently "no mandated national coaching education program exists in the United States for youth sports" (McLeod et al. 2011, p. 213). Because youth sports administrators and programs relied heavily on volunteer coaches, previous training or competence may not be a high priority when hiring coaching staff personnel (Quain 1989).

Millions of children participate in athletic activities through local parks and recreation departments, churches, YMCAs, and private athletic companies. Each organization offering youth sports opportunities have an obligation to provide "adequate coaching and medical supervision" (McLeod et al. 2011, p. 212). Given the lack of universal minimum requirements to become a youth sports coach, individual youth sports organizations determined their coaching criteria (National Federation of State High School Associations 2020). Some required their coaches to have a current first aid/CPR card while others had no minimum standards of training or education.

Research has documented a lack of first aid knowledge among youth coaches (Albrect 2009, Valovich-McLeod et al. 2008). Preventing and minimizing the negative impact of athletic injuries begins with having educated and prepared coaches (Valovich-McLeod et al. 2008). Injuries sustained while participating in recreational athletics have resulted in 2.6 million children being treated in emergency departments per year (Youth Sports Safety Alliance 2013), with an estimated healthcare cost of two billion dollars (Merkel and Molony 2012). The 2014 Youth Sport Safety Summit showed concussion rates for 8-13 year olds playing organized team sports doubled (Bakhos et al. 2010) and 47% of heat-related injuries reported occurred in youth athletes (Nelson et al. 2011). While participating in sports will never be completely risk free of injury, having a coach who is prepared to identify and handle common athletic injuries would significantly increase the overall safety of youth sports in the United States.

"Currently, no single entity oversees governance for all youth sports. As a result, uniformity in safety policies and procedures across organizations is lacking" (Huggins et al. 2017). A number of national organizations encouraged and promoted various levels of health and safety training for coaches. The National Action Plan for Sports Safety highlighted the need for coaches to be educated on such topics as cardiac events, neurological injuries, environmental and exertional conditions, and dietary/substance-induced conditions (Youth Sports Safety Alliance 2013). The National Athletic Trainers' Association (2013) suggested youth sport coaches be credentialed if their state, conference or league requires it, as this ensures that coaches have some background knowledge in the sport they are coaching. Additional recommended safety measures included requiring youth sport coaches to: obtain certification in first aid, cardiopulmonary resuscitation or CPR, and use of an automated external defibrillator or AED, know the signs and symptoms of both heat illness and concussions, and have an emergency plan in place (Casa et al. 2012, National Athletic Trainers' Association 2013). The National Association for Sport and Physical Education set domain two of their coaching standards and benchmarks as safety and injury prevention, ensuring

coaches be knowledgeable about injury prevention, responding in an emergency, heat illness, and concussions (National Association for Sport and Physical Education 2013). Best practices for youth sports include emergency action plans as well as education for leaders and coaches in the areas of emergency plans, sudden cardiac arrest, brain injury, exertional heat stroke, preexisting medical conditions, environmental conditions (lightening safety) and medical services (Huggins et al. 2017). These recommendations have not trickled down into action for youth sports coaches and administrators.

Evidence indicated the need for mandated health and safety training in youth sports (Albrect 2009, Andersen et al. 2002, Barron et al. 2009, Binkley et al. 2002, Council on Sports Medicine and Fitness & Council on School Health 2011, DiFiori et al. 2014, Gregory 2013, Huggins et al. 2017, Mickalide and Carr 2012, National Athletic Trainers' Association 2013, National Association for Sport and Physical Education 2013, Shimon 2013, Valovich-McLeod et al. 2008, Witkowski 2013, Youth Sports Safety Alliance 2013). Youth sport provider models varied greatly across the country, from organizations with full time staff to those comprised completely of parent volunteers (Pardis 2014). Many educational programs existed to meet this need, either comprehensive programs or programs focused on specific health and safety issues. Despite the need for youth coaches to have such training to maintain the safe participation of young athletes, currently "no mandated national coaching education program exists in the United States for youth sports" (McLeod et al. 2011).

There is no lack of available and convenient programming for youth sport coaches (American Heart Association 2020, American International Group 2020, American Orthopaedic Society for Sports Medicine 2014, Centers for Disease Control and Prevention 2019, Human Kinetics 2020, National Center for Sports Safety 2017, Sports Safety International 2020a, 2020b, USA Football 2020, US Sports Academy 2015, Walsh et al. 2013). While sport specific requirements by leagues vary, basic health and safety information is readily available for youth sports organizations to utilize to educate their coaches, thus providing a safer playing environment.

Gorse (2010) was the first author to address health and safety issues within youth baseball organizations. Since then, his study has not been replicated using other youth sports, especially those available to female youth athletes. No additional studies have specifically looked at youth sports with regard to coaching education or included both coach and administrator perspectives within the same study. This study investigated current practices in health and safety education for youth sport coaches. The youth sport coaches' and administrators' experiences with health and safety-training requirements was also investigated.

The purpose of this qualitative multi-site case study was to explore current practices in health and safety education for youth sports coaches in northwest Pennsylvania. The study was designed to gain a deeper understanding of the current health and safety requirements for youth sport coaches. The experiences of youth sport coaches and youth sport administrators was examined to identify areas of improvement in the education and preparedness of youth sport coaches to handle common health and safety issues associated with sport participation.

Methodology

This multi-site case study relied upon interviews with the participants and a review of formal site documents to capture the personal experiences of youth sport coaches and administrators. Participants' beliefs about their experiences and the interaction of multiple perspectives (coaches and administrators), combined with analysis of coaching handbook/policy manual provided a broad picture of current practices and attitudes regarding health and safety training in youth sports in the Northwestern Pennsylvania area.

This study used semi-structured interviews, through an interview guide to identify the experiences and feelings of youth sport coaches and administrators regarding health and safety education in youth sports. In addition, coaching handbooks/policy manuals were analyzed to gain a better understanding of current practices. Three distinct sites were selected to show unique aspects and perspectives of youth sports settings such as differences between non-profit and private business youth sports opportunities. Site 1 was managed by a private entity with municipal support. Site 2 was managed by a private company, and Site 3 was a local non-profit organization.

Participants

The participants in this study included youth sport administrators and coaches at each of the sites, as they differ in their roles within youth sports organizations. One youth sports administrator from each site, and two youth sport coaches from each site were interviewed, for a total of nine participants. All administrators were male. Fifty percent of coaches were male and 50% were female. Inclusion criteria for participants included the site youth sports administrators and any youth sport coach affiliated with each site. Site administrators agreed to assist in accessing all youth sport coaches within their organization for potential study participation. No exclusion criteria existed for participants in this study.

Data Collection

Interviews were conducted using an interview guide. The semi-structured guide was created by the researcher based on the available literature on the topic of coach education in youth sports, and was reviewed by a panel of three experts in the field of youth sports to establish content validity of the interview questions.

Document analysis was selected as an additional data collection tool to gain the in-depth understanding necessary in case study methodology (Yin 2014). Data was gathered through analysis of each site's coaching handbook/policy manual. This objective source of data assisted the researcher in corroborating emerging themes from the participant interviews and identify specific characteristics of each site (Yin 2014). A checklist was created by the researcher based on the literature.

Procedures

The researcher generated a list of potential sites offering youth sports in the northwest Pennsylvania region. After receiving Institutional Review Board approval, youth sports administrators at each site were contacted and provided written approval to participate in the study.

Administrators at each of the data collection sites were contacted to schedule an interview at convenient time, location, and setting appropriate for recording the session. The participant signed the informed consent form and the interview was performed and recorded for transcription. The researcher followed the interview guide to ensure consistency of questions asked of the participant groups (administrators and coaches). Each recorded interview was transcribed verbatim to provide the most accurate account of data for analysis. Participants provided an email address in order to receive a written transcription of the interview. This member checking allowed participants to make corrections and verify the accuracy of the data collected during their interview. The coach interviews followed the same procedure as described above. Interview transcripts, upon approval by each participant for accuracy, were coded for common responses. Finally, the researcher obtained a photocopy or electronic copy of the site's coaching handbook/policy manual for review and analysis.

Data Analysis

The interviews were hand coded by the researcher to identify themes as they related to the study's research questions. Each site's coaching handbook/ policy manual was analyzed using the document checklist. The documents were reviewed for specific health and safety content identified in the literature as best practice.

Results

Two first order themes emerged from the findings that explained the current landscape of coach education in youth sports: business barriers and gaps in knowledge. Each first order theme was made up of supporting second order themes. The supporting themes for business barriers included sufficient staffing and sport governing bodies. The supporting themes for gaps in knowledge included concussion education and handling emergencies. The themes that emerged were also used in identifying answers to the research questions. The participants have been given aliases to protect their confidentiality.

Current Practices

Coach interviews revealed scarce efforts to require health and safety education for youth sport coaches in the northwest Pennsylvania region. Volunteer coaches were not required to have any health and safety training or certifications, except a background check. Paid coaches were required to have first aid/CPR/ AED certification. In addition, sports with governing bodies, such as USA

Gymnastics and USA Swimming, required additional education for coaches of that specific sport. Youth sport coaches with additional experience or coaching positions outside of youth sports had additional health and safety training required by the high school or collegiate leagues. All youth sport coaches in this study identified areas of weakness where they wished for additional education and training. The coaches also were unanimous in their feelings that additional health and safety education requirements would not deter them from volunteering to coach youth sports.

The majority of administrators in the study identified concussion awareness, sudden cardiac arrest, risk management, and knowledge of safe playing conditions and education as key for their youth sports coaches. Administrators also cited requirements of the individual sports' governing bodies, such as USA Swimming and USA Gymnastics, as both essential and necessary knowledge and skills.

Best Practice Implementation

Evidence from this study indicated only 1 of the 3 youth sports organizations in this study had a coaching manual/policy handbook. Having a coaching manual/policy handbook does not guarantee that best practices are being implemented. However, if a site was performing best practices as determined at the literature on youth sports safety, a coaching manual/policy handbook would best provide each youth sport coach with the education requirements and policies for reporting injuries, accessing emergency medical care, concussion and heat illness protocols, and emergency actions plans specific to each sport venue. The two sites that did not have a coaching manual/policy handbook relied predominately on volunteer coaches, with the exception of paid swim coaches.

The site with a coaching handbook shared an electronic copy with the researcher for analysis. The handbook is updated annually and provided to all coaches at the facility for reference. The coaching manual/policy handbook included many, but not all, of the health and safety topics noted in the literature as being necessary information for youth sport coaches. All coaches at this site are paid employees and are required to maintain first aid/CPR/AED certification; however, this was not specifically indicated in the handbook. The manual lacked a concussion policy or protocol, including knowledge of signs and symptoms and return to participation criteria or policies. It also lacked any mention of heat illness, perhaps because this sport only occurs inside.

The manual included many key aspects of an emergency action plan; however, it was incomplete and not organized as a standalone plan. A list of phone numbers to access the fire department, emergency medical services, and the police was provided. Incident report forms were included in the document, as well as how and when to contact the athlete's parents in the event of an injury. Other health and safety information such as a list of signs and symptoms of musculoskeletal injuries, splinting techniques, and using first aid skills was presented. With regards to overuse injuries, the handbook included skill progression sheets and suggestions for adjusting the teaching methods to the student's skill level. To improve safety, the manual suggested not leaving

the athletes unattended, using proper cushioning for equipment and checking and ensuring equipment readiness prior to beginning practice.

Health and Safety Education Experiences

The swimming and gymnastics coaches in this study were required by their governing bodies to have specific education. The other coaches were not required to have any health and safety education or training to coach youth sports for the organizations were data was collected. One coach completed first aid/CPR/AED certification, as well as the Concussion Wise and Cardiac Wise courses due to additional coaching responsibilities in interscholastic sports.

All administrators in this study cited background clearances as a safety measure. Two sites required the coaches to pay for their background clearances. The third site has only paid coaches, and covers the cost of their employees' background clearances. Sam, who works at a non-profit, noted it is an administrative challenge to educate all the coaches about what clearances they need and how to get them. He attempted to accomplish this through coaches' meetings prior to the start of the season, but found it to be difficult to get coaches to attend the meetings. He then has to follow-up with those who could not attend to get them caught up, saying "it takes a lot of communication." Dan had a different experience with clearances. He owns and operates a gymnastic center. He reported frustration when saying

> "Pennsylvania has a state mandate. We have our Act 33/34 clearances, and then we got stricter with that and added the fingerprint test and such. But that's a duplicate of USA Gymnastics because USA Gymnastics is doing a national one. It's putting the cost back on the consumer and back on the business. I have to have double certificates that say the same thing."

Administrators interviewed in this study discussed the potential benefits of requiring additional education and training for the youth sport coaches in their organization. They believed it would benefit the youth athlete participants because the overall environment would be safer and the coaches would be better equipped to handle injury situations. Conversely, the administrators also identified three barriers to requiring additional education for their youth sport coaches. These barriers included their heavy reliance on volunteer coaches, the increased time commitment from the coaches to obtain and maintain certifications, the additional costs of such education programs.

Sufficient Staff

The youth sport administrators interviewed indicated serious concerns that requiring additional education for their youth sport coaches would negatively impact their ability to staff their programs. Matt noted that his organization runs using over 300 volunteer coaches. He questioned his ability to be able to replace them if coaches were given additional requirements. Sam echoed similar concerns at his organization. They rely heavily on volunteer coaches to run his youth sport programming. He said

"Coaches are just interested in coming in and coaching. They are great. They amaze me at how good they are with the kids. But, I think we'd lose a lot of them if there were more hoops to jump through."

Time Commitment

The youth sport administrators were also concerned about the additional time commitment for coaches with requiring additional health and safety training. Sam noted his coaches' busy work and home schedules, in addition to attending coaches' meetings, team practices, and events. He felt requiring a full day first aid/CPR/AED course would be asking the coaches to commit additional personal time and that it could deter some from continuing to coach. Matt noted similar concern, given his large coaching staff. With over 300 coaches in his organization, he saw additional training as an increased time commitment for the coaches and for the program staff to keep track of their completion.

Cost

The final business barrier to emerge from the data was the cost associated with additional required training for youth sport coaches. This barrier was identified by both coaches and administrators in the study. Walt, a youth sport coach, believed that if coaches were required to pay for their education, it would limit the number of people willing to volunteer. Sam, the non-profit administrator, said

"Cost would be a negative impact, if it increased cost. Being a non-profit, we are giving out scholarships, we are breaking even on these things. If it was mandated and we had to pay for it, it would be a problem. They [coaches] would have to pay for it, or we have to pay for it."

Data collected in this study showed concerns from youth sport administrators and coaches that requiring background clearances, the additional time commitment of health and safety training, and the cost associated with additional training would negatively impact an organization's ability to acquire sufficient volunteers to coach their youth sport teams. These findings are associated with the theme of business barriers.

In the interviews, coaches were asked if more education was required or mandated in order for them to coach youth sports, would it deter them from coaching and why. The coaches (paid and volunteer) unanimously answered that additional education requirements would not deter them from coaching youth sports. They provided various explanations for their response. The coaches want additional training to be required because it would improve their comfort level with handling injuries and emergencies. Walt, who coaches his child's team, said he complete whatever process was necessary to continue to do that. Kathy indicated that she is motivated by wanting to share her love of soccer and work with kids, so she would continue to coach even with additional requirements. Donnie indicated his overall passion for the sport of gymnastics and that additional education requirements would not diminish his desire to work within the sport.

Gwen, a swim coach, said "mandatory minimums are there for safety. Physical safety, personal safety, and legal safety." These responses counter the concerns from administrators in the first theme (business barriers) that additional education would limit the staff of coaches, especially volunteers.

Gaps in Knowledge

Concussion Awareness

Coaches and administrators cited various levels of previous concussion training, yet all felt that more education would be beneficial. Matt, an administrator, felt that coaches are responsible for maintaining safe playing conditions, which can differ per sport. Coaches at this organization are not required to have concussion education.

Coaches in this study felt concussion training should be required and renewed often due to the changing knowledge and standards of care. Carrie discussed how the management of concussions has changed drastically since she was an athlete. She also noted that concussions are included in her USA Gymnastics education courses, but not to the extent or as detailed as she wants to feel comfortable. Walt discussed a concern about mishandling a concussion and causing the child additional harm or delaying recovery.

One administrator and one coach cited concussion training they have completed to coach at the interscholastic level as appropriate and adequate. It included an online program they complete annually. Tom, a youth sports coach, went on to explain how this outside education on concussion management has trickled into his coaching at the youth sports level. He explained

> "If I did not have that [outside] training, there could have been some issues that could have happened over the last five or six years with my son at (site). I wouldn't know how to act. I knew how to react. Speaking of one example, a kid got hit with a baseball. So I immediately called mom, told her what to do. She didn't think anything –oh he will be fine. We texted back and forth. I told her 'You really should take him to the ER.' Low and behold, he did have a concussion. Having that training outside was huge. Any other (site) coach would have just called mom or dad and never followed up with it. It makes a big difference, especially in the safety of the child, which is first and foremost no matter what."

Handling Emergencies

The coaches in this study cited various aspects of first aid as being important to their job, including handling blood safely, having access to a first aid kit with the appropriate supplies, and knowing when to apply ice to an injury. Kathy wished she had more knowledge about asthma. She said she is unsure how hard to push them during conditioning if they begin to have difficulty breathing. Kathy also identified concerns with food allergies. She has experienced young athletes with specific food allergies that have affected the team regarding snacks and getting exposure to the allergen from teammates. Tom, who also coaches at the interscholastic and collegiate levels, noted that he uses first aid skills required for other coaching positions the

most often when he is coaching youth sports for this organization. He said he was thankful he had the previous training because he was able to put it to use with his youth athletes when they became injured.

Sport specific rescue techniques were reported by coaches as necessary training for youth sport coaches. Gwen, the youth swim coach, shared that while her position requires being a certified coach through USA Swimming, it does not require her to have lifeguarding or water safety instructor certification. She felt that water rescue techniques, such as backboarding a victim in the water, would be helpful to learn and practice. Donnie, a gymnastics coach, also indicated the importance of sport specific rescue techniques. He said

They make us do a safety certification. Several things they do there. Mainly, the best one I think they do there is a video of rescue efforts for pit safety. So if you have a gymnast who lands on their head or neck, you know how to get them out properly.

Discussion

The theme of business barriers included factors such as sufficient coaching staff and the role of governing bodies. Both participant groups voiced issues surrounding the dependence on volunteer coaches by youth sports organizations. They expressed concerns that volunteer coaches would not be willing to go through the training and may reconsider volunteering, putting a strain on the organizations to get enough coaches to support programming. In addition, participants in this study noted the time commitment required to complete health and safety education as a concern. Administrators were nervous the time to complete training programs may deter their volunteer coaches from coaching. However, all coaches interviewed in the study were willing to complete health and safety training. The coaches in this study sited specific examples of injury situations where they did not feel adequately prepared to help. All six of the coaching participants indicated that mandated health and safety education would not deter them from coaching youth sports.

1. Another theme that emerged was gaps in current knowledge and skill related to health and safety in youth sports, as identified by participants. These gaps included concussion knowledge and handling emergencies. All coaches interviewed in this study had previous coaching experience. Health and safety education courses could use this previous life experience as a learning resource to provide education and skills specific to scenarios they have experienced or will likely experience.

2. These findings in this study suggest significant room for improvement and consistency in health and safety education for youth sport coaches across the region. Youth sport administrators are not aware of the health and safety education opportunities available for little or no cost. There is a clear disconnect between youth sport administrators and their coaches regarding requiring health and safety training. Administrators felt additional health and safety training would be

beneficial to the coaches, athletes, and organization as a whole, but cited concerns that it would deter youth sport coaches from volunteering their time and services. The youth sport coaches in this study were unanimous that additional education requirements would not deter them from coaching. Therefore, administrators should be able to require additional health and safety education, even of their volunteer coaches, without the burden of the additional cost for the organization or loss of staff.

3. The findings also suggest a need for policy manual/coach handbooks to be created, distributed, and updated annually. Having such documents available to youth sport coaches would streamline the dissemination of important information and provide guidance on how to handle specific situations that may arise.

4. While these findings may not surprise professionals in the field, these discrepancies between best practice and actual implementation have not been previously documented in the literature. In addition, areas of improvement were noted that can significantly improve safety education in youth sports. For example, the misconception that additional education would deter coaches from participating is essential knowledge to bridge the gap. Coaches were clear they would prefer additional education to not having any requirements.

Limitations

This study was localized to one county in one state, and represent only a fraction of the youth sports organizations in the region. The small participant sample may not accurately represent health and safety education practices at similar youth sports sites in the region, state, and nation. These factors limit the generalizability of the study's results; however, the results are consistent with studies in the relevant literature.

The methodology and participant selection utilized in this study may have limited the accuracy of the data collected. Participants were not representative of coaching any particular youth sport and not screened for years of coaching or administrative experience or if they coached their own child.

Conclusions

These findings add to the body of existing literature indicating a need for youth sport coaches in the United States to be better educated on health and safety issues common to athletic participation. Coaches and administrators can address weaknesses and areas of specific concern in knowledge and skills relative to coaching youth sports. Open communication between youth sport administration and coaching staff is essential to identify the education needs of coaches to ensure their comfort in preparedness for injury. Organizations who create education programming can use these findings to find better methods to meet the needs and wants of youth sport coaches and improve marketing their programs to youth sport administrators effectively. The

coaches and administrators in this study were not aware of the many free online courses available to them. These courses would meet the educational needs and desires of the coaches and appeal to the administrators as they are easily available and low or no cost. Finally, coach preparation and sport/ recreation administration programs can use these findings to adapt their curriculum to better prepare future coaches and administrators regarding health and safety of youth sport activity. Additional focus on emergency action plans, necessary documentation, and limiting liability is needed.

Several avenues exist for future research on this topic. Further investigation should evaluate current practices in youth sport coach education on the state, regional, or national levels. Studies could compare those sports with governing bodies versus those that do not get direction from a national organization. Additional research is needed on the prevalence of policy manuals and emergency preparedness in youth sports.

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The Impact of Gender Inequality on Women's Team Sports – Evidence from Europe

By Selçuk Özaydın[*]

Gender inequality is a major challenge to tackle in the world of sports and has adverse effects on success in women's sports. Previous studies provide empirical evidence regarding these adverse effects yet they do not take the stereotyping in sports into consideration. This study acknowledges the presence of gender-typing in sports and investigates its influence on success in team sports. The results of a panel data estimation suggest that the impact of gender inequality differs both in magnitude and direction depending on the type of sports. In sports that are considered more feminine, gender inequality is actually positively influential on sporting success.

Introduction

Due to its growing social and economic impact, sports have become a top priority especially for the developed nations. A number of studies have tried to identify the factors that are influential on sports at the international level. From cycling (Torgler 2007) to football (Hoffman et al. 2002) numerous studies investigated the determinants of success in sports. Despite the differentiation in the determinants of success from sport to sport, socio-economic factors are highlighted as highly influential on success in almost all kinds of sports (Buts et al. 2011, De Bosscher et al. 2006).

Unlike before, the participation of women in sports is not seen as trespassing in men's territory anymore (Birrell and Cole 1994). The presence of women in sports has been increasing rapidly over the past decades however the perception of male and female appropriate sports is still present (Ross and Shinew 2008). Previous studies suggest that gender equality is an important element of success not only for women (Hoffmann et al. 2006) but also for men (Berdahl et al. 2011). The adverse effects of poor socio-economic conditions on success for both men and women have been documented in the literature.

Due to certain sociological and biological attributes, some kind of sports are associated with men and some with women. Metheny (1965) was the first to gender type sports based on these sociological and biological attributes. She categorized sports into acceptable and unacceptable for women. The society's perception of acceptable sports for women causes differentiation in sports participation for women and men (Koivula 1995). As women's and men's participation differentiates so does the success in different branches of sports. A

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higher interest in a certain kind of sport means more athletes and more resources therefore higher success.

This study investigates the impact of gender inequality on success taking gender-typing in sports into consideration. The popular three team sports in Europe are chosen which are, football, basketball and volleyball. First, the determinants of success for women's football, basketball and volleyball are identified by conducting a panel data analysis. The official women's rankings from FIFA, FIBA and FIVB which are regressed on United Nations' gender inequality index (GII), women population and men's rankings. UN introduced the GII in 2010 and most recent GII was released in 2018 therefore the study investigates the period between 2010 and 2018. In light of the regression results, the impact of gender inequality on success is discussed within a gender typing framework.

In general women's sports have been neglected by the sports economics and in cases of women's basketball and volleyball there are no studies regarding the determinants of success. Despite being the most popular team sports, after football in Europe, both volleyball and basketball did not receive much attention from the scholar. This study is contributing to the reduction of this gap in the literature.

Literature Review

As mentioned earlier, Metheny (1965) was the first, to categorize sports in terms of their masculinity and femininity depending on certain attributes such as esthetics, competition, bodily contact and face-to-face opposition. In her classification, volleyball was the only team sport which was considered appropriate for women. Both socially and physically, sports accommodate a historical hierarchy in favor of men (Kane and Snyder 1989). This male dominance in sports creates the sense of inappropriateness both in men's and women's perception. 55 years after Metheny's classification, the gender roles still exist in sports, despite the improving gender equality. It is not uncommon to see girls or young women to stop practicing sports because they feel like it contradicts with their gender (Guillet et al. 2000). The perception of feminine and masculine sports is still very common although there have been changes as the equality increased.

Individuals develop a perception of masculinity and femininity regarding sports through socialization during their childhood (Alley and Hicks 2005). Previous studies illustrate that small girls associates tasks that require strength and power with masculinity (Corbin and Nix 1979). The perception of male and female appropriate sports is present in both genders which affects individuals' choices in practicing sports. Studies that have been conducted among female athletes also provide evidence that even women perceive certain sports inappropriate for women (Salisbury and Passer 1982). Still there are numerous men and women who feel like some sports are not appropriate for them. When the importance of sports participation in overcoming gender barriers and women's empowerment (Deem and Gilroy 1998) is taken into consideration, investigation on gender-typing and its impact on performance is of utmost importance.

Following Metheny, numerous studies have been conducted to investigate the gender stereotypes in sports. Since the participants perception of sports differ from culture to culture, the studies conducted in the United States and the studies conducted in Europe provide different results. Football (soccer) is very popular among women in US. The popularity of soccer among men started increasing after the 1994 World Cup which was hosted in US and continued with the arrival of superstars in MLS (Baxter 2014). Although the popularity of football (soccer) among men is increasing as Riemer and Visio (2013) and Sobal and Milgrim (2019) suggest, football is seen as a gender-neutral sport in the US whereas in Europe it is one of most masculine sports (Koivula 1995, Lauriola et al. 2004, Plaza et al. 2017). The other two team sports, basketball and volleyball, which are investigated in this study are considered gender-neutral sports by the previous studies in the literature however it should be mentioned that basketball is on the masculine edge of the scale and volleyball is on the feminine edge.

Teams sports are chosen over individual sports due to the fact that; many athletes are born and trained in different countries yet they compete for other countries. The effect of being born and trained abroad is much less in team sports compared to individual sports since there are several players on the pitch or the court. Furthermore, in individual sports, an extraordinary athlete might achieve success despite a country's lack of success in a particular sport. Success in team sports rely highly on the resources and the sports legacy in a country.

Socio-economic determinants of success in sports at an international level is an essential element of the literature and a number of studies tried to identify the factors that are influential on sportive success. Men's football has been the most popular sport in this sense (Torgler 2004a, Hoffmann et al. 2006, Gásquez and Royuela 2016). Although women's football is not as popular as men's, there are a number studies investigating the determinants of success (Torgler 2004b, Hoffman et al. 2006, Jacobs 2014). Both Jacobs and Hoffman and his colleagues conclude that gender equality is a key element of success in women's football. Another common determinant of success for women's football is the men's football legacy in a country. Nations which are successful in men's football are more likely to be successful in women's football as well (Hoffman et al. 2006, Valenti et al. 2020). Factors like the presence of facilities, expertise of coaches and trainers and the general interest of public are all related to men's football legacy therefore the positive correlation between men's and women's success in football is easy to anticipate. Talent pool is of course another important determinant of international success in sports which is proxied by population by a number of studies in the literature (Hoffmann et al. 2002, Valenti et al. 2020). More populated countries are likely to have more talented players compared to the less populated countries.

For men's and women's national basketball and volleyball teams, there are no studies investigating the socio-economic factors that are influential on success. The literature on basketball and volleyball focus on tactical and in-game factors that are influential on success (Vute 1999, Csataljay et al. 2009, Sampaio et al. 2010).

Materials and Methods

To identify the determinants of national team success and investigate the impact of gender inequality, following equations are estimated:

$$WR_{it}^f = \alpha_i + \beta_i GII_{it} + \delta_i lnWP_{it} + \theta_i MR_{it}^f + \varepsilon_{it} \qquad (1)$$

$$WR_{it}^b = \alpha_i + \beta_i GII_{it} + \delta_i lnWP_{it} + \theta_i MR_{it}^b + \varepsilon_{it} \qquad (2)$$

$$WR_{it}^v = \alpha_i + \beta_i GII_{it} + \delta_i lnWP_{it} + \theta_i MR_{it}^v + \varepsilon_{it} \qquad (3)$$

Equations 1, 2 and 3 will enable the identification of determinants of success for football, basketball and volleyball respectively. Where, WR_{it} is the women's ranking for country i at time t, GII_{it} is the gender inequality index for country i at time t, $lnWP_{it}$ is the natural logarithm of women population for country i at time t and MR_{it} is the men's ranking for country i at time t. Women population is included in the model as a proxy for the talent pool. The higher the population is, the more options are available to pick players for the national team. Men's ranking is also included in the model which is used as a proxy for the resources in a country. A successful men's national team indicates that the country has the required resources, such as facilities, trainers etc. Since the dependent variable used to measure success is world rankings, the independent variables with negative coefficients would be positively influential on success and the ones with positive coefficients would be negatively influential.

Historical data for women's and men's rankings for football are available at FIFA's webpage however for basketball and volleyball only the recent rankings can be found at FIBA and FIVB websites. Officials, from both FIBA and FIVB, were kind enough to share the historical data for women's and men's rankings which made this study possible. Table 1 presents the summary statistics for world rankings for women and men in football, basketball and volleyball.

Table 1. *Summary Statistics of World Rankings*

	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
WR^f	337	42.09	31.08	1	121
MR^f	360	46.25	39.70	1	184
WR^b	199	28.72	20.28	2	98
MR^b	230	35.21	25.07	2	126
WR^v	341	56.16	36.65	1	121
MR^v	325	54.27	38.86	2	141

Gender inequality index (GII) and women population data is available publicly and are gathered from United Nation's Human Development Reports webpage and World Bank database respectively. Table 2 presents the summary statistics for the GII and women population.

Table 2. *Summary Statistics of GII and Population*

	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
GII	354	0.17	0.09	0.04	0.42
$lnWP$	343	15.26	1.38	11.97	18.16

There are 40^{1} countries in the data set for the nine-year period and as Tables 1 and 2 suggest, the panel data is highly unbalanced. The data regarding the rankings especially in basketball is missing. Some countries in the data set did not make to the international rankings in the investigated period. For GII and population there are also missing observations due to the unavailability of data for some of the countries in the investigated period.

Results

As presented in the previous section, three different equations are estimated for football, basketball and volleyball. In order to avoid any methodological issues, due to the missing data, each equation is estimated with a different number of observations. Equation 1 is estimated with, 337 observations, Equation 2 is estimated with 199 observations and Equation 3 is estimated with 325 observations. The number of observations used in the estimated equations is bounded by the minimum number of observations in men's and women's rankings for a particular type of sport. Table 3 presents the estimation results of Equation 1.

Table 3. *Estimation Results for Women's Football Rankings*

WR_{it}^{f}	*Model 1* *Random Effects*	*Model 2* *Fixed Effects*	*Model 3 - FGLS*
GII_{it}	124.847*** (17.283)	85.668*** (20.366)	148.417*** (7.082)
$lnWP_{it}$	-14.243*** (2.077)	-23.114 (15.386)	-9.922*** (0.343)
MR_{it}^{f}	0.001 (0.022)	-0.015 (0.022)	0.151*** (0.019)
$Constant$	242.477*** (32.079)	382.643 (236.853)	162.474*** (5.701)
	χ^2 value	prob $> \chi^2$	
Hausman Test M1-M2	63.67	0.000	
Modified Wald Test for Heteroskedasticity	92611.25	0.000	
	$F(1, 36)$	prob $> F$	
Wooldridge test for autocorrelation	1.839	0.184	
	CD-Test	p-value	
Pesaran CD Test	0.503	0.615	

Note: Numbers in the parentheses are standard errors, *** p<0.01, ** p<0.05, * p<0.1

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[1]The list of countries can be found at the Appendix.

Hausman Test results in favor of the fixed effects regression and Modified Walt Test provides evidence for the presence of heteroskedasticity. The Wooldridge autocorrelation and Pesaran cross-sectional dependency test results show that there is no autocorrelation and no cross-sectional dependency in the data. Therefore Model 3's results are taken into consideration. All three explanatory variables are statistically significant in 99% confidence. The gender inequality index and men's ranking have both positive coefficients indicating that they have adverse effects on success and population has a negative coefficient which indicates a positive effect on success.

Table 4. *Estimation Results for Women's Basketball Rankings*

WR_{it}^b	*Model 1 Random Effects*	*Model 2 Fixed Effects*	*Model 3 Pooled OLS Driscoll and Kraay SEs*
GII_{it}	47.844* (25.287)	143.422*** (36.464)	143.422*** (21.572)
$lnWP_{it}$	-3.953* (2.143)	-13.779 (35.406)	-13.779 (14.738)
MR_{it}^b	0.426*** (0.064)	0.331*** (0.073)	0.331*** (0.077)
$Constant$	74.212** (33.663)	214.409 (564.532)	214.409 (236.661)
	χ^2 value	prob $> \chi^2$	
Hausman Test M1-M2	17.90	0.000	
Modified Wald Test for Heteroskedasticity	4388.77	0.000	
	$F(1, 15)$	prob $>$ F	
Wooldridge Test for Autocorrelation	32.669	0.000	
	CD-Test	p-value	
Pesaran CD Test	1.974	0.048	

Note: Numbers in the parentheses are standard errors, *** p<0.01, ** p<0.05, * p<0.1

Table 4 presents the estimation results for Equation 2 and as in the case of Equation 1, Hausman, Modified Wald and Wooldridge tests yield similar results however there is no autocorrelation and the Pesaran CD test provides evidence for the presence of cross-sectional dependency. Therefore, Driscoll and Kraay standard errors are used in the estimation of the equation and the results are presented in the third column. Gender inequality index and men's ranking are statistically significant and have positive coefficients which indicates that they are adversely effective on women's rankings.

Table 5. *Estimation Results for Women's Volleyball Rankings*

WR_{it}^v	Model 1 Random Effects	Model 2 Fixed Effects	Model 3 – FGLS AR(1)
GII_{it}	-66.357** (27.653)	-86.531* (45.526)	-42.732*** (11.741)
$lnWP_{it}$	-9.202*** (2.515)	9.245 (32.554)	-8.347*** (0.925)
MR_{it}^v	0.296*** (0.042)	0.232*** (0.044)	0.339*** (0.032)
Constant	190.492*** (39.168)	-88.752 (503.529)	169.126*** (14.905)
	χ^2 value	prob $> \chi^2$	
Hausman Test M1-M2	21.17	0.000	
Modified Wald Test for Heteroskedasticity	1.9e07	0.000	
	$F(1, 15)$	prob $>$ F	
Wooldridge Test for Autocorrelation	109.540	0.000	
	CD-Test	p-value	
Pesaran CD Test	*0.884*	0.377	

Note: Numbers in the parentheses are standard errors, *** p<0.01, ** p<0.05, * p<0.1

As in the cases of football and basketball, the test results in favor of the fixed effects and there is heteroskedasticity. The Wooldridge and Pesaran tests show there is autocorrelation but no cross-sectional dependency therefore Equation 3 is estimated using FGLS with AR(1) All the independent models are statistically significant at 99% and gender inequality index's coefficient is negative unlike in basketball and football indicating that countries with higher gender inequality perform relatively better in women's volleyball.

Discussion

The first sub-section of the discussion chapter, interprets the results presented in Tables 3-5 and identify the determinants of success for football, basketball and volleyball. The second sub-section investigates the relationship between gender inequality and gender-typing in sports in detail.

Determinants of Success

The findings of this study regarding women's football are aligned with the previous studies (Torgler 2004b, Hoffman et al. 2006). Gender inequality is adversely influential on success in women's football. Also, countries with higher women's population are relatively more successful. The coefficient on men's football ranking is positive indicating that it is adversely effective on women's rankings. Nations with a higher men's football ranking have relatively higher women's rankings. Despite the popularity of football all around Europe, some nations have better facilities, trainers and players therefore they are more successful.

The determinants of success for basketball are similar to football but women's population is statistically insignificant. There is no evidence that more populated countries in Europe are relatively more successful women's basketball. It should be noted that basketball is the only type of sports with cross-sectional dependency out of the three investigated sports. Undoubtedly, football is the most popular sport in Europe. Unlike football, there are some countries with a basketball tradition and some without one. For example, Yugoslavia was a basketball nation with great players and great enthusiasm for the sport. Former Yugoslavian countries inherited the basketball legacy and they are all very competitive and passionate in basketball. Yugoslavia breakup into seven countries: Bosnia, Croatia, Kosovo, Macedonia, Montenegro, Serbia and Slovenia (Zejnullahi 2014). Out of these seven, countries six of them (excluding Kosovo) are in the data set. Another example would be the lack of interest in basketball in the Great Britain (Buckner 2019). The British are very passionate about not just football but also about rugby and cricket. Basketball is never a priority for them therefore the interest hence success is low at basketball. Therefore, cross-sectional dependence can be explained by the existence or non-existence of basketball legacy in European countries.

For women's volleyball, all three independent variables are statistically significant. As in the cases of basketball and football, men's ranking is adversely influential on women's ranking. Population, on the other hand, is positively influential on success as in football. Lastly, unlike in football and basketball, gender inequality index is positively influential on success. European countries with higher gender inequality, are relatively more successful in women's volleyball.

Gender Inequality and Gender-Typing in Sports

United Nation's gender inequality index takes three dimensions into consideration which are health, empowerment and labor market (UNDP 2019). These three dimensions reflect the conditions women live in within a country and therefore they are expected to be correlated with sports participation and sports success. It is reasonable to assume that women living in prosperous countries will be more involved in sports and more successful. Although that is the case in football and basketball, the results presented in Table 5 suggest otherwise for volleyball.

As mentioned earlier despite the improving gender inequality in recent years, gender-typing still exists in sports. The perception of male and female appropriate sports and the societal attitude towards sports can affect individuals' involvement in sport (Plaza et al. 2017). Therefore, men and women will be more likely to participate in sports which are considered "appropriate" for them. The gender-typing studies in the literature regarding European countries have been all conducted in countries where gender inequality is relatively low such as Sweden, Italy and France (Koivula 1995, Lauriola et al. 2004, Plaza et al. 2017). Out of the 40 countries in the dataset, these three are among the top 10 in gender equality therefore how gender-typing in sports differs in countries with higher gender

inequality is a matter of question. How GIIs' coefficients change for different kinds of sports is intriguing in a gender-typing framework. As presented in Tables 3 and 4, GII is adversely influential on success in women's football and basketball yet the magnitude of the impact is more than two and a half times higher on football when compared to basketball. Football is considered a more masculine sport than basketball as the previous studies suggest and whereas GII is positively influential on success for volleyball, it can be seen that gender inequality is positively influential on success. Out of the three investigated sports, volleyball is considered as the most feminine among the three (Koivula 1995, Lauriola et al. 2004, Plaza et al. 2017). These results can be interpreted as such: countries with higher gender inequality are relatively more successful in feminine sports. Perhaps, the societal norms direct girls and women to play sports which are considered more appropriate for them therefore they are more successful. Although volleyball is perceived as gender-neutral sport according to the previous studies, the perception of volleyball might be more feminine in countries with higher gender-inequality which is a subject which definitely needs more investigation.

Conclusion

The determinants of international success for football, both for men and women, have been subject to academic studies before however basketball and volleyball did not receive much attention from scholars in socio-economic terms. This study contributes to the literature by identifying the determinants of international success in both women's basketball and volleyball. Although the impact of gender inequality on success has been accounted for, how the impact changes for different sports has not been investigated before. The findings of study conclude that the impact does not only differ in magnitude but also in sign for different kinds of sports. The empirical evidence suggests that countries with higher gender inequality are relatively more successful in feminine sports and furthermore despite the negative impact of gender inequality on masculine sports, the adverse effects decrease as the masculinity of the sports decreases. How the impact of gender inequality changes for different kinds of sports has not been investigated in previous research therefore this study fills a gap in the literature in this sense.

In general, gender equality is associated with human development and developed countries are doing better in these terms. In countries, where women are discriminated, sports could be an extremely effective tool in fortifying their grounds in the society. The benefits of sports for social inclusion have been documented numerous times in the literature (Waring and Mason 2010, Frost et al. 2013). Sporting success at the national level empowers women in the public eye and sets great example for children which makes the determinants of success in women's sports even more important.

The perception of female appropriate sports within a society affects the participation rates of women and especially in countries with high gender

inequality, girls and young women are more likely to participate in feminine sports (Riemer and Visio 2003). The question of how female appropriate sports, hence gender typing in sports, differs in countries with higher gender inequality will be answered through future research.

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Appendix

List of Countries in the Dataset
Albania
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Czechia
Denmark
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Malta
Moldova (Republic of)
Montenegro
Netherlands
North Macedonia
Norway
Poland
Portugal
Romania
Russian Federation
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
Ukraine
United Kingdom