NORGES IDRETTSHØGSKOLE

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FA Women´s Super League players` nonverbal behaviors in match

A descriptive analysis of 173 women football players in the 2021/22 season

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Abstract

Background: Psychological abilities is emerging as one the most important attributes for successful football players (Haugaasen & Jordet, 2012). However, extended research on players` nonverbal behavior (NVB) in sport is lacking (Furley, 2021), which means that people do not know much about how players communicate nonverbally on the pitch during a match. Furthermore, there are limited research on women in sport (Persson et al., 2020), indicating it was particularly interesting to investigate women´s NVB.

Purpose: The overall purpose of this study was to examine the nature and frequency of women football players` nonverbal behaviors in a match.

Methods: A non-participatory observation was conducted. A total of 173 women football players (M_{age} = 25.9, *SD* = 3.8) from the top division in England (FA Women´s Super League) were coded descriptively. The players` nonverbal behaviors were coded in a league match using Hudl Sportscode.

Results: Women´s Super League players had a mean frequency of 2.15 nonverbal behaviors per minute (*SD* = 1.141) and an average of 214.88 in a full match. Most of the nonverbal behaviors were coded as tactical (85.4%). Results revealed that mean frequency of tactical, positive, and negative NVB differed in the different playing positions. Furthermore, teams ahead encoded more positive NVB compared to negative NVB than teams behind and at level. Also, winning teams were more positive than losing teams and tied teams, and losing teams were more negative than winning teams and tied teams. There were also differences in tactical behavior between tied teams compared to winning teams and losing teams. There was not found a relationship between NVB and game location. Captains had a higher frequency of positive and tactical NVB, but not negative, compared to the rest of the players. A relationship was also found between emotional behavior the last ten minutes of the game and game result.

Summary: This study was the first research conducted on women football players` NVB in a match. The results demonstrate that players` NVB vary across playing positions and roles, and dependent on the game status, and game result. The results provide practical implications for coaches, but further research is needed before conclusions can be made. Hopefully, the results can inspire further research on women football players` nonverbal behaviors in match and function as a guide for similar research methodology.

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1 Introduction and background

Football is the world's most popular sport, both in terms of the number of players and number of viewers (Strudwick, 2016). UEFA Women's Euro 2022 brought exceptional interest in women´s football as over 365 million people worldwide watched the games (UEFA, 2022b). Several records were set in the Euro's, including record crowd (87,192), record combined attendance (574,875), and record average attendance (18,544). The game of football is highly competitive and consists of physical, technical, tactical, and psychological factors that are important to master the game and reach top level (Strudwick, 2016). Furthermore, football is an open and dynamic game with relatively complex requirements for performance and this complexity appear to also reflect both role-specific and position-specific differences (Haugaasen & Jordet, 2012). Early researchers and coaches saw anthropometrical and physiological attributes as the fundamental factors for the best football players, however, newer researchers claim that psychological abilities, and technical and tactical skills are the fundamental attributes that distinguish successful players from less successful players (Haugaasen & Jordet, 2012). Previous studies provide subsequent evidence that people often display nonverbal behavior, associated with that person's internal states and contextual variables, and observers pick up on the nonverbal behavior and give them meaning (Furley, 2021). Nonverbal communication and behavior have been frequently studied in various scientific disciplines, but in sport it is only slowly emerging and, therefore, no comprehensive and theoretically based analyses on nonverbal communication in game play exist today (Furley, 2021). This means that people do not know much about how players communicate with each other nonverbally on the pitch during a match. The lack of knowledge in players' nonverbal communication may lead to this part of football players performance being ignored or misjudged based on subjective opinions.

The purpose of the present study is therefore to investigate players` nonverbal communication by merging match analysis in football with nonverbal communication. Not only that, it is also an attempt to expand research on women in sport, particularly in the world's biggest sport, football. The research literature that exists on women´s football has mostly focused on history, sexuality, ethnicity, and femininity (Persson et al., 2020). Therefore, the underlying goal of this study was to broaden the research on psychological factors in women´s football. There is no published research on elite women football players` nonverbal behaviors, and this study may provide information which may inspire to new research questions.

2 Introduction to theory

When considering communication people normally think of the verbal, spoken part of communication (Matsumoto et al., 2012). However, humans do not communicate by words alone, nonverbal communication is a crucial and big part of daily interactions (Eaves & Leathers, 2018, p. 5). It is estimated that between 65% and 95% of information exchanged between individuals is conveyed nonverbally (Matsumoto et al., 2012). In nonverbal communication there are different sources of messages (Eaves & Leathers, 2018). One source is the environment or context. Different places send different messages with the use of color, lighting, fabric textures, and so forth. Another source is one´s physical characteristics, including height, weight, skin color, hair, facial characteristics, odors, and artifactual clues. The last source is nonverbal behavior (Eaves & Leathers, 2018), which will be elaborated subsequently.

2.1 Nonverbal communication

2.1.1 Defining nonverbal communication and nonverbal behavior

Nonverbal communication (NVC) is defined as "the transfer and exchange of messages in any and all modalities that do not involve words" (Matsumoto et al., 2012, p. 4). NVC is a broad category encompassing the distance between people when they talk, the way they dress, the design of their room and the use of time. Nonverbal behavior (NVB) is a subcategory of NVC (Matsumoto et al., 2012). NVB is the scientific phrase for body language and is defined as "behaviors that occur during communication that do not include verbal communication" (Matsumoto et al., 2012, p. 4). NVB includes facial expressions, attitude, touch, and arm gestures.

2.1.2 The function of nonverbal communication

Communication function to create meaning (Eaves & Leathers, 2018). Therefore, the practical significance of NVC is related to the intentions for the communication (e.g. information and persuasion), the precision in the communication, and the efficiency in the communication (the time and effort put in) (Eaves & Leathers, 2018). With intent of expanding people´s knowledge of NVC, Eaves & Leathers (2018) describes six reasons why NVC has great functional significance.

First, most information in human interaction is conveyed nonverbally (Eaves & Leathers, 2018; Faure et al., 2018; Matsumoto et al., 2012). People often find themselves in situations where they must instantly and precisely decide the meanings of messages being sent to them (e.g., with a potential lover). In order to create meaning of the information, people typically rely on the tone of the voice, facial expressions, and body gestures (Eaves & Leathers, 2018).

Second, NVC reveal feelings and emotions better than verbal communication (Eaves & Leathers, 2018). NVC is human´s richest determinant about emotional states, but also a dependable and constant indicator of the emotion that is being conveyed or received. Specifically, it is understood that NVC can provide us with knowledge about emotions: first, communicators are particularly sensitive to emotional expressions; second, only some emotional expressions can be accurately identified; third, it exists a nature of inaccurate identification of emotions; and forth, communicators serve the emotional meaning of communication to different degrees (Eaves & Leathers, 2018). The ability to determine others` emotions, personality, intentions, and thoughts is called interpersonal accuracy (Schmid Mast & Hall, 2018).

Third, the nonverbal portion of communication conveys intentions that rarely mislead (Eaves & Leathers, 2018). Nonverbal cues are rarely under one´s control, and people´s true intentions can therefore oftentimes be revealed by their nonverbal cues (Ekman, 1992). Van Kleef et al. (2004) proposed that emotions only appear in response to events that are appraised as more or less important and, therefore, provide important information to others. Nonverbal cues can also usually, rather precisely, suggest what the communicator thinks of us (Eaves & Leathers, 2018; Van Kleef et al., 2004).

Fourth, nonverbal cues serve a metacommunicative function (communication about communication) in interpersonal communication (e.g. offering your jacket to some who is freezing) (Eaves & Leathers, 2018). To attain high-quality communication, additional nonverbal cues are necessary to clarify the meaning of the message. When the verbal and nonverbal message communicate the same meaning, the value of the cues is low. On the other side, when the verbal and nonverbal communication convey conflicting meanings, the cues become important. Van Kleef (2009) proposed a model that provides a framework for understanding the interpersonal effects of emotions. I will elaborate this further in subsection 2.3.4 (The EASI model and emotions in sport).

Fifth, nonverbal cues are more efficient in communication than verbal cues (Eaves & Leathers, 2018). Time is crucial in many situations, and most events can be described more quickly with gestures. To communicate more, in less time, improving gestures and nonverbal cues have shown to be the most efficient (Bente et al., 2008; Eaves & Leathers, 2018). A review published in 2011 examined research on emotion expressions, more specific its two functions; adaption and communication of critical information (Shariff & Tracy, 2011). It is concluded that people have the capacity to quickly communicate socially significant information nonverbally.

Sixth, nonverbal cues are the most effective way for suggestion (Eaves & Leathers, 2018). Suggestion is defined as "the psychological process by which a person guides their own or another person's desired thoughts, feelings, and behaviors by presenting stimuli that may elicit them as reflexes instead of relying on conscious effort" (Wikipedia, 2022). People tend to seek control in interpersonal communication, to protect one´s ego and self-image. Nonverbal approach is suitable for communication that has a maximum potential for enhancing own image, with a minimum risk of emptying it (Keltner et al., 2019). This is because the intent of nonverbal cues always can be denied, and therefore, any of the negative psychological consequences that may result from a nonverbal approach can most likely be avoided (Eaves & Leathers, 2018).

2.1.3 Encoding and decoding signals

Nonverbal communication includes a person´s signal production (encoding), the person´s behavior (code), and another person receiving the signals (decoder) (Wiener et al., 1972).

Encoding is NVB, producing information with body movements and facial expressions (Furley, 2021). Majority of verbal communication is encoded consciously, while NVC is encoded both consciously and unconsciously (Furley, 2021; Matsumoto et al., 2012). Research show that people can be aware of their NVB whether or not they engage in the conversation to intentionally send a message (Ekman & Friesen, 1969; Matsumoto et al., 2012), which suggests that NVB vary along a continuum of controllability (Furley, 2021).

Decoding NVB is the ability to pick up signals and cues from other people and interpreting them (Furley, 2021). People process nonverbal signals quickly, make sense of these, and act upon them (Wiener et al., 1972). The human information processing system is hardwired to

decode nonverbal signals that are adaptive, for example threat related information (Furley, 2021; McArthur & Baron, 1983).

Furley (2021) describes three different methodologies to study the decoding and encoding of NVB: evaluative coding, descriptive coding, and automated coding. In evaluative coding, the goal is to get subjective impressions of observers. In this method, nonverbal expressions are shown to different groups who are asked to evaluate the internal state or make some other inference based of the NVB of the athletes (Furley, 2021). In descriptive coding, trained coders use a predefined coding system, which give precise information on the NVB encoded by athletes. The descriptive methodology gives an unique information abundance of the data sets facilitate researchers to pursue different research strategies (Bente et al., 2008). Descriptive coding is the most time-consuming method and the method used to study NVB in this paper. The last, newly emerging, approach is automated coding. With use of technology devices, this method measure muscle activity connected with NVB. This is time efficient, but it can be unsuitable for use in real-world settings (Furley, 2021).

2.2 Communication and roles in sport teams

Few studies in sport psychology have examined the nature of communication in performance settings (LeCouteur & Feo, 2011). Therefore, there is limited understanding of how successful communication between teammates is accomplished. Several researchers identify communication as possibly the most important aspect for athletes` internal team interaction (Lausic et al., 2009; LeCouteur & Feo, 2011). Further, there exists a few studies on formal and informal roles in sport teams and their impact on team cohesion (Cotterill & Fransen, 2016).

LeCouteur and Feo (2011) explored how the communicative choices made by team members during performance impacted the quality of defensive cooperation. Verbal and nonverbal communication were analyzed descriptive in three elite netball matches. Results revealed that high frequencies of on-court talk appeared during less successful defensive performance outcomes (LeCouteur & Feo, 2011). These results are not in line with a study on American college tennis athletes (Lausic et al., 2009). Lausic et al. (2009) found in their study that winning tennis teams communicated twice as much as losing teams. Double tennis teams were filmed, and audio recorded, and the players` communication were coded. Not only did winning teams communicate more, but they also had more significant patterns of communication as tactical statements, meaning they discussed actions and prepared potential

events more frequently than losing teams (Lausic et al., 2009). It seems like there is not merely "more" communication that is vital to guarantee effective collaboration between teammates in performance settings, but also the nature and quality of the communication (Lausic et al., 2009; LeCouteur & Feo, 2011).

A few studies have examined the formal and informal leadership roles in teams (Fransen et al., 2014; Fransen et al., 2012; Voelker et al., 2011). Researchers have highlighted that both coaches and players recognize that athlete leaders impact team cohesion, athlete well-being, and team confidence (Cotterill & Fransen, 2016; Fransen et al., 2012; Voelker et al., 2011). It exists both formal and informal leaders in teams and they all impact team cohesion and performance (Fransen et al., 2014). A well-known formal leader is the team captain, who get pointed out by the coaches, staff, and players. Generally the captain is considered as the leader of the team, and with that come expectations as how he/she should act and communicate on and off the field (Fransen et al., 2014). Results from an interview study conducted by Voelker et al. (2011) revealed that captains mostly experience positive aspects with their role, but the captains in the study also pointed out that their role were stressful and challenging. Including in their role were effective communicating skills with teammates and the coaches. In 2014, Fransen and colleagues published a study on athlete leadership in teams. Athlete leadership is when an athlete occupy a impacting role in a team, first and foremost to help teammates achieve a shared goal (Fransen et al., 2014). The participants were 4,451 coaches and athletes, men and women, from nine different sports (Fransen et al., 2014). They completed a questionnaire with question about athlete leadership role, including four leadership roles (task leader, motivational leader, social leader, and external leader), and optimal team functioning (collective efficacy). The results indicated the task leader were perceived as the most important leader, in second place were the motivational leader. The task leader were defined as "the one in charge of the tactical decision-making on the field", and the motivational leader were defined as "the biggest motivator on the field", this person were the one guiding all the emotions in the right direction so the team could perform in the best way (Fransen et al., 2014, p. 1393). Further, the results revealed that the captain rarely is perceived as the most important leader on and off the field, at least not in several roles (e.g. task leader, motivational leader, social leader, and external leader). This tells us that different players within the team fulfill various leadership roles, which add to previous research that informal athlete leaders often take important roles on and off the field (Fransen et al., 2014).

2.3 Theoretical framework

One of the major communicative functions of NVB is expressing emotions (Eaves & Leathers, 2018). In this section I will present two rivalry theories regarding emotions, which are basic emotion theory and behavioral ecology theory. I will also define emotion and present the EASI model and the subject emotional intelligence.

2.3.1 Defining emotion

There are many definitions of emotions, but Lazarus (1991) points to three features that most definitions include, being (1) physiological reactions, (2) action tendencies, and (3) subjective experience (as cited in Van Kleef et al., 2004). Salovey & Mayer (1990, p. 186) describes emotions as "organized responses typically arising in response to an event, either internal or external, that has a positively or negatively valanced meaning for the individual". There is also important to point out that emotions differ from moods as they are short and discrete (Van Kleef et al., 2004).

2.3.2 Basic emotion theory

Basic emotion theory (BET) origin from the expect that verbal and nonverbal communication autonomously convey information about emotion (Ekman & Cordaro, 2011; Furley, 2021). It is the most popular psychological theory of emotion and facial emotional expression, and captures both the unique characteristics about certain universal emotions and what different emotions have in common (Ekman & Cordaro, 2011). BET evolved based on the thought that ontogeny (the creation and development of an organism) is responsible for the commonalities in each distinct emotion (Ekman & Cordaro, 2011). Basic emotions is therefore also called biological emotions (Matsumoto & Hwang, 2012b). In a way emotions are "grammar of social living", because they position humans within a social and moral order (Keltner et al., 2019). An important characteristic typified in the adjective "basic" is the view that emotions have evolved biologically through adaptation to the environment (Ekman & Cordaro, 2011). Emotions are distinct and brief states involving physiological, behavioral, cognitive, affective, and expressive factors that enable humans to react to problems in adaptive ways (Keltner et al., 2019; Shariff & Tracy, 2011). The basic emotions are anger, fear, happiness, sadness, disgust, and surprise (Keltner et al., 2019; Matsumoto & Hwang, 2012b).

Table 1. *The basic emotions, their triggers, and their function. From Matsumoto and Hwang (2012b, p.22).*

Emotion	Trigger	Function
Anger	Goal obstruction, injustice perceived norm violations	Remove the obstacle
Fear	Threat to physical or psychological well-being	Avoid threat; reduce harm
Happiness	Goal attainment or accomplishment	Future motivation
Sadness	Loss of loved one or object	Recoup resources; call for help
Disgust	Contamination; offensive, rotten objects	Repulsion or elimination of the contaminated object
Surprise	Sudden novel objects	Orient and obtain more information

The basic emotions are not single affective states but a family (a group with familiar characteristics) of related states (Ekman, 1992). The members in an emotion family shares commonalities in expression, in physiological activity, in the nature of the former events they arise from, and/or in the appraisal processes. These commonalities also distinguish one family from another (Ekman, 1992). An example is anger expressions. There exists over 60 anger expressions that share certain features, which differ them from the family of fear expressions and disgust expressions (Ekman, 1992). Ekman and Cordaro (2011, p. 365) define thirteen characteristics found in nearly all basic emotions:

1. Distinctive universal signals.
2. Distinctive physiology.
3. Automatic appraisal.
4. Distinctive universals in antecedent events.
5. Presence in other primates.
6. Capable of quick onset.
7. Can be of brief duration.
8. Unbidden occurrence.
9. Distinctive thoughts, memories, and images.
10. Distinctive subjective experience.

11. Refractory period filters information available to what supports the emotion.
12. Target of emotion unconstrained.
13. The emotion can be enacted in either a constructive or destructive fashion.

Some of the characteristics distinguish one emotion from another while others are useful in distinguishing emotions from other affective states (Ekman, 1992). The last characteristic has been added more recently and arose with the notion that emotions such as anger, fear, and happiness can be enacted in a constructive or destructive form. While all basic emotions follow these criteria, they do it in distinctly different ways. Visually they are all universally distinguishable (Ekman & Cordaro, 2011), this is one of the reasons BET has been central to the study of emotional expression (Keltner et al., 2019).

Darwin is a progenitor of contemporary emotion-expression research as he in 1872 published the first chapter in a long-standing naturalist investigation on nonverbal expressions of emotions (Shariff & Tracy, 2011). He proposed that emotion expressions serve two functions: (a) preparing the organism to respond adaptively to environmentally recurrent stimuli and (b) communicating critical social information. These emotions are called "expressive" because they make the encoder apply emotional states to the decoder (Frijda, 1986). A good example is the reaction to fear. Disclosure of a potentially threatening situation brings out a flood of responses including heavier breathing, preparation for rapid movement, and an assembling of observant resources to promote hypervigilance. These responses facilitate the ability to escape or handle the threat (Shariff & Tracy, 2011). The fear expressions (e.g. widened eyes to increase the visual scope) emerged as part of adaptive behavior (Keltner et al., 2019; Shariff & Tracy, 2011). Within this framework, emotions are evoked by events and are about causing action and changing the probabilities of future actions. They enable people to react to significant stimuli in the environment or within themselves, with complex patterns of behavior as facial muscle movements, vocal cues, bodily movements, gesture, posture, and so on (Ekman, 1992; Frijda, 1986; Keltner et al., 2019).

Emotional expressions are also important in developing and regulating interpersonal relationships, e.g. relationship between teammates in sport (Ekman, 1992; Keltner et al., 2019; Shariff & Tracy, 2011). Before elaborating this further I will define cues and signals, as biologists make an important distinction between these:

> Cues provide information collected as a byproduct of something that serves an alternate adaptive purpose; for example, chewing is a reliable cue that someone is

> eating, but it did not evolve to communicate that information. Signals evolved specifically for the purpose of communication; for example, peacock plumage evolved as a hard-to-fake signal of mate quality. (Shariff & Tracy, 2011, p. 396)

It is hypothesized that emotion expressions began as cues and evolved to signals (Shariff & Tracy, 2011). In line with social interaction becoming more possible and even important, the adaptive value of facial and bodily behavioral expressions may have shifted toward communication. The ability to quickly and precisely recognize emotion expressions characterize daily life and appears to be universal, suggesting that understanding others` emotions is adaptive (Ekman, 1992; Shariff & Tracy, 2011). In the matter of interpersonal relationships people seem to have evolved two intrinsic psychological abilities, encode expressions in common, evolutionarily frequent situations, and automatically read and respond to expressions encoded by others (Shariff & Tracy, 2011). I will elaborate more about how emotional expressions coordinate social interactions in subsection 2.3.4 (The EASI model and emotions in sport).

2.3.3 Behavioral ecology theory

The behavioral ecology view (BECV) is a new approach formulated in the early 1990s that propose a distinction and solution to the dichotomy embedded in BET (Crivelli & Fridlund, 2019; Fridlund, 2014). The critiques of BET have focused on the validity of “basic emotions”, that it is oversimplified, and that recent modifications are inconsistent (Crivelli & Fridlund, 2018, 2019). BECV is grounded in animal communication and modern evolutionary biology. It proposes that peoples` facial expressions are not "expressions" of anything, have no intrinsic meaning, and that they are not controlled by any specific internal state. In BECV, our faces are "social tools" that are used as lead signs of unforeseen action in social interactions, and their role depends upon the historical context of the current social interaction, the interactants, and their aim within the interaction (Crivelli & Fridlund, 2018, 2019). The basis is how our faces function in social interactions, like words and other NVB they are ways we change our social path (Crivelli & Fridlund, 2019).

BECV is critical as to whether there are “universal” facial behaviors apart from those that are functional, like eyeblinks, tears, yawns, burps, coughs, or sneezes (Crivelli & Fridlund, 2018). One of the reasons for this perception is the grounding in contemporary views of the evolutionary and cultural forces at play. What does facial behavior do within the interaction? According to BECV people use facial expressions to signal their next move to alter others`

emotions. People alter the course of their interaction towards a certain outcome, often with mutual gain (Crivelli & Fridlund, 2018). For example, smiling can be used to influence other`s to play or connect, or gasping can deflect others attack by one's own submission (Crivelli & Fridlund, 2018).

Within BECV, the sociality hypothesis emerged in an observational study in 1979 (Crivelli & Fridlund, 2018). The hypothesis states that nonverbal behaviors as gestures and facial displays serve to impact a target audience, so the behavior signals should be reliant on the presence and positioning of that audience (Kraut & Johnston, 1979). Kraut and Johnston (1979) found that bowlers did not smile when they made strikes, but rather when they rotated and saw their companions. A number of studies supports this (Fernández-Dols & Ruiz-Belda, 1995; Ruiz-Belda et al., 2003), facial displays are not expressed when BET anticipate that emotion peaks, but when an audience is most available (Crivelli & Fridlund, 2019). A study on football fans found that they smiled more in interactive phases, defined as "when the fan talked to or looked at another fan", than noninteractive phases (Ruiz-Belda et al., 2003, p. 320). The participant was filmed while they watched a World Cup match in groups and filled out a questionary on their emotions during the match. BECV has had a major influence in the sociality hypothesis and the social functions of NVB (Crivelli & Fridlund, 2019; Kraut & Johnston, 1979).

2.3.4 The EASI model and emotions in sport

Social intelligence is the ability to understand and manage people and oneself (Salovey & Mayer, 1990). Socially intelligent people can perceive one´s own and others` internal states, and behaviors, and act optimally based on that information. Emotional intelligence is a subset of social intelligence and defined as "the ability to monitor one`s own and others` feelings and emotions, to discriminate among them and to use this information to guide one`s thinking and actions" (Salovey & Mayer, 1990, p. 189). People regulate behavior and solve problems based on emotions, and emotional intelligence is related to social skills required for teamwork (Salovey & Mayer, 1990).

The EASI (Emotions As Social Information) model have a social-functional approach to emotion (Van Kleef, 2009, p. 184). It is well known that mood provides information to the self, and the premise of the EASI perspective is that emotional expressions provide information to influence observers. The model identifies two processes that can influence the observers` behavior: inferential processes and affective reactions.

Inferential processes are when others` emotional expressions infer observers' information about their feelings, attitudes, relational orientations, and behavioral intentions (Van Kleef, 2009). In turn it may influence the observers` behavior. When one is the target of a happy expression, one may infer that one did something right, and this inference may in turn make the target stay on the course. An anger expression may infer wrong behavior, and result in apologizing or changing of conduct.

Emotional expressions can also influence observers affective reactions (Van Kleef, 2009). Affect encompasses both moods and emotions (Van Kleef et al., 2004), and affective reactions include two types. The first type is when emotions spread directly from expresser to observer via emotional-contagion processes. This involves mirror-neuron activity and physiological feedback from facial, vocal, and postural movements. The second type contains the effect on impressions and interpersonal liking, partly through the social intentions they transmit. Expressions of happiness can increase liking and expressions of irritation and anger can decrease liking. Both of these processes can influence the behavior of the observer (Van Kleef, 2009).

Inferential processes and affective reactions are mutually influential to behavioral reactions, and the two processes may relate to one another (Van Kleef, 2009). They may converge to predict the same behavior, motivate opposite behaviors, or influence one another. The EASI model postulate that the interpersonal effects of emotional expressions depend on the motivation and emotional intelligence of the observer. In addition to provide information, the power of inferences and affective reactions also depends on social-relational factors (Van Kleef, 2009). Social-relational factors include the nature of the interpersonal relationship, cultural norms, and to whom or what the emotion is expressed. People respond different if the emotional expressions are directed to themselves, peers, or the situation itself, or if it is appropriate or not (Van Kleef, 2009).

It is generally acknowledged that emotions, and, with that, emotional expressions, are more frequent when high-value goals are at stake (Lazarus, 2006). One example is in a sport competition, to lose is always a high-value goal at stake. McCarthy (2011) did a review of the literature on emotions in sport performance to establish the current status and propose future directions. The field is diverse, but by examining specific aspects of the emotion-performance relation researcher has found that emotions influence specific components of sport performance like perception, attention, memory, decision-making, and judgement (McCarthy,

2011). Positive emotions broaden the attention, which lead to promoted openness and flexibility, and more efficient information accumulation, it also influences attachment between people.

Black et al. (2019) conducted a study on the effect of emotional intelligence on team cohesion to improve team performance. Team cohesion is defined as "the level of attraction of team members to the team and the desire for members to want to stay in the team" (Black et al., 2019, p. 102). Several researchers have examined the relationship between team cohesion and performance, and it seems like team cohesion and performance are two variables that affect each other, with a stronger direction from cohesion to performance (Gioldasis et al., 2016; Mullen & Copper, 1994). Black et als. (2019, p. 104) hypothesis were "Emotional intelligence is positively related to team cohesion". Participants were 146 college seniors, in 35 teams, within Business (Black et al., 2019). Each team competed in a business simulation where they managed a small startup company with the same resources. The teams competed for eight rounds, representing eight years. Participants` perceptions of own emotional intelligence were measured with a 16-item scale. Team cohesion was also measured with a scale, including six items that measures the degree to which team members stand together and stay united in the pursuit of a common goal. Results revealed significance between emotional intelligence and team cohesion (Black et al., 2019). Better team cohesion increased the members contribution to the group work, and further enhanced the group performance.

Eccles and Tenenbaum (2004) proposed a framework to enhance the understanding of the psychology of team sport performance by considering teamwork, and the communication required for that, from a cognitive perspective. In the framework they claim that team members in professional teams gain shared knowledge through communication, experiences and practice, and use this knowledge to clarify precisely and efficiently unintentional NVC from teammates and thus understand them better (Eccles & Tenenbaum, 2004). Team members also develop a shared knowledge of a very specific code to accomplish intentional verbal and nonverbal communication, this communication is often short, domain specific, and standardized messages. Development of unintentional and intentional communication require time and cognitive resources, but both has benefits when it comes to accomplishing teamwork. Further, Eccles and Tenenbaum (2004) propose that unorganized tasks, like a performance setting, appear to benefit from more communication because it involves more coordination from teammates.

2.4 Research on NVB in sport

A growing body of research have investigated the relationship between NVB and sports performance as communication is recognized as important in team sport (Furley, 2021; LeCouteur & Feo, 2011). In performance settings players often use a variety of nonverbal behaviors to perform various actions and coordinate the movements of teammates. Furley and Schweizer (2020) have proposed categorizing the studies on the relationship between NVB and sports performance depending on whether they conceptualize NVB either as a consequence or as a predictor of sports performance. Another category proposed is contextual and personal factors (Furley, 2021). All the studies included implemented evaluative or descriptive coding, or both.

2.4.1 NVB as a predictor of sports performance

There has been done several experiments on dominant and submissive NVB in sport (Bijlstra et al., 2020; Furley et al., 2012). Dominant NVB is considered as erect posture, shoulders back, chest out and head straight, while submissive NVB is slouched posture, shoulders forward, chest in and head down (Bijlstra et al., 2020, p. 1).

Penalty kicks are an extensive phenomenon of research on NVB in football (Bijlstra et al., 2020; Furley et al., 2012). Furley et al. (2012) investigated the effects of dominant and submissive NVB on impression formation and expectancy of success of football players in two experiments. In experiment one, participants were 22 male, German football goalkeepers with an average of 14 years in senior football. A NVB stimuli were created and presented to the goalkeepers (Furley et al., 2012). Participants watched video of actors preparing for a penalty kick (placing the ball, walking back, and starting the run-up) and rated the player on four 11-point scales (Furley et al., 2012). The results in experiment one showed that dominant and submissive nonverbal behaviors effect impression formation and outcome expectation of football players. Dominant NVB were seen as more positively, meaning penalty takers showing dominant NVB were anticipated to perform better than players showing a submissive NVB. In experiment two, 32 male, amateur football players were instructed to look at twelve pictures and react to whether they think it is a good or bad football player (Furley et al., 2012). Results indicate a strong automatic association between NVB and football skill, dominant NVB is linked with a good football player and submissive NVB is linked with a "bad" football player. (Furley et al., 2012). One example is that the participants responded

significantly faster when pairing qualities linked with good football players with pictures showing a dominant NVB.

In 2020 Bijlstra et al. did a study, in line with Furley et al. (2012), on the power of NVB for goalkeeper's impression formation in football. In experiment one 54 students participated in a repeated measures design (Bijlstra et al., 2020). The participants watched video of penalty takers and goalkeepers in penalty situations and were asked to rate each video on seven impression formation measures (assertive, competitive, experienced, confident, composed, focused, and relaxed) (Bijlstra et al., 2020, p. 2). The results reveal that penalty takers encoding of dominant NVB is associated with more positive impressions, and additional negative outcome expectancies for goalkeepers (Bijlstra et al., 2020). In experiment two 68 female students participated in the same design, but they only looked at video of the penalty-takers. The results of experiment two confirmed the same as experiment one, penalty-takers who show dominant NVB are generally evaluated more positively, as better players (Bijlstra et al., 2020). Experiment three was created with 72 students that were told to determine which side of the goal each ball was shot. The results of experiment three reproduced results from experiments one and two that penalty-takers who show dominant NVB are considered more positively (better players) than penalty-takers who show submissive NVB players (Bijlstra et al., 2020). Experiment three also provides evidence that participants were better able to predict where penalty takers showing a submissive NVB would shoot, compared to penalty takers with showing a dominant NVB.

Furley and Memmert (2021) investigated the effect of pre-performance NVB on performance in dart over four experiments. In the first experiment, 50 men and women with dart experience completed a laboratory study (Furley & Memmert, 2021). The participants watched sampled clips from the Darts World Championship (including poor performance, medium-to-good performance, good performance, and perfect performance) where athletes did three darts in one throw. After watching the video clips, they were asked to estimate the score based on pre-performance NVB. Experiment two was a duplicate from experiment one but consisted of additional randomly sampled videos. Participant were 50 new men and women that went to the same procedure as in experiment one (Furley & Memmert, 2021). Results in experiment one and two revealed that pre-performance NVB was predictive of performance. In experiment three the authors separated the participants in two groups, one with less dart experience (n=50) and one with more dart experience (n=50) (Furley & Memmert, 2021). Further, the same method was implemented except in this experiment

everything in the video except the face was blackened. This modification was done based on previous research on the critical role of the face (Furley & Memmert, 2021). Results replicate the findings from experiment one and two, this add to the idea that facial information can give away important performance predictions (Furley & Memmert, 2021). In the last experiment (four) the procedure were the same, except the athletes did one throw instead of three (Furley & Memmert, 2021). Participants were 100 new men and women, separated in two groups, one to replicate the other. Results revealed that pre-performance NVB before a single throw, with perfect performance, led to higher performance ratings than pre-performance NVB followed with poor performance (Furley & Memmert, 2021). In general, results of all four experiments revealed that pre-performance NVB in dart gives accurate information to observers regarding following performance. This suggests that a person's brief NVB provides accurate information to an observer about how the person is likely to behave or perform. However, the results do not indicate which pre-performance NVB cues that were linked to good or bad performance.

Several researchers have investigated celebration and touch in team sports, both as a predicter and a consequence (Kraus et al., 2010; Moesch et al., 2015, 2018; Moll et al., 2010; Ronglan, 2007). Touch is likely very important as it requires close physical contact and is one of humankind`s earliest and most basic forms of communication (Matsumoto & Hwang, 2012a). Kraus et al. (2010) did an ethological study of physical touch, cooperation, and individual and team performance in the NBA (National Basketball Association in North America, men's league). All 30 teams tactile communication was coded during one match by two separate teams of coders (Kraus et al., 2010). Twelve specific types of touch in celebration were coded (e.g. fist bumps, high tens, and leaping shoulder bumps), cooperation was coed using a 4-point scale (0 = no cooperation, 3 = a great deal of cooperation), player performance was assessed using the Win Score (measuring the positive impact a player has on his team), and team performance were assessed with indicators of offensive and defensive efficiency (Kraus et al., 2010). Results revealed that touch is central for predicting performance in competitive group settings, because it fosters cooperation between teammates (Kraus et al., 2010). The author highlighted the importance to remember that this study researched patterns of physical touch in a specific competitive group, NBA teams. Basketball is known for a specific language of touch, and therefore this might not generalize to other group settings.

2.4.2 NVB as a consequence of sports performance

In 2015, Moesch et al. did a naturalistic study on female elite handball players celebrations, more particularly how and when they celebrate. The authors did a systematic observation of "high stake" matches (derbies, matches between teams not more than four places apart on the table or play-offs) from the highest female handball league in Sweden. Their hypotheses were that during high-stake matches a high frequency of NVB would be shown (Moesch et al., 2015). The results revealed that handball players showed more arm gestures, one or two fists up, than touch after they scored (Moesch et al., 2015). The results did not reveal any information about why a nonverbal behavior was shown, but the authors assumed that handball players experience pride when scoring. High fives and low fives where the touch behaviors most shown (Moesch et al., 2015). Moesch et al. (2018) did another observational study on nonverbal post-shot celebrations and their relationship with performance. Data collection and matches were the same as their study in 2015 (Moesch et al., 2015). The results revealed that prior performance (score difference during the last 5 minutes) significantly predicted the degree of celebrating gestures in the coming period. It also may seem like teams with a high number of post-scoring touch (shown by the shooter) in periods with good team performance were related with positive ensuing team performance (Moesch et al., 2018). Further, there were non-significant results on the effect of encoding of NVB on the ensuing team performance. Ronglan (2007) did a qualitive study on a women's national handball team. A one-year fieldwork and interviews found that the team wanted to show community and shared strength during the matches by shouting, cheering, clapping hands, and back-slapping. They believed showing efficacy beliefs through gestures and cheering was informative to others, they wanted to show better dedication and will than opposing teams (Ronglan, 2007). The study also revealed that players found handball more fun when sharing happiness after successful performances.

In 2010 Moll et al. investigated the effect of celebration of individual success on team success in penalty shootouts. Video images from penalty shootouts in the football World Cup men (1974-2006) and European Championship men (1972-2008) were included (Moll et al., 2010). The post-shot responses of 151 successful penalty kicks were analyzed using a NVB coding system, including universally nonverbal behaviors associated with pride. This coding scheme contained; the head tilted back or up, smile, one or both arms held out of the body, one or both arms raised, one or both hands made to fists, hands on hips, arms crossed, chest expanded, and torso pushed out (Moll et al., 2010, p. 986). Results revealed that 66% of the

players showed celebratory behaviors, mostly linked with pride (Moll et al., 2010). The results also highlighted that when individuals celebrated after scoring, they were more likely to win the penalty shootout. Especially when they raised both arms up or down, expanded the chest, and/or made both hands into fists.

In 2021 a study on the nonverbal behaviors in successful and unsuccessful professional volleyball teams was published (Durdubas et al., 2021). Eight male professional volleyball teams were observed, unaware that their nonverbal behaviors were being evaluated (Durdubas et al., 2021). Video recordings of matches of the top four and bottom four teams were analyzed, including a win, a loss, and a draw match for each team. Nonverbal behaviors were coded with Behavioral Observation Research Interactive Software (BORIS), and a generated coding scheme with eight nonverbal behaviors categorized as either positive or negative were created (Durdubas et al., 2021). Results revealed that successful teams presented a greater number of nonverbal behaviors in total, and differed significantly in their use of instructional (hand, arm, and head gestures to instruct teammates) and supportive (eye contact, head nods, touching, smiling, and certain body positions after a teammate have done a mistake) behaviors (Durdubas et al., 2021). Successful teams presented more frequent use of instructional nonverbal behaviors when they won, more supportive behaviors when they lost, and both of these behaviors during draw matches (Durdubas et al., 2021).

Furley and Schweizer (2014b) did a study on the influence of score-related nonverbal behavioral changes on the confidence in winning. Basketball athletes watched video footage of male professionals being far behind, close behind, draw, having a close lead, or high lead (Furley & Schweizer, 2014b). The perceivers were then instructed to assume the role of a player of the opposing team and estimate, based on the NVB of the opponent in the video, how confident they were about beating the opponent from either not at all confident or very confident. The results showed that athletes are well-equipped to pick up and interpret subtle NVB changes related to the score, also, they use this information to determine their confidence (Furley & Schweizer, 2014b). The further behind the athlete were, the more confident the participants were that they could beat the athlete. In fact, the participants never really thought they would lose (Furley & Schweizer, 2014b). The results did not indicate what subtle nonverbal behaviors that “revealed” the score.

Furley and Schweizer (2014a) also explored if humans can detect whether athletes are trailing or leading based on the perception of thin slices of athletes’ NVB. Participants were adults

(some with experience with the sport and some not), and children. Video footages were taken from basketball matches from the NBA, games from World Cup in table tennis, and handball matches from the European Championships of men and the World Championships of women. Results revealed that leading and trailing in sports were linked with nonverbal cues that are understood as signs of winning and losing (Furley & Schweizer, 2014a). In other words, people can detect whether an athlete is trailing or leading based on their NVB. Furley and Schweizer (2014a) highlights that research on NVB in sport mainly focus on post-performance emotional expressions or pre-performance NVB. In contrast, these results propose that NVB appearing during different stages of the game can be understood as cues to who is currently leading and who is trailing.

2.4.3 Contextual and personal variables

A newer line of research on NVB in sport is investigating eventual links between NVB and contextual and personal variables, not directly related to performance. One of these is Furley et al. (2018) that did three experiments on the territoriality hypothesis of the home game advantage. Territoriality can be defined as "the occupation of an area by an animal or group of animals by means of repulsion through overt defense or advertisement" (Furley et al., 2018, p. 1). In experiment one participants without any special football experience watched video of European Champions League for men and had to estimate who was playing at home or away based on the video footage. The video footage only included football players before game start. In experiment two the same method was used, but the participant had to rate the players in terms of aggression, dominance, and assertiveness (Furley et al., 2018). The procedure was identical in experiment three, but the video footage was from the lowest German football league (men). Results from alle three experiments implied that athletes, both professional playing in front of a big crowd and amateurs playing with small audience, change their nonverbal behavior depending on game location (Furley et al., 2018). Game location was most often revealed by home game athletes showing more dominant and possibly aggressive NVB compared to the players playing away. This study is the first to show a behavioral territoriality reaction of athletes depending on game location (Furley et al., 2018).

Another newer study that investigated links between NVB and a contextual factor is Leitner and Richlan (2021). They developed a categorical analysis system for emotional behavior in football (ASEB-F) with the main purpose to investigate the effects of the "missing" audience during Covid-19 on the NVB and experience of professionals in sport (Leitner & Richlan,

2021). Matches from the “championship group” (top six teams) in the 2018/19 season were compared to the 2019/20 season. The authors analyzed the emotional behavior of the players, team staff and officials using the ASEB-F. The main sample were 20 matches of FC Red Bull Salzburg (RBS) as they won the league both seasons, additional statistics from the rest of the matches were included to further analyze all matches in the championship group (Leitner & Richlan, 2021). The five categories developed for this study, which is event, behavior, extra behavior, participants, and consequences. Results revealed that the clearest difference between the seasons is the number of “emotional situations”, matches without audience had 19,5% fewer “emotional situations” (Leitner & Richlan, 2021). The emotional behaviors that decreased the most were “words fight” and “discussion”.

Unlike the studies that investigated NVB as a predictor for or consequence of NVB, Brimmell et al. (2018) have studied if challenge and threat states can predict NVB during pressured situations. People see a situation as a challenge when resources exceed demands and as a threat when demands exceed resources (Brimmell et al., 2018, p. 90). Participants were 35 men and seven women with at least two years’ experience with competitive football (Brimmell et al., 2018). Their task was to take a penalty kick indoor, with an indoor ball and an indoor goal. The experiment existed of several measures: first, participants had to fill out demand resource evaluations to assess evaluated demands and to measure evaluated resources (Brimmell et al., 2018). Second, the participant heart rate was measured during baseline (five minutes prior to shot) and while participants got post-pressure instructions (one minute after shot). Third, NVB before the task was recorded and analyzed by untrained observers (71 men and women). The observers rated the participants NVB on six 11-point scales: submissive–dominant, unconfident–confident, on edge–composed, unfocused–focused, threatened–challenged, and inaccurate–accurate (Brimmell et al., 2018). The results revealed that participants who self-reported the task as more of a challenge were seen with more dominant and confident NVB, and more likely to take an accurate penalty, compared to participants who evaluated the task as more of a threat (Brimmell et al., 2018). The heart rate measures did not predict ratings of NVB or expected performance. Results in the previous study were also the first to point out that athletes' stress appraisals appear to be related to NVB.

Furley et al. (2019) also researched a personal factor for NVB, more specific the power motive as a predictor of receptiveness to dominant and submissive NVB in sport. “The power motive can be broadly defined as a concern of having an impact (cognitively, emotionally, or physically) on others” (Furley et al., 2019, p. 917). Participants were German students, both

men and women (Furley et al., 2019). The participants implicit power motive was measured using the Picture Story Exercise, they were asked to typewrite imaginative stories on six pictures. When it comes to explicit power motive, the dominance scale of the German version of the Personality Research Form were used (Furley et al., 2019). The scale represents an evaluation of oneself as being dominant. In the end the participants watched video footage of brakes in basketball matches from the NBA and the highest German league, and brakes in table tennis matches from different international cups and leagues (Furley et al., 2019). The videos were categorized in three different categories: far behind, close score, or high lead. Participants rated the video on a scale from far behind to high lead, the scale was presented as a 11-point scale (Furley et al., 2019). Results revealed that the implicit power motive was positively associated with the capacity to separate athletes who were far behind from athletes who were close behind or at draw, but not athletes who were far leading (Furley et al., 2019). This means that variations in people's implicit need for power anticipate their openness against others` submissive NVB signals.

2.4.4 The gap in previous research

Within the research field of NVB in sport there exist some limitations. One limitation is that there are few naturalistic field studies where athletes have been studied in their natural environment (e.g. in a match). Instead, there have oftentimes been actors who have encoded certain nonverbal behaviors, and this manipulating of NVB and testing effects on observers reduce the ecological and external validity (Thomas et al., 2015). Another limitation is that participants and selection in the studies are mostly men. Some studies on handball teams and players have investigated NVB of female athletes (Moesch et al., 2015, 2018; Ronglan, 2007), but there is a gap in research when it comes to gender. There exists a tendency that NVB researcher present results with limited (sometime sole) focus on male athletes without specifying the gender gap in the selection, and without discussing the possible gender differences (Brimmell et al., 2018; Furley & Schweizer, 2014b; Furley et al., 2018; Kraus et al., 2010).

Further, a limitation is that most research has involved a limited focus on specific behaviors, and these are typically limited within specified categories. For instance, Moll et al. (2010) categorizes celebratory behaviors as "one arm up", "fist-up", or "two arms-up". This enables more precise observations but limits the understanding of relationships between potential intrapersonal variables (e.g. confidence) and nonverbal behaviors. Reducing behaviors to

smaller more controllable variables have been associated with limitations in the external validity of findings (Durdubas et al., 2021). To prevent limited focus on behaviors the coding in this study based the behavior on context, not only action. Meaning “two arms up” can be coded as several different behaviors, for example it can be a player asking for the ball or it can be disappointment towards the referee or a teammate, all depending on the context.

The present study is, to my knowledge, the first ever study conducted on tactical and emotional NVB in a match in women’s football, meaning each player is analyzed through their entire match performance. Emotional NVB is categorized as positive or negative, positive including energizing gestures (increasing and/or activating energy in oneself or others) and validating gestures (recognizing and/or acknowledging others’ emotions). Negative energy includes gestures indicating disappointment, frustration, and/or anger. Tactical behaviors are behaviors that players do to gain advantage in the match, including directing teammates, ball seeking gestures, and influence referee. For further operationalization of the variables see also subsection 3.5 (Variables).

The overall purpose of this study was to investigate characteristics of FA Women´s Super League players` tactical and emotional nonverbal behaviors in match.

Further, the aims of this study were to answer the following questions:

1. What is the players distribution of tactical, positive, and negative NVB based on the playing positions?
2. How are emotional nonverbal behaviors related to game status?
3. What is the relationship between the teams tactical and emotional nonverbal behaviors and game location?
4. What is the relationship between the teams` tactical and emotional nonverbal behaviors and game result?
5. What is the relationship between the captains` emotional and tactical nonverbal behaviors and the rest of the players` emotional and tactical nonverbal behaviors?
6. What is the relationship between the teams` positive and negative NVB in the last 10 minutes of the match and the game result?

3 Method

3.1 Design

In this project descriptive coding were used to observe and analyze players NVB. This study is a non-participatory observation, where the players do not know they are being observed and, therefore, do not change their NVB. Before the coding started, we developed a coding system with the goal to identify and document observable tactical and emotional NVB of football players, and some contextual factors. The developing of the coding system involved discussion, testing, many modifications, and operationalization of all the variables. When we were pleased by the code window and became trained coders, three master students started coding FA Women's Super league (WSL) and Premier League (PL). Players tactical and emotional behaviors, with arms, were coded, solely focusing on one player and one team at the time. The NVB were limited to arm-movements because arms extend from the player's body and the video footage received did not facilitate seeing players facial expression. By watching video of the players, it gave us the opportunity to go back and forth and make sure we did not miss any behaviors. In this study every team in WSL were coded in one match.

3.2 Selection

3.2.1 FA Women´s Super League

FA Women´s Super League (WSL) is the top women division in England and was established in 2010. The league is ranked by UEFA as the third best league in Europe (behind French Division 1 Arkema and German FLYERALARM Frauen-Bundesliga) (UEFA, 2022a). The league has twelve teams, and they play double series from September to May. Since 2015 Chelsea, Arsenal and Manchester City have been the top three teams, Chelsea winning the last three seasons. England hosted UEFA Women's Euro 2022, and England won their first UEFA Women's Championship title. 22 players of their 23-player squad played in WSL in the 21/22 season, representing Manchester City (nine players), Chelsea (four players), Arsenal (four players), Manchester United (three players), and Aston Villa (two players).

A total of 173 players were coded and they had a total of 27,819 coded situations. 87 players played a full match (90+ minutes), 43 players were substituted off, and therefore, 43 players were substituted in (M = 73.6 minutes, SD = 30.3). The players where between 17 and 36 years old (M = 25.9, SD = 3.8), and they come from 20 different countries, mostly in Europe (England, Scotland, Wales, Ireland, Switzerland, Norway, Sweden, Denmark, Iceland,

Germany, France, Spain, the Czech Republic, Greece, Netherlands, Jamaica, Canada, Japan, South Korea, and Australia).

3.2.2 Match inclusion and exclusion criteria´s

The match inclusion criteria´s were that the matches had to have a maximum of two goal difference in the fulltime score, it had to be a variation of wins, losses and ties, and a variation of home and away matches. It is considerable performance differences between the top and bottom teams in WSL, therefore, it seemed necessary to select specific matches from the league. Based on this and previous research assumptions that contextual factors would affect players NVB were made (Furley & Schweizer, 2014a, 2014b; Furley et al., 2018; Smith, 2017).

A Sky Sports article from 2017 with statistics from Premier League show that 90 percent of teams that gain a two-goal lead win the match, 7.4 percent draw and only 2.6 percent lose (Smith, 2017). Furley and Schweizers (2014b) study on score related NVB showed that athletes pick up and interpret subtle NVB changes that occur during a match and use this information to define how confident they are in beating the opponent. The further behind the opponent are, the more confident are the athletes (Furley & Schweizer, 2014b). Furley and Schweizer (2014a) have found evidence that thin slices of athletes' NVB can reveal who is leading and trailing, and Furley et al. (2018) that athletes change their NVB depending on game location.

To be able to do the analyses we depended on video of the matches in both tactical and broadcast view (see section 3.3.1). Originally six matches in which four teams won, four teams lost, and four teams tied were selected. Three of the original matches did not meet the inclusion criteria´s. The matches were excluded due to tactical view being too low and zoomed in. This made it difficult to get an overview of the players, and the centrebacks and left and right defenders often got cut out of the picture. This problem seemed to be due to small stadiums. Five matches that met the inclusion criteria`s were then added.

3.3 Data collection

3.3.1 Pre video analyses

This project consists of video analysis of PL and WSL. 22 matches were analyzed, 14 from PL, and 8 from FA Women´s Super League. Both tactical and broadcast view of the matches

were distributed from TV 2 broadcasting. Tactical view is a high placed camera, usually placed in the middle of one of the longer sides, that shows the whole pitch and every player (except goalkeepers at certain times). This gives the ability to look at the players throughout the match, but from a further distance. Broadcast view is the video that companies get access to stream to audiences at home. The image is often more zoomed in, and different cameras show different angles of the pitch and the players.

In this study only the 8 WSL matches were included. Of the twelve teams five won, five lost, and two tied. It was five home matches and seven away matches. A total of 132 90-minute sequences were coded. Some players did not play the whole match. When a player was taken off, the substitute was coded for the rest of the match. In WSL they could substitute up to five players with a maximum of three substitution-stops (meaning they would have to substitute for example two players at the same time).

3.3.2 Post video analyses

The player's timeline was saved as CSV-files and added to a excel sheet. In the excel sheet additional variables were added. The variables added were the game status, game location (home or away), player position, booking, goal scored, own goal, big mistake, and the game round. When a team was finished coded a spreadsheet with each team and the team number were created, and at the end a excel document with all the teams and players behaviors were created. This was the first dataset. A second dataset with one column for each player with their matrix, total amount of each behavior and contextual variables, were also created. In this dataset other additional variables were added. The variables added were total playing minutes, total registrations, captain or not captain, result, game location, substitute or not substitute, total frequency, tactical frequency, positive frequency, negative frequency, positive frequency last 10 minutes, and negative frequency last 10 minutes.

3.4 Video analyses

The matches were analyzed using Hudl Sportscode. Sportscode is a video program that require a MacBook and an external screen to split screen. One of the screens showed the code window, the other showed the match switching between tactical and broadcast view (see Figure 1). The tactical view made it possible to always see most of the players while the broadcast view made it possible to look closer at players with and around the ball. The tactical video and broadcast video were perfectly synchronized. It should be noted that a new

behavior was coded if the player returned his or her hands to a neutral state, provided a new message or directed it towards a new recipient. Furthermore, nonverbal behaviors after goals were not coded (coding started again five seconds before kick-off).

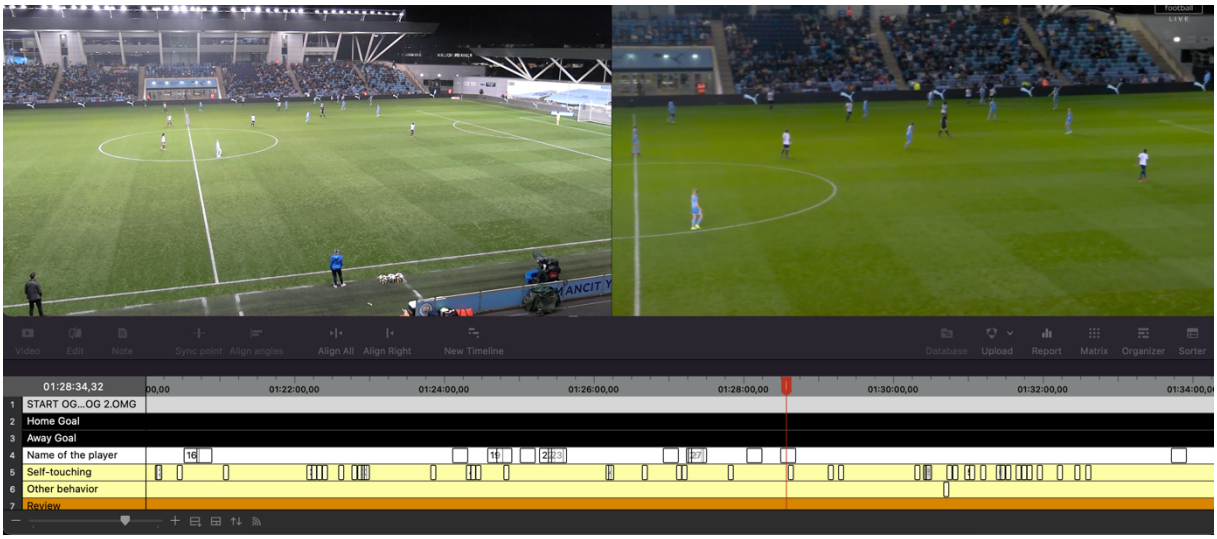

Figure 1. *Illustration of the split-screen function and timeline in SPSS. The tactical view (left) and broadcast view (right) was synchronized.*

The code window (see Figure 2) consisted of high-order themes (e.g. tactical NVB) rather than micro level behaviors (e.g. two arms up). One player was coded completely, through an entire match, before the next player was coded. Goals were coded when one of the teams scored so that the score were correct, the clock were only coded in the beginning and end of each half as it updated automatically based on what time interval the coding took place in (five-minute intervals). Player, score, and time in game were code buttons. To make the process easier the variables were placed tactically based on the order of the coding. On the top left side most of the contextual variables were placed (e.g. broadcast/tactical view, near/far side, and in/out of possession). These variables were action (toggle) buttons, meaning one in each category always stayed active, for example tactical, near side and in possession. The gesture sizes (small, medium, large), intensities (low, medium, high), and durations (short duration, long duration) were also action buttons. Further were the label buttons, they informed about the code (player, score, and time in game). First of the label buttons were the out of play variables. Out of play included all set pieces (e.g. throw in, kick off, corner, etc.) and were only registered when the ball was out of play. Next were the tactical and emotional variables. The tactical variables included three different subcategories, ball seeking behavior, directing teammates, and influence referee. The emotional variables included five different

categories, energization, emotional validation, relief, other, and disappointment, frustration, and anger. All the emotional variables included the same triggers, contextual reason for the behavior, for example shot or D+ (good defensively behavior). Touch and tactical exchange were also label buttons, they were coded additional to tactical or emotional when the analyzed player initiated it. Finally were the teammates variables, including all the teammates who were on the pitch, and the other potential receiver`s, opponents, coach, self, referee, and others. When it was clear who the analyzed player communicated with, the player or receiver was coded, when it was clear the message was to one or more teammates, but not who, the teammates big button was registered.

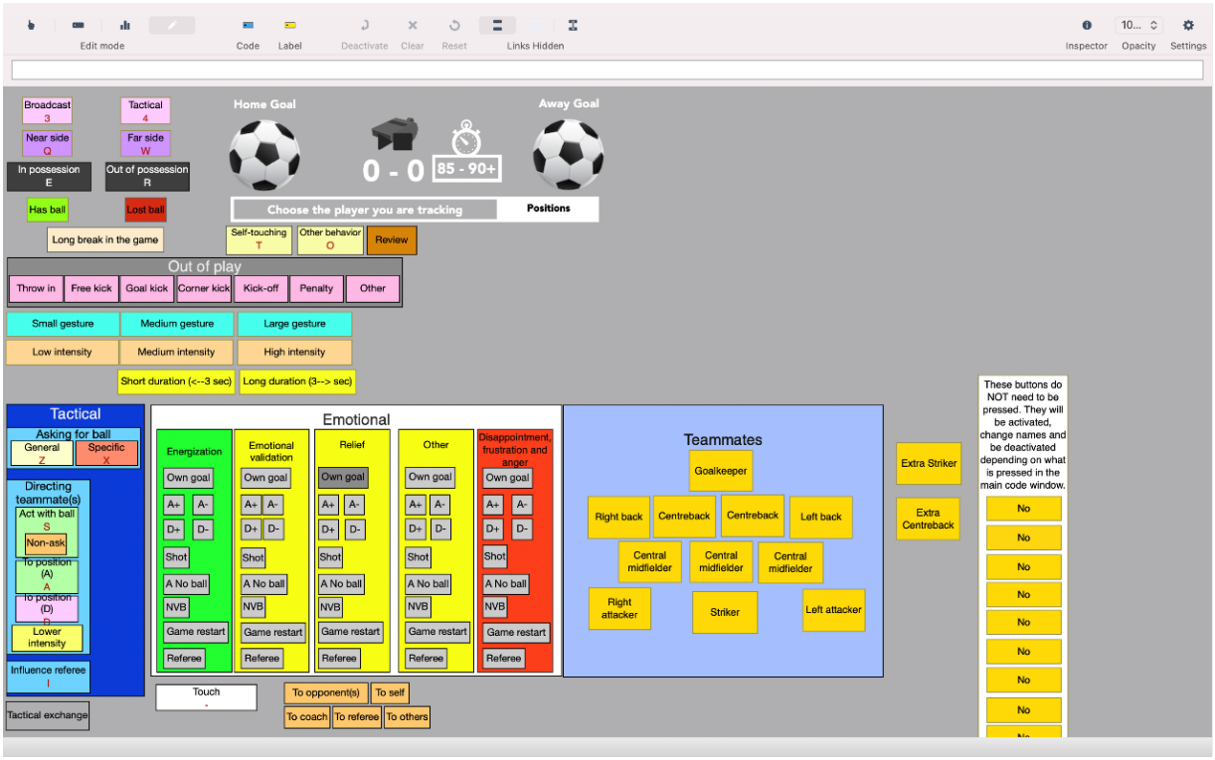

Figure 2. *The code window with all the included variables and values.*

The analyses system provides contextual factors, the resulting visually observable NVB including size and intensity, and the teammate(s) or other receiver. One of each contextual category had to be active, and one factor from behavior, emotional or tactical, and at least one decoder had to be coded. The coders coded the message they thought the receiver perceived.

3.5 Variables

Variables in this study are categorized as tactical, emotional, and contextual. To find good, objective performance measurement tools for this study time was spent discussing, searching on databases, and consulting with football coaches and professionals. The extend of the

analyses is big, therefore not all variables will be included in this study. Further, after discussion and evaluation two of the five original emotional categories were excluded due too few registrations (other, relief), and two of the categories were combined because the context and purpose of the behaviors were too difficult to distinguish (energization and emotional validation). Also, both energization and emotional validation were subcategories of positive emotions.

Table 2. *Categories, variables and operationalizations of the key variables in this study.*

Category	Variable	Description/operationalization
Emotional	Positive NVB - Energization - Emotional validation	**Energization:** Any arm-related behavior where the analyzed player tries to increase and/or activate energy or intensity levels in herself, teammate(s) or fans. Will possibly occur after the goalkeeper saves a penalty, a team is awarded a penalty, a last-ditch sliding tackle, a teammate misses a shot etc. Press this button when you are certain you see an energizing gesture, but you are not able to define what triggered it. **Emotional validation:** Emotional validation is typically gestures where the analyzed player's behavior indicates she tries to recognize and/or acknowledge other players emotions. Press this button when you are certain you see an emotional validation gesture, but you are not able to define what triggered it.
Emotional	Negative NVB - Disappointment, frustration, and anger	**Disappointment, frustration, and anger:** Any behavior indicating that the analyzed player is disappointed, frustrated, or angry. Disappointment relates to sadness or displeasure caused by the non-fulfillment of one´s hopes and expectations. Frustration arises from the perceived struggle to fulfill an individual´s will or goal and is likely to increase when a will or goal is denied or blocked. Anger involves a strong painful and non-cooperative response to a perceived insult, hurt or threat.
Emotional/Tactical	Touch	Press this button in addition to the other emotional/tactical gestures when the analyzed player initiates touching.
Tactical	Tactical - Ball seeking behavior - Directing teammates	**Ball seeking behavior:** *General:* The player indicates through arm-movements that she wants the ball, but not specifically where she wants the ball. Typically, with both hands, possibly when on the other side of the pitch. "Look at the amount of space I have got to receive the ball".

	- Influence referee	*Specific:* The player indicates through arm-movements that she wants the ball, and leaves clues as to where she wants it (into space, to her feet, to her body etc.). **Directing teammates:** Use this button, when you are absolutely certain that the behavior you see is some kind of tactical direction to one or more teammates. Includes Act with ball, To position (A), To position (D) and Lower intensity. **Influence referee:** Any behavior and arm-movement that is done to influence the referee. Often made proactively, before the referee blows the whistle to challenge for a desired outcome. Typical example is that a teammate is tackled, and the analyzed player raises her arms to challenge the ref and indicate "Ref, that's a foul". Could also happen after a foul, as the player tries to avoid e.g., a booking.
Contextual	Gesture size - Small - Medium - High	**Small gesture:** Use this when the nonverbal behavior are small one-arm-movements, downwards close to the body. **Medium gesture:** Use this when the nonverbal behavior, through arm-movements, is clearly visible and easy to detect. Can be made with one arm to the side or up, and two arms downwards (lower than shoulders). **Large gesture:** Use this when the nonverbal behavior, through arm-movements is seen as both arms raised above the shoulders, or both arms extended to the side.
Contextual	Gesture intensity - Low - Medium - High	**Low intensity:** The nonverbal intensity equivalent of whispering / slow walking. Use this when the nonverbal behavior, through arm-movements, are slight, slow movements of hands, or one or both arms. **Medium intensity:** The nonverbal intensity equivalent of normal speaking / jogging. Use this when the nonverbal behavior, through arm-movements, is visibly dynamic. Can be made with both one and two arms/hands. **High intensity:** The nonverbal equivalent of screaming/sprinting. Use this when the nonverbal behavior, through arm-movements is visibly dynamic with high speed.

3.6 Validity and reliability

3.6.1 Validity

Validity is the degree to which a test or instrument measures what it is supposed to (Thomas et al., 2015). There are three different kinds of validity: concept validity, internal validity, and external validity. Concept validity is the actual concept we want to study, specifically NVB. The term NVB is the scientifically term for body language, and the understanding of the term seems universal. It is also important for concept validity that the operationalization is great (Thomas et al., 2015), therefore, previous definitions for NVB and different tactical and emotional behavior are adopted in this study.

Internal and external validity referrers to whether the conclusions made in the study are valid or not (Thomas et al., 2015). Internal validity is defined as "the extent to which the results of a study can be attributed to the treatments used in the study" (Thomas et al., 2015, p. 13). One part of the internal validity is statistical validity. The statistical validity depends on using the right effect measures and the right statistical tests, to avoid making type I and type II errors (Field, 2013; Thomas et al., 2015). To make sure the right tests were implemented normality tests were done, an expert was consulted, and guidelines from the book "Discovering statistics using IBM SPSS statistics" were followed (Field, 2013). The players were analyzed in a real competitive situation, and they did not know they were being analyzed. This design allowed the collecting of a huge amount of data of the phenomena being studied within a real-world setting with high ecological validity. External validity is "the generalizability of the results of a study" (Thomas et al., 2015, p. 13). External validity in this study refers to whether these results can be transferred to other populations. WSL has players from 20 different countries which make the generalization greater. The overall goal was not to generalize WSL teams and players, but to examine one of the best leagues in Europe and some of the world's best players.

3.6.2 Reliability

Reliability is the consistency to the data collection, and refers to the degree of measurement error in the measurement instrument (Scholtes et al., 2011; Thomas et al., 2015). In this research the measurement error relates to the rater (coder). The lower measurement error, the higher the reliability of the measurement instrument and coder (Scholtes et al., 2011). There are three types of reliability tests: inter-rater, intra-rater, and test-retest. In this project it was

conducted two inter-rater tests, one pilot test in the beginning and one at the end, and one intra-rater test. Reliability of measurement in performance analysis is severely important (Bloomfield et al., 2007). When a human is a part of the measurement instrument it can result in inaccurately data due to the subjective nature of human movement recognition (Bloomfield et al., 2007). Therefore, it is important to measure the inter-observer reliability (IOR).

3.6.2.1 Inter-rater reliability

The inter-rater reliability estimates whether two, or more, raters have compliance when using the same measurement instrument (Scholtes et al., 2011). In this project we were three main coders (master students), that also write each our master´s thesis, and one experienced coder. Only two of the master students analyzed WSL.

In the pilot test the three master students tested the IOR by analyzing one player in the first half of a Premier League match. The experienced coder coded the same half. Due to the magnitude of variables and the time constrains of the analysis we considered one half in the inter-observer test to be adequate. The data, every coding, was compared and ranked from 0-1 (categorized in both coding a nonverbal behavior and coding the same nonverbal behavior), 0 being similar (both coded a situation, or both coded the same behavior), and 1 being nothing similar as the experienced coder (either only the master student or the experienced coder coded a situation, or they coded the situation different). A total of 178 situations were included. The data were nominal and therefore a Cohen's Kappa test were used (Cohen, 1968). The kappa coefficients (k) values strength of agreement was interpreted as very good over 0.8, values between 0.6 and 0.8 was interpreted as good, values between 0.4 and 0.6 was interpreted as moderate, values between 0.2 and 0.4 was interpreted as fair, and values below 0.2 was interpreted as poor (Altman, 1991). The inter-observer strength of agreement for the author of this thesis and the experienced coder was very good for seeing a nonverbal behavior ($k = 0.84$), and good for coding the same nonverbal behavior ($k = 0.74$).

At the end of the analysis the three master students had done 27 of the 32 matches (WSL and PL) and were considered the new experts. Therefore, the IOR was compared between each of the master students (see Table 3). The students all coded the same player in one match, and a total of 322 situations were included. The inter-observer strength of agreement between the two master students (including the first author) that coded the WSL was good for seeing a NVB ($k = 0.7$), and good for coding the same NVB ($k = 0.64$).

Table 3. *After test - the inter-observer strength for coding the same nonverbal behavior. Kappa coefficients between the three experienced coders.*

	Coder 1	Coder 2	Coder 3
Coder 1		k=0.71	k=0.71
Coder 2	k=0.71		k=0.64
Coder 3	k=0.71	k=0.64	

3.6.2.2 Intra-rater reliability

At the and the first author also did an intra-rater test. The intra-rater reliability evaluates reliability across different times by having one rater score the same measurement instrument on two different occasion (Scholtes et al., 2011). In this study the first author coded the same player with almost a year apart. A total of 338 situations were included when added "missed" registrations in both analyses. The strength of agreement was good for both coded similar (k = 0.7) and coding a situation (k = 0.72). In the first analysis a total of 297 situations were coded, including 239 tactical and 58 emotional. In the re-test a total of 285 situations were coded, including 235 tactical and 50 emotional.

3.7 Ethical considerations

It is important that research are carried out thoroughly methodically and consider the ethical aspect of research (Gajjar, 2013; Halvorsen, 2008). The purpose of research ethics is to make researchers, and the society in general, aware of the ethical questions that arise because of research, first and foremost linked to the research process. Ethical considerations and assessments of research have got greater importance as the attention on social research application in society and its importance for social development have increased (Halvorsen, 2008). Furthermore, researchers are normally passionate about their research projects, but their academic freedom is constrained by ethical principles to protect those who participate.

An approval to carry out the research was conducted from the Norwegian Centre for Research Data (Norwegian: NSD). The data in this project comes from already existing video recordings of publicly held football matches which are already scrutinized in detail by the clubs and the media and evaluated/communicated publicly. Therefore, obtaining consent to study and analyze these already existing video recordings was estimated to be unnecessary.

Consent is completely unrealistic (impossible) to expect given that players and teams at this level of professional football (respectively, two of the biggest leagues in men's and women's football) receive several inquiries every week. These assumptions are in line with published policy in leading sports science journals (i.e., Journal of Sports Sciences) that professional athletes must expect to undergo a number of tests and analyzes as part of their profession, and that they is omitted from normal requirements for obtaining consent (Winter & Maughan, 2009). A requirement from NSD, since consent from the players and teams were not obtained, was to make this project publicly available in other ways. Therefore, followed by NSD's recommendation, a public website about the project was created. Further, extra strict requirements to safeguard players' rights were done, which among other things implies high requirements for data security, secure communication, and full confidentiality in reporting results.

3.8 Statistical analysis

SPSS (version 28) was used to analyze the data. To decide whether parametric or non-parametric tests should be done, the normal distribution for “tactical frequency”, “negative frequency”, “positive frequency”, “positive frequency last 10 min”, and “negative frequency last 10 min” were examined (Field, 2013). These values tell us something about what the frequency distribution of our data looks like. Normally distributed data have a value of 0 for both skewness and kurtosis. A positive score indicates that the data pile up on the left side of the normal curve **(**too many low scores) and a negative score indicates that the data pile up to the right (too many high scores). The skewness and kurtosis were then divided by their standard deviation to test whether the values were significantly different from 0 (normal). Values greater than 1.96 is significant at $p < 0.05$, values above 2.58 is significant at $p < 0.01$ and above 3.29 is significant at $p < .001$ (Field, 2013). Kolmogorov-Smirnov test is for testing the skewness/kurtosis values. A significant value ($p = 0.05$) indicates a deviation from normality. A large sample highly power the test, which means even small and unimportant deviations from normality might be assumed significant (Field, 2013). Further observations of histograms were also conducted.

Descriptive analyses were used to explore frequency, mean and standard deviation of several different variables. The normal distribution of total frequencies of all the players were calculated. A Kolmogorov-Smirnov test showed $D (173) = .079$, $p = .010$, meaning significantly non-normal. To present the results mean and standard deviation will be used

because this is the most common measure of tendencies as it is the average score (Field, 2013). When comparing the mean and median, it revealed almost the same numbers.

To examine the relationship between captains` and not captains` NVB, the different positions NVB and the team`s NVB normality tests on "tactical frequency", "negative frequency" and "positive frequency" were conducted. A Kolmogorov-Smirnov test showed tactical frequency scores, D (173) = .075, p = .019, positive frequency scores, D (173) = .159, p < .001, and negative frequency scores, D (173) = .150, p < .001, were all significantly non-normal.

The relationships between all the positions were examined with three non-parametric Kruskal-Wallis tests. Positions were set as the independent variable and tactical frequency, positive frequency, and negative frequency as dependent variables. To examine the relationship between game location (home (72) and away (101)) and tactical, positive, and negative NVB frequency, three Mann-Whitney tests were conducted. Further, three Kruskal-Wallis tests were conducted to examine the relationship between NVB and game result. Result (win (59), draw (23), loss (56)) were then set as independent variable, and tactical, positive, and negative NVB frequency as dependent variables. Significance level were set at p = .05 in all tests.

The parametric test MANOVA were conducted to examine the relationship between captains and the rest of the players, while not fully complying with the assumptions, because the research question requires to look at group differences with a range of variables together. As far as I know, there does not exist a non-parametric equivalent (Field, 2013). The MANOVA was executed with captain as the independent variable (captain (12), not-captain (161)) and tactical frequency, positive frequency, and negative frequency as dependent variables. A significance level of 0.05 was used and the Bonferroni correction was employed to correct for multiple testing (p = 0.05/2 = .025). To check how the data behaved when doing separate independent tests, three non-parametric Mann-Whitney U tests were conducted with a 95% confidence interval to determine significance.

To examine the relationship between the teams` positive and negative nonverbal behaviors in the last 10 minutes of the match and the game result normality tests on "positive frequency last 10 min" and "negative frequency last 10 min" were conducted. A Kolmogorov-Smirnov test showed that positive frequency last 10 min scores, D (138) = .205, p < .001, and negative frequency last 10 min scores, D (138) = .194, p < .001, were both significantly non-normal. As in the previous question, the parametric test MANOVA were executed because the research question requires to look at group differences with a range of variables together. The

MANOVA was executed with game result as the independent variable (win (59), draw (23), loss (56)) and positive and negative frequency last 10 minutes as dependent variables. A significance level of 0.05 was used and the Bonferroni correction was employed to correct for multiple testing ($p = 0.05/3 = .017$). Sample size in each group were very different, therefore a Hochberg`s GT2 post hoc test were conducted (Field, 2013). To check how the data behaved when doing separate independent tests, two non-parametric Kruskal-Wallis H tests were conducted with the significance level $p = .05$.

To ensure the conclusions are valid, the results significance will be examined in the results section, and only significant results will be used to draw conclusions. The results that are not significant, but seem to go in one direction, will instead be discuss as trends or tendencies.

4 Results

In this section the results from the 27,819 registered behaviors will be presented. The analyses cover a large amount of data with a lot of included variables, and I will not be able to present everything. Due to the lack of research on this topic the focus in this section will be to present descriptive statistics of players tactical, positive, and negative NVB. Some basic tests of significance will also be presented.

4.1 Descriptive statistics

Total frequencies of the WSL players` NVB are presented in Figure 3. The players encoded between 0.22 and 7.10 nonverbal behaviors per minute ($M = 2.15$ registrations, $SD = 1.141$). The average nonverbal behaviors for all the players were 160.75 ($SD = 116.25$), and average for those who played a full 90 minutes were 214.88 ($SD = 115.95$). Tactical behavior stood for 85.4% (23,750) of the behaviors, and emotional behavior stood for 14.6% (4,068 registrations). Of the tactical behaviors, directing teammates were encoded most with a total of 17,516 (73.8%) registrations, followed by asking for ball (3,395, 14.3%) and influence referee (2,505, 10.5%). Directing teammates represented 63% of the total nonverbal behaviors encoded by the WSL players. Positive NVB stood for 2,467 (60.6%) of the emotional behaviors, and touch between teammates, which usually came with a positive gesture, were engaged 531 times. The gestures were 87,1% of the time medium, 6,8% of the time small, and 6,1% of the time large. The intensity of the gestures was 98,3% of the time medium, 1,4% of the time high, and only 0,3% of the time low.

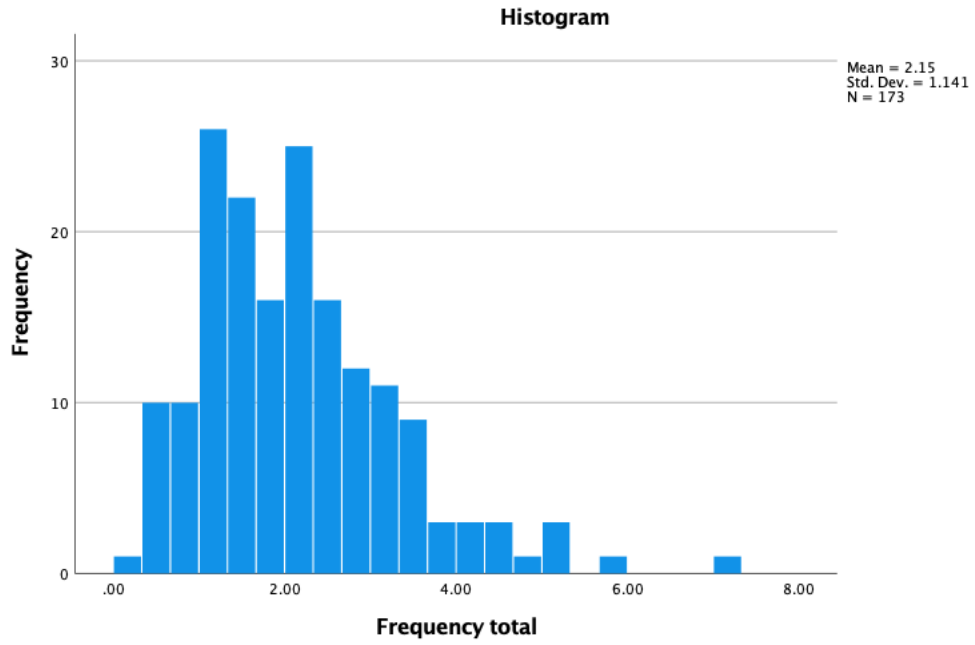

Figure 3. *Total frequency of players` NVB during WSL matches, frequency is expressed as behaviors per minute.*

4.2 Playing position

There were big differences in number of nonverbal behaviors and what nonverbal behaviors encoded based on playing position (see Figure 4 and Figure 5). Centrebacks had the highest total frequency out of all the positions (M = 2.80 per minute, SD = 1.36), including the highest tactical frequency (M = 2.46 per minute, SD = 1.17) and positive frequency (M = .24 per minute, SD = .20), and the lowest negative frequency out the outfield positions (M = .09 per minute, SD = .09). Central midfielders came in second place, while goalkeepers had the lowest total frequency of all the positions (M = 1.03 per minute, SD = .64, it should be noted that goalkeepers were more frequently out of the frame than the other positions). Out of the outfield positions wide attackers had the lowest total frequency (M = 1.82 per minute, SD = .82) and the lowest tactical frequency (M = 1.47 per minute, SD = .74). It seems like strikers had the lowest frequency of positive NVB (M = .17 per minute, SD = .12) and the highest frequency of negative NVB (M = .16 per minute, SD = .12).

Kruskal-Wallis H tests with significance $p < 0.05$ show that tactical, H (5) = 32.743, $p < .001$, and negative frequency, H (5) = 19.852, $p = .001$, was significantly affected by playing position. Pairwise comparisons with adjusted p-values showed that there were significant differences for tactical frequency between centrebacks compared to goalkeepers ($p = .000$, $r = .73$), wide attackers ($p = .002$, $r = .47$), and strikers ($p = .024$, $r = .42$). There were no significant differences between tactical frequency for centrebacks compared to central

midfielders (p = 1.000, r = .15) or side backs (p = .691, r = .26). Further, there were significant differences in tactical frequency between goalkeepers compared to side backs (p = .026, r = .50), and central midfielders (p = .001, r = .54). There were no significant differences in tactical frequency between the rest of the positions.

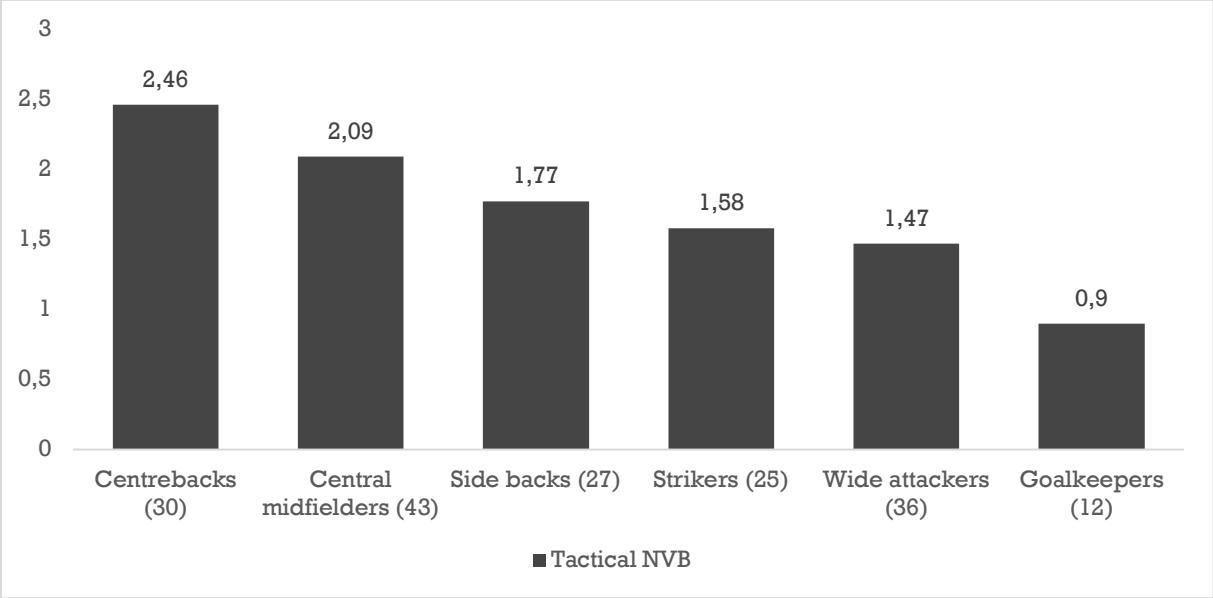

Figure 4. *Mean frequency of players` tactical NVB based on position, frequency is expressed as behaviors per minute. The numbers in brackets behind the position is the total number of players in that position.*

Pairwise comparisons with adjusted p-values showed that there were significant differences for negative frequency between goalkeepers compared to central midfielders (p = .012, r = .45), wide attackers (p = .012, r = .48), side backs (p = .013, r = .53), and strikers (p = .000, r = .71). There was no significant difference between negative frequency for goalkeepers compared to centrebacks (p = .119, r = .41). Further, there were no significant differences in negative frequency between the rest of the positions. Kruskal-Wallis H test show that positive frequency was not significantly affected by player position, H (5) = 7.666, p = .176. These results tell us that tactical and negative NVB is correlated with playing position on the pitch, while positive NVB is not.

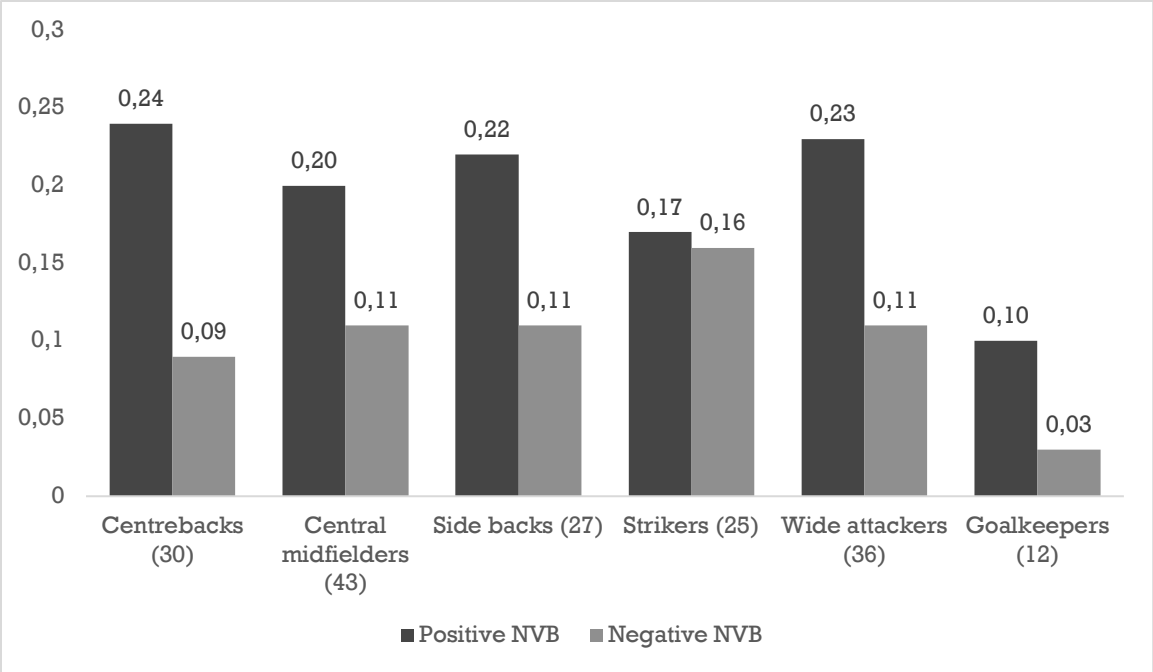

Figure 5. *Mean frequency of players` positive and negative NVB based on playing position, frequency is expressed as behaviors per minute.*

4.3 The relationship between game status and emotional nonverbal behaviors

In Figure 6 the total positive and negative behaviors registered when players were ahead, behind, or level are presented. The total amount of minutes teams and players were ahead, behind, or level, varied a lot. Some teams were never ahead, and some was never behind, also some matches were level most of the time and others had an early goal. Because of these differences the focus will be on the difference between positive and negative emotional NVB for each game status. When teams were ahead 71% (854) of their emotional NVB were positive, meaning only 29% (349) were negative. Teams behind had 56,8% (710) positive emotional NVB registrations and teams at level had 57% (901) positive NVB registrations. These numbers tell us that teams that were ahead had a greater amount of positive NVB compared to negative NVB in match. On the other side, when teams were behind or at level players showed off almost the same amount of positive and negative NVB.

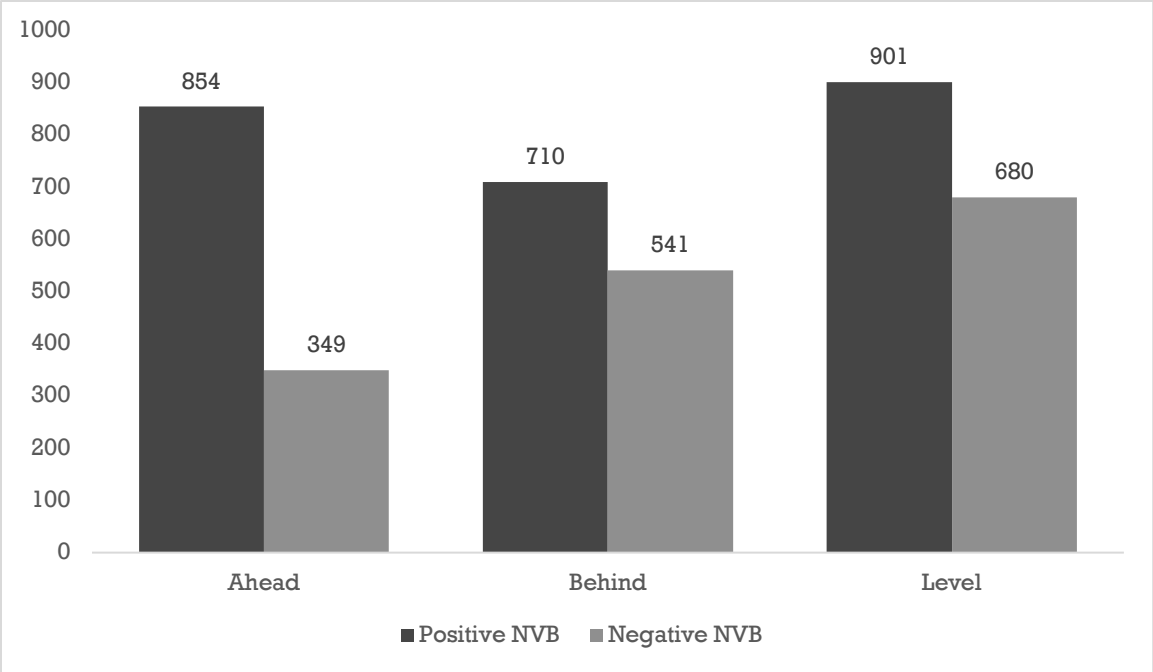

Figure 6. *Game status during matches and total amount of positive and negative nonverbal behaviors.*

4.4 The relationship between the teams` tactical and emotional nonverbal behaviors and game location

Figure 7 present the 12 teams' average total NVB per minute. When it comes to home and away games, teams one, five, seven, ten and twelve played at home (M = 2.07 per minute per player, SD = 1.05), while teams two, three, four, six, eight, nine and eleven played away (M = 2.2 per minute per player, SD = 1.20). The home teams had almost the same positive frequency (M = .20, SD = .16) as away teams (M = .21, SD = .23), as with the negative frequency (Home teams: M = .10, SD = .10; Away teams: M = .11, SD = .11). Mann-Whitney´s revealed tactical frequency for home teams (*Mdn = 1.6292*) did not differ significantly from away teams (*Mdn = 1.7800*), U = 3805.5, z = .522, p = .602, r = .039, positive frequency for home teams (*Mdn = .1519*) did not differ significantly from away teams (*Mdn = .1429*), U = 3437.0, z = -0.613, p = .540, r = -0.047, and negative frequency for home teams (*Mdn = .0779*) did not differ significantly from away teams (*Mdn = .0745*), U = 3708.500, z = .223, p = .823, r = .017. These results tell us that game location is not correlated with players` emotional and tactical NVB.

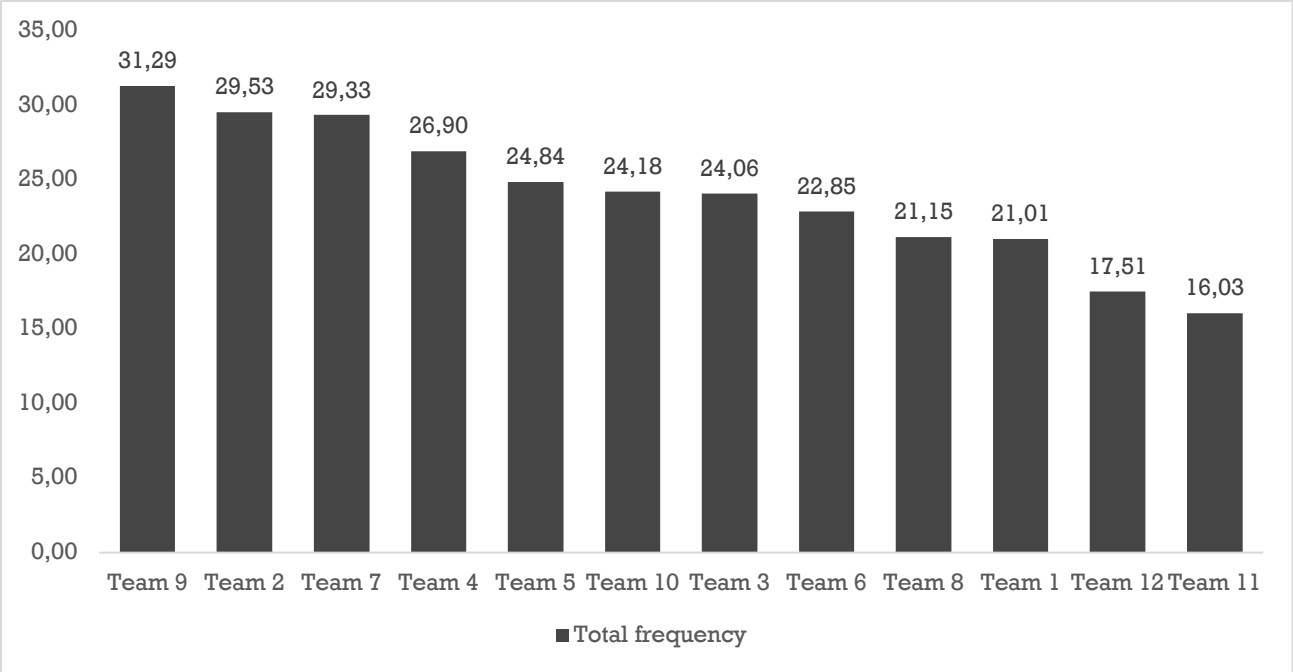

Figure 7. *Every team`s mean NVB per minute.*

4.5 The relationship between the teams` tactical and emotional nonverbal behaviors and game result

Figure 8 present the winning, losing, and tied teams mean positive and negative NVB per minute. Teams one, two, six, nine and ten won their matches (M = 2.26, SD = 1.24), teams eleven and twelve tied (M = 1.46, SD = .84), and teams three, four, five, seven and eight lost their matches (M = 2.28, SD = 1.05). The winning teams had a mean positive frequency of 0.27 per player (SD = .25) and mean negative frequency of 0.09 per player (SD = .08), they also had an average of 51.2 touches. The losing teams had lower positive frequency than the winning teams (M = .17 per player, SD = .12), but clearly the highest negative frequency of all the groups (M = .15 per player, SD = .13). The losing teams had an average of 47.6 touches, which is almost the same as the winning teams. Lastly, tied teams had the lowest positive frequency (M = .10 per player, SD = .11) and negative frequency (M = .05 per player, SD = .05), and they had an average of 18.5 touches.

Kruskal-Wallis H tests showed that tactical frequency, H (2) = 9.283, p = .010, positive frequency, H (2) = 24.096, p < .001, and negative frequency, H (2) = 18.521, p < .001, were all significantly affected by game result. Pairwise comparisons with adjusted p-values showed that there were significant differences between tactical frequency for players that played draw compared to players that won (p = .029, r = .26), and loss (p = .008, r = -0.31). There were no

significant differences between tactical frequency for players that won compared to players that lost (p = 1.000, r = -0.05). Further, there were significant differences between positive frequency when players lost compared to players that tied (p = .007, r = -.31), and players that won (p = .048, r = .20). There was also a significant difference between positive frequency when players tied compared to players that won (p = .000, r = .48). Finally, there were significant differences between negative frequency when players lost compared to players that tied (p = .000, r = .39), and players that won (p = .004, r = -0.26). There was no significant difference between negative frequency between players that tied compared to players that won (p = .113, r = -0.16). These results tell us that winning teams are more likely to encode a higher amount of positive NVB compared to losing teams and tied teams. They also tell us that losing teams are more likely to encode a higher amount of negative NVB than winning teams and tied teams. The tactical results show that teams that tied were more likely to encode less tactical NVB than winning and losing teams.

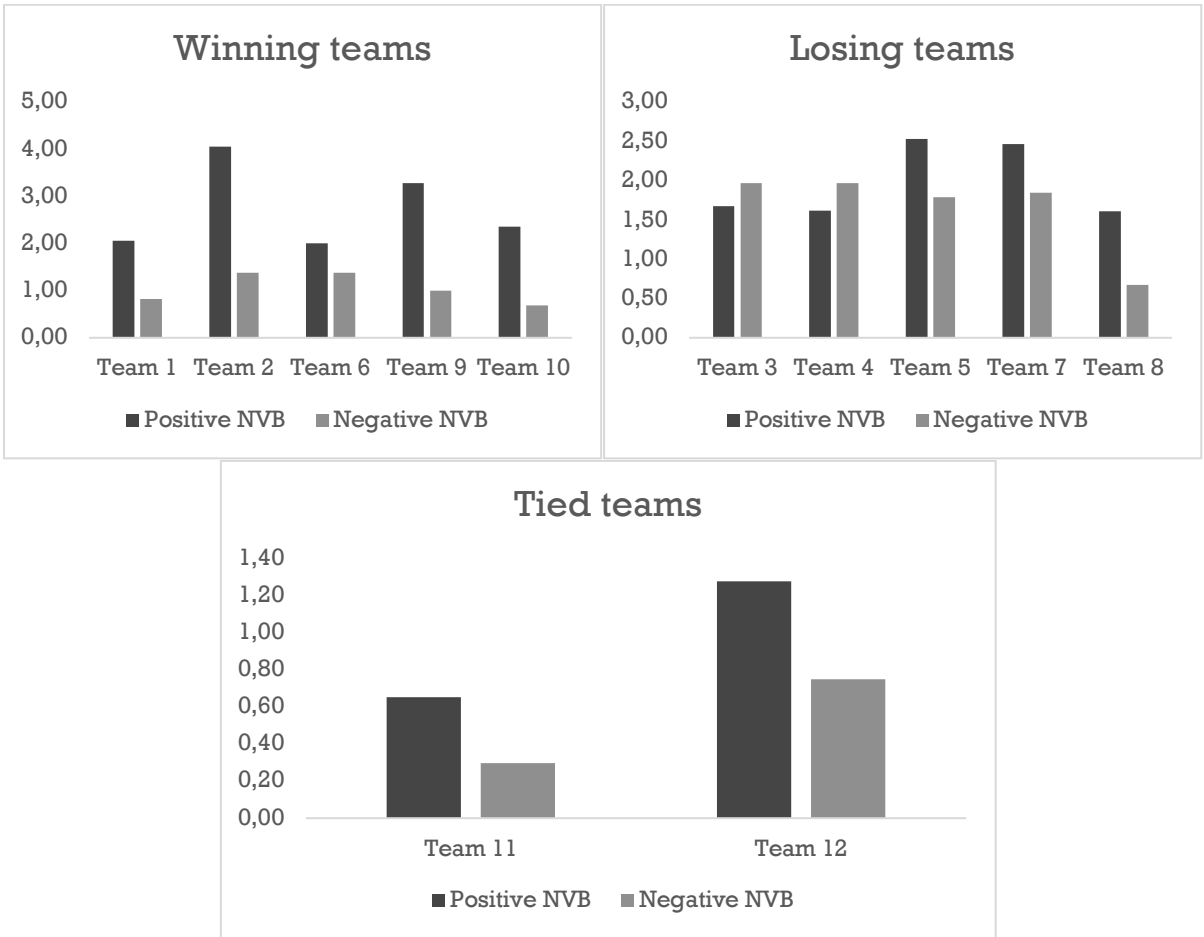

Figure 8. *Winning teams`, losing teams`, and tied teams` mean positive and negative nonverbal behaviors per minute.*

4.6 The relationship between the captains` and the rest of the players` emotional and tactical nonverbal behaviors

Figure 9 present captains` and not captains` (rest of the players) mean tactical, positive, and negative NVB. A MANOVA followed by three Mann-Whitney U tests were conducted to examine the relationship between the captains` and the rest of the players` tactical and emotional nonverbal behaviors. The results of the multivariate tests (Pillal´s Trace, Wilks` Lambda, Hotelling´s Trace and Roy´s Largest Root) all reached the criterion for significance $p < .001$. Test of Between-Subjects Effect (univariate test) revealed that based on the p-values there was a significant difference between groups in terms of positive NVB ($p = .014$) and tactical NVB ($p < .001$), but not in terms of negative NVB ($p = .667$).

Follow up Mann-Whitney´s revealed negative NVB for captains (*Mdn = .0591*) did not differ significantly from not captains (*Mdn = .0769*), U = 1026.50, $z = .362$, $p = .718$, $r = .002$. However, captains *(Mdn = .3082)* showed significantly more positive NVB than not captains *(Mdn = .1429),* U = 535.00, $z = -2.575$, $p = .01$, $r = -.015$, captains (*Mdn* = 2.57) also showed significantly more tactical NVB than not captains (*Mdn* = 1.63), U = 368, $z = -3.573$, $p < .001$, r = -0.27. These results tell us that a captain is more likely to have higher total amount of positive and tactical nonverbal behaviors compared to players that are not captain.

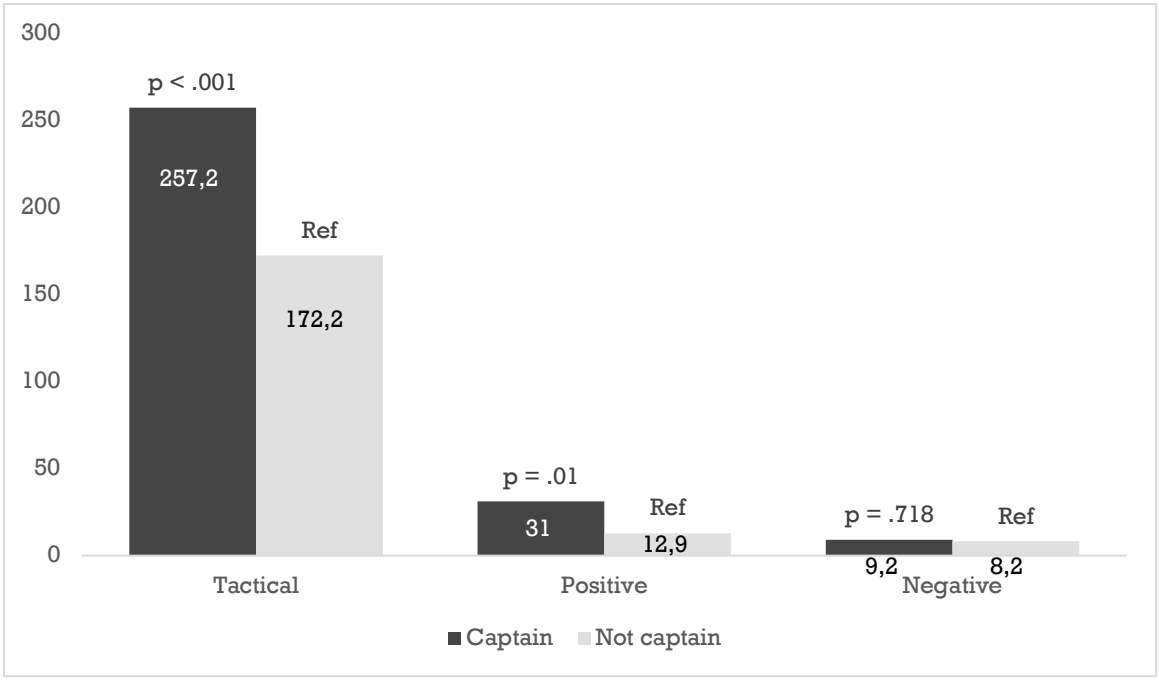

Figure 9. *Mean tactical, positive, and negative NVB for captains and not captains. Captains` results were added and divided by 12, and not captains` were added and divided by 120. The total amount is then 132 90-minutes.*

4.7 The relationship between the teams` positive and negative NVB in the last 10 minutes of the match and the game result

To examine the relationship between teams` positive and negative NVB frequency in the last 10 minutes of the match and the game result a MANOVA were conducted. Last 10 min includes extra time that varies from three to ten minutes; therefore, the players frequency was examined. The results of the multivariate test (Pillal´s Trace, Wilks` Lambda, Hotelling´s Trace and Roy´s Largest Root) all reached the criterion for significance $p < .001$. Test of Between-Subjects Effect (univariate test) revealed that based on the p-values there was a significant difference between groups in terms of positive NVB last 10 min ($p < .001$) and negative NVB in the last 10 minutes ($p = .002$). This tells us that teams that win, lose, or draw act different in form of emotional NVB in the last 10 minutes of matches.

Kruskal-Wallis H tests with significance $p < 0.05$ showed that positive frequency last 10 minutes was significantly affected by game result H (2) = 29.22, $p < .001$. Pairwise comparisons with adjusted *p*-values showed that there was no significant difference between positive frequency last 10 minutes for teams that played draw compared to teams that lost ($p = .144$, $r = -0.22$). There were significant differences in positive frequency last 10 min when teams won compared to teams that lost ($p = .000$, $r = 0.36$), and compared to teams that played draw ($p = .000$, $r = 0.54$). Further, negative frequency last 10 minutes was significantly affected by game result H (2) = 10.62, $p = .005$. Pairwise comparisons with adjusted *p*-values showed that there were no significant differences between negative frequency last 10 minutes for teams that played draw compared to teams that won ($p = 1.0$, r = .076). There were significant differences in negative frequency last 10 min when teams lost compared to teams that won ($p = .02$, $r = -0.25$) and compared to teams that played draw ($p = .02$, $r = -0.08$).

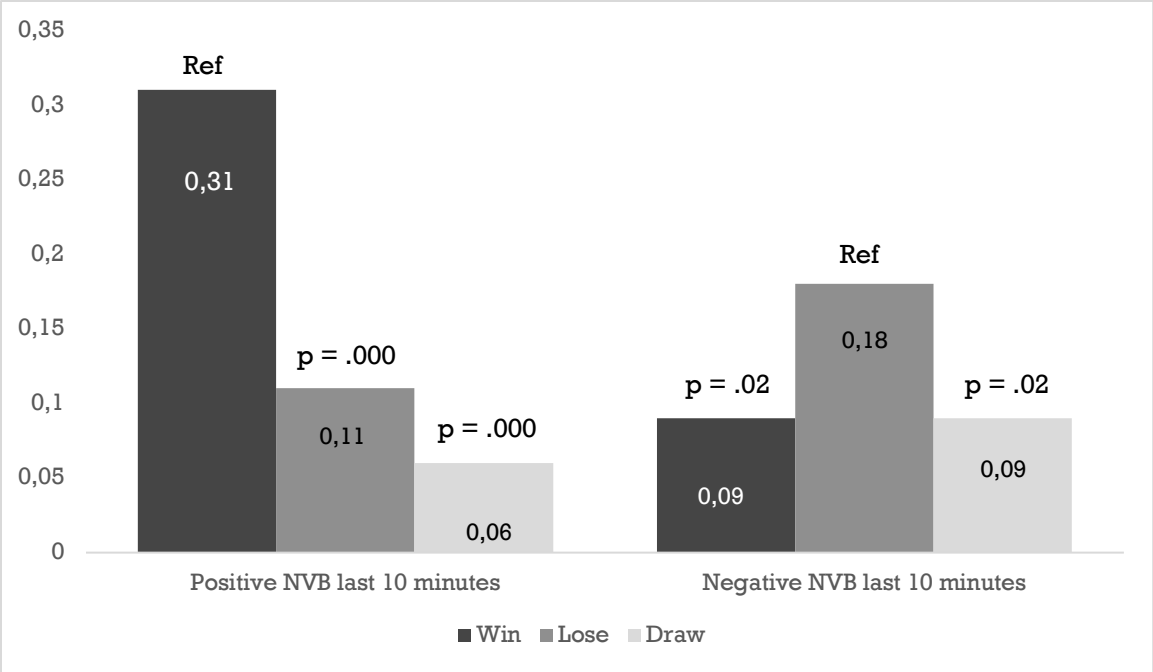

Figure 10. *The frequency of positive and negative NVB the last 10 minutes of the game for each game result. The reference category for significance for Positive NVB last 10 minutes is Win, and the reference category for significance for Negative NVB last 10 minutes is Lose.*

5 Discussion

The purpose of this study was to learn about how elite women football players engage in NVB in a match, including how performance and game location are related with teams` overall emotional and tactical NVB. This thesis is an attempt to contribute to research on NVB, by providing a new method in researching players nonverbal behaviors. Within this section, I will discuss theoretical and practical implications connected to tactical and emotional NVB. I will also discuss the differences identified dependent on playing position, game status, game result, game location, and whether players were captains or not. Firstly, I will discuss the players` distribution of NVB, before discussing the players` and teams` emotional NVB and implications for the emotional theories (BET and BECV). Furthermore, I will discuss the players` and teams` tactical NVB results, and the captains` and the rest of the players` NVB. Finally, I will discuss contextual factors briefly. I will also propose implications for practice, future research, and acknowledge the limitations of this research.

5.1 Player's distribution of NVB

The players in this study encoded an average of 160.75 nonverbal behaviors in one match and had a frequency of 2.15 registrations per minute (*SD* = 1.141). Their frequency ranged from 0.22 registrations per minute to 7.10 registrations per minute, which appears to be a big

variation. It appears that elite level women footballers communicate significantly more tactically than emotionally. Of the total 27,819 nonverbal behaviors encoded by the 173 players, 23,750 (85.4%) were coded as tactical and 4,068 (14.6%) were coded as emotional. Of the tactical behaviors 17,516 were coded as directing teammates, 3,395 were coded as asking for ball and 2,505 were coded as influence referee. Based on previous research it may seem like communication is important for team interaction and team performance (LeCouteur & Feo, 2011; Moesch et al., 2015; Ronglan, 2007). LeCouteur and Feo (2011) demonstrated that there is not the frequency of communication that ensure effective collaboration between teammates in match, but the nature and quality of the communication encoded. This reflects the result in this study, considering player`s range on nonverbal behaviors as much in teams as between teams.

The fact that there is a large variation in number of nonverbal behaviors in this data may have several explanations. First, the WSL consists of 12 teams with players who have very different experiences and skills, and they represent 20 different nations with different cultures. Whilst BET present emotions as biological and universal (Matsumoto & Hwang, 2012b), different cultures have different ways of expressing themselves. Further, the league clearly has top teams fighting for the title, which also played in the Champions League, and several teams in the bottom competing to keep their place in their league. This is relevant as previous performance, confidence and performance expectations have shown to effect NVB (Bijlstra et al., 2020; Durdubas et al., 2021; Furley et al., 2012; Furley & Memmert, 2021). Another explanation for the substantial differences in nonverbal behaviors could be that this analysis includes players in all positions on the pitch. The positions ranged in total frequency of NVB and in what types of NVB they encoded (tactical, positive, and negative). While centrebacks encoded an average of 2.46 tactical nonverbal behaviors per minute, wide attackers only encoded 1.47 tactical behaviors per minute ($p = .002$). Central midfielders had the second most average frequency of tactical nonverbal behaviors (2.09 per minute). Both these positions are central on the pitch, meaning they have players on both sides, behind them and in front of them. It is reasonable to think that positions central on the pitch require more communication to attain good performance, than positions on the side. Different playing positions can have very different contextual requirements for NVB. Further, results reveal that negative nonverbal frequency were significantly affected by player position ($p < .001$). Goalkeepers were significantly less negative than central midfielders ($p = .012$), wide attackers ($p = .012$), side backs ($p = .013$), and strikers ($p = .000$). Centrebacks are the second

least negative players, but the results were not significant. There is a possibility that players` personal factors and character affect their playing position as much as playing position affect their communication on the field. Lastly, players` previous performance and experiences may affect players` NVB. Whether players and teams are confident or not are likely to influence their emotions and tactical gestures (Durdubas et al., 2021; Furley, 2021; Shariff & Tracy, 2011). Results from a previous study revealed that previous performance significantly predicted the degree of celebrating gestures in the coming period for handball teams (Moesch et al., 2018). For the teams in this study this means that both the results and performance from the last season and the last match could influence their frequencies and types of nonverbal behaviors. It is also likely that the teams` confidence going into a match is influenced by their previous result against the opponent team, as this could be a predictor for possible result. Further, previous studies show that there exists an effect of individual celebration on team success (Moll et al., 2010). This means that not only team performance and game result could correlate with coming matches and period, but also individual previous performance. Football is a team sport where individuals also have their individual goals, they want to perform at their best and develop as players. Based on previous research it is likely to expect that players` NVB is affected by both team performance and individual performance for the reason that it affects confidence and stress appraisals (Brimmell et al., 2018; Moesch et al., 2018).

5.2 Emotions and nonverbal behavior

Results in the current study revealed that players on the winning teams had a significant higher frequency of positive emotional NVB (0.27 per minute) compared to the losing teams (0.17 per minute, $p = .048$) and the tied teams (0.10 per minute per player, $p = .000$). Furthermore, losing teams encoded significantly more negative NVB per minute (0.15 per player) than winning teams (0.09 per player, $p = .004$). and tied teams (0.05 per player, $p = .000$). One possible reason for these results is that losing and being at level are emotionally demanding, it is also unpleasant (Durdubas et al., 2021). That winning teams have more positive gestures than losing teams is in line with previous research. In this study performance outcome refers to game status and game result. These results seem consistent with previous research, which found that successful volleyball teams differed significantly from unsuccessful teams in their use of supportive behaviors (eye contact, head nods, touching, smiling, and certain body positions after a teammate have done a mistake) (Durdubas et al., 2021). Moll et al. (2010) studied the effect of individual celebration after scoring in penalty shootouts. Results revealed that the majority of players showed celebratory behaviors (66%),

and individuals that celebrated with both arms (up or down, or into fists) were more likely to be on the winning team (Moll et al., 2010). When it comes to touch, there were almost no difference in the average shown by winning teams (51.2) and losing teams (47.6) in WSL. These results seem consistent with a study on elite handball players celebrations that revealed that handball players showed more celebrating arm gestures than touch (Moesch et al., 2015). Players in the WSL encoded 2,467 positive gestures but only 531 touches between teammates were engaged. However, the result that winning teams and losing teams encoded almost the same amount of touches is inconsistent with two previous studies on touch in handball and basketball (Kraus et al., 2010; Moesch et al., 2018). The study on handball players saw a tendency that teams with a high number of post-scoring touch shown by the shooter were related to positive team performance (Moesch et al., 2018). Furthermore, the study on physical touch and cooperation in the NBA found that touch was central for predicting performance in competitive group settings because it fostered cooperation between teammates (Kraus et al., 2010). Handball and basketball are known for specific language of touch and are therefore not so comparable to football. In handball high fives and low fives are frequent (Moesch et al., 2015), while fist bumps and leaping shoulder bumps are some of the most frequent touches between teammates in basketball (Kraus et al., 2010). While the touches, both frequency and nature of them, might be different in football there is no doubt that physical contact between teammates enhances energy and possibly group cohesion (Ronglan, 2007).

Some of the results in this study have implications for the emotional theories BET and BECV, and the EASI model. With grounding in BET it is possible that players develop emotional expression to regulate their interpersonal relationships with other teammates (Ekman, 1992; Shariff & Tracy, 2011). BET were formed with the assumption that NVB autonomously send information about emotion (Ekman & Cordaro, 2011), according to Darwin emotional NVB either prepare people to adapt or communicate critical information (Shariff & Tracy, 2011). Regarding interpersonal relationships it seems like people have evolved two intrinsic psychological abilities, encode expressions and automatically read and respond to expressions encoded by others (Shariff & Tracy, 2011). Furthermore, the ability to read own and others` emotions and use them to guide own thinking and action is called emotional intelligence, and emotional intelligence is required for teamwork (Salovey & Mayer, 1990). Based on theory on emotional intelligence and group cohesion it is reasonable to think that positive reinforcement between teammates enhances performance (Black et al., 2019; Van Kleef,

2009). According to the EASI model one player`s emotions are likely to influence other players` emotions through inferential processes and/or affective reactions, and this influence teamwork (Salovey & Mayer, 1990). McCarty (2011) emphasized that positive emotions influence attachment between people. Positive emotional nonverbal behaviors in this study are most of the time celebrating gestures made by the players to activate energy in themselves or teammates, or to recognize and acknowledge other players emotions. A frequent situation where emotional NVB was encoded by the WSL players were as a reaction after a shot or a chance. There was a distinction between either applause, signs for good attempt/play, or hands above the head or to the side, signs of disappointment that they did not score. Van Kleef (2009) claims that when someone is the target of a happy expression people usually assume they did something right, consequently, this assumption may in turn make people stay on the course. Based on this claim it is likely that players that got an applause reaction from teammates for their shot/chance were more likely to shoot again later in the match. This is also supported by the fact that the winning teams had significantly more positive NVB than the losing teams (p = .048). It is also likely that players on teams who shared more positive NVB experienced more fun (Ronglan, 2007). This is in line with the EASI model, more specific the thought that expressions of happiness can increase liking (Van Kleef, 2009). Players reacting with positive nonverbal behaviors after a miss (or other "bad" involvements) is more in line with BECV than BET (Crivelli & Fridlund, 2018, 2019). In BECV our nonverbal behaviors are seen as "social tools" instead of "expressions", and they are used as lead signs with a specific aim to the decoder (Kraut & Johnston, 1979). More specific, positive NVB reactions to "negative" performances can be explained as a tool used by a player to get a reaction from a teammate. Most likely to stay on the course, to not give up and to keep trying (Van Kleef, 2009). Furthermore, WSL players also showed emotions towards the referee and opponents. There are some situations players try to influence the referee both tactically and emotionally, most likely to create a relationship and influence following situations by showing how "hurt" they are and/or influence the referees` guilt. Using NVB to affect the opponent team have shown to be something teams are aware of and do (Ronglan, 2007).

Results from current study reveal a tendency that WSL teams that are leading express more positive emotions compared to negative, than teams behind or at level. This is in line with Furley and Schweiser´s (2014a) study that found that NVB during different stages of the match can be understood as cues to who is currently leading and who is trailing. Furthermore,

previous studies show that both athletes and non-athletes can pick up on athletes NVB (score-related) and use this information to determine their confidence in winning (Furley & Schweizer, 2014b). Results in the current study revealed that both positive and negative frequency in the last 10 minutes of a game were significantly related to the final game result. WSL teams that won encoded significantly more positive emotions (p = .000) and significantly fewer negative emotions than teams that lost (p = .02). A discussion that should be made in this concern is whether emotions encoded last 10 minutes is a conscious predicator for game result or a consequence of game status. Meaning, where the teams that won ahead in the last 10 minutes and encoded more positive emotions and less negative emotions for that reason? Or did the winning teams encode more positive emotions and less negative emotions which caused that they won? The tests conducted (MANOVA and Mann-Whitney) do not determine causality, only that there is a relationship between emotions encoded the last 10 minutes and game result. Based on previous results (Furley & Schweizer, 2014a, 2014b) and results in this study it is likely that there is an effect both ways. Teams that were ahead had a tendency of higher frequency of positive emotions compared to negative emotions which most likely affected that they won the match. Another discussion is whether winning teams NVB were affected by losing teams NVB. Previous studies show that a person's NVB provides accurate information to an observer about how the person is likely to behave or perform (Furley & Memmert, 2021). This is transferable to the results in this study as there is a possibility that teams ahead see negativity in opponents, perceive it as them being frustrated and, further, experience more self-confidence and encode more positive NVB. This can be seen as a positive circle that results in more positive gestures between teammates in teams ahead, which often result in them winning.

5.3 Tactical nonverbal behavior

The results reveal no significant difference in tactical NVB between the winning teams and the losing teams (p = 1.000). The current results contradict previous result on tactical NVB between teammates and team performance (Durdubas et al., 2021; Lausic et al., 2009; LeCouteur & Feo, 2011). A study published in 2009 with tennis teams found that winning teams communicated twice as much as losing teams (Lausic et al., 2009). Winning teams communicate more tactically than losing teams, mostly they discussed actions and prepared for potential events. Durdubas et al. (2021) found, in line with Lausic et al., that successful teams differed from unsuccessful teams significantly in their use of instructional behaviors (hand, arm, and head gestures to instruct teammates). LeCouteur and Feo (2011) found in

their study on verbal and nonverbal communication in netball that communication was more frequent in less successful defensive performance than in successful performance (LeCouteur & Feo, 2011). One explanation for the results proposed by the researchers was that increased talk are likely to occur during critical moments as a defensive crisis. It should be noted that this study defined success in situations, and not game result as in the current study, which makes the results not so comparable. There is a possibility that the "best" teams communicate less during critical moments because they are better trained in how to handle the crisis, on the other side, there also is a possibility that they communicate more which give better results (less chances and goals against). Further, Eccles and Tenenbaum (2004) have proposed that unorganized tasks, like a performance setting, is likely to benefit from more communication because it enhances coordination between teammates. Even if the overall tactical NVB did not differ in winning teams compared to losing teams in the current study, it is a possibility that some of the subcategories differed. In line with Lausic et al. (2009) and Durdubas et al. (2021) we included an instructional subcategory (directing teammates), which included both defensively and offensively tactical gestures. Lastly, another possible reason for the contradicting results is that tennis, volleyball, and netball are three sports with distinct differences from football.

5.4 Captains` NVB compared to the rest of the players

One major finding when it comes to captains and not captains was that captains encoded positive emotional gestures significantly more than the rest of the players ($p = .01$). It was also a small tendency that captains had an average of more negative NVB than the rest of the players. According to Shariff and Tracy (2011) one of the functions of emotional expressions is to communicate critical social information. Further, McCarty (2011) emphasized that positive emotions broaden the attention, which increase openness and flexibility, but first and foremost influences attachment between people. It is likely that captains have an important role in enhancing the attachment between teammates, more precisely the teams group cohesion (Black et al., 2019). Results from a study published in 2014 indicated that the participants perceived the motivational leader the second most important leader (behind task leader) (Fransen et al., 2014). The motivational leader was the most important motivator on the field, and this person also guided all the emotions in the right direction so the team could perform in the best way (Fransen et al., 2014). Further, the results do not indicate that the captain usually play this role, but it seems like it is important that someone guide teammates

emotions because it affects team cohesion, athlete well-being, and team confidence (Cotterill & Fransen, 2016; Fransen et al., 2014).

When it comes to tactical NVB, the captains encoded tactical gestures significantly more than not captains ($p < .001$). The 12 captains had a mean of 257.2 tactical gestures in each match, 90+ minutes, while the rest of the players had a mean of 172.2 tactical gestures. It should be noted that other players include goalkeepers who reduced the not captains' average number of gestures. As far as I know there exists no study comparing nonverbal behaviors for captains to not captains, but there exist studies on roles in teams (Fransen et al., 2014; Fransen et al., 2012). Results from an athlete leadership study indicated that task leaders were perceived as the most important leaders as they are responsible of the tactical decision-making on the field (Fransen et al., 2014). Furthermore, the results revealed that the captains rarely were perceived as the most important leader in several roles, meaning they either were a task leader, motivational leader, social leader, or external leader. Results from the current study indicate that the captains in WSL are some of the task leaders in their teams as they have a high frequency of tactical NVB compared to the rest of the players. Overall, each captain did not score highest on tactical NVB for their team, but they were all high on tactical NVB.

5.5 Contextual factors

Results on game location revealed that tactical frequency for home teams did not differ significantly from away teams ($p = .602$), neither did positive frequency ($p = .540$), nor negative frequency ($p = .823$). These results are not in line with previous research from Furley et al. (2018) who found that athletes changed their NVB depending on the game location. Three experiments were conducted and both participant with and without football experience could detect whether professional or unprofessional football players played home or away. Most often players gave away game location by encoding dominant or submissive NVB (Furley et al., 2018). An important difference, and possible explanation for the contradicting results is that in Furley et al. (2018) participants only watches video footage of players before the match. Pre-performance NVB have been examined as a predictor for performance by several researchers (Furley & Memmert, 2021; Furley et al., 2018). However, players are likely to change their NVB once the match has started and during a match. Another possible explanation for the current results of no significant differences is that players where only coded in one match, meaning they were either coded in a home game or away game. There are several external factors that have not been considered in the game location results, for

example if the “best” teams played home or away, previous performance, confidence, game status, and game result. Even if there were no significant differences in tactical, positive, or negative frequency for home and away teams, this does not mean that players do not change their behavior dependent on game location. The overall NVB results might be similar, no significance, but the individual players NVB can differ significantly (e.g. more positive at home games, or more tactical at away games). Furthermore, WSL did not have a high amount of audience in the 2021/22 season, which is known for one of the biggest home advantages and have shown to be a factor for NVB (Leitner & Richlan, 2021). This tells us that there is a possibility that other factors than game location play a more crucial role for players NVB. Based on previous studies it is likely that personal factors, as challenge and threat state and power motive, could affect players` NVB (Brimmell et al., 2018; Furley et al., 2019). These factors have not been taken into consideration in the results in the current study.

5.6 Strengths and limitations

Whilst this study enhances the understanding of elite women football players` NVB in a match, there exist some limitations that need to be discussed.

5.6.1 Design

This study is a non-participatory observation and descriptive coding were used (Bente et al., 2008). The main purpose in this study was to investigate FA Women´s Super League players` tactical and emotional nonverbal behaviors, and according to Furley (2021), descriptive coding is favorable when exploring NVB. Descriptive coding also seems to be very effective in reliably catching precise nonverbal behaviors (Furley, 2021). Coding already existing video footage result in no dropouts. Furthermore, this is a naturalistic field study where the players are coded in real-world settings. The method give possibility to code the specific, not manipulated, nonverbal behaviors typically shown as the players are unaware that their nonverbal behaviors were being evaluated (Durdubas et al., 2021). There also exists some limitations with this method. First, descriptive coding is the most time consuming methodological approach to investigating NVB in sports (Furley, 2021). Another limitation highlighted by previous studies is that the coders evaluation of another person and the interpretation of their NVB often is biased by stereotypes and/or prejudice (Bente et al., 2008). This influence in coders is often unconscious and triggered by even the most subtle incentives. It is important to state that football matches constitute complex social processes

and interactions between various participants, therefore, it is impossible to consider every complex and contextual variable.

5.6.2 Selection of players and matches

Even though the present study is one of the first to explore NVB at the highest level of women footballers by including a big sample from the English top league, there are some limitations with the sample selection. This is one of the best leagues in Europa where a couple of teams have Champions League appearances. Even though it includes players from different national origins, it could be that players communicate NVB differently in other countries. Furthermore, in this project we chose to analyze all the teams and players in one match. This gives a greater understanding of differences in teams, and a greater number of selection (12 teams, 173 different players). On the other side, a limitation with coding teams in one match is that it only gives a snapshot of the players` behaviors. As presented, we analyzed NVB based on the context in this project, but by analyzing players` NVB in a snapshot we miss the bigger context as previous performance and opponent. Players` NVB in one match is possibly not generalizable to NVB in every match. The inclusion criteria for matches also come with possible limitations in generalizing the results. One limitation in the included matches were that there was not an equal amount of the different game results (win, loss, and draw) or game locations (home and away). This makes several group sizes unequal and possibly affects the results one way or the other. Another limitation with the selection is that it does not include the teams` coaches and staff, as they are possible factors for players NVB. Coaching practice and behavior are widely discussed in psychology and coaching literature (Baker et al., 2000; Côté & Gilbert, 2009), and it is likely that the coaches` methods and behavior effect the players` emotions, motivation, and effort, and further NVB.

Included in the selection is the video footage received, which also have some limitations. Firstly, a strength with the video footage were that it derived from actual sports competitions, league matches. One of the biggest limitations with the video footage is that the tactical view excluded the goalkeeper when the team had the ball higher in the pitch. This means that goalkeepers on teams that had great ball possession, especially high in the pitch, possible has less coded nonverbal behaviors. Furthermore, in some of the video footage the tactical view also did not include the defenders when their teams had the ball high in the pitch, and especially in offensively corner kicks. Lastly, both tactical and broadcast view filmed players from only one side (one angle, usually placed in the middle of one of the longer sides). This

gives limited view of the players` NVB when they have their backs turned to the camera, also, there were difficulties with distinguishing "natural" movements (e.g. running) from NVB from the players on the farthest side of the pitch. There were possible also difficulties with picking up small behaviors from the players on the farthest side of the pitch.

5.6.3 Operationalization and inclusion/exclusion criteria's

We chose to operationalize NVB as only by arm-movements, first and foremost because arm-movements are objective and easy to detect. We did not analyze "natural" movements, meaning when the players move their arms as they run, jump, or stop their movements. Another limitation in the operationalization is that there is a challenge to assign a selected meaning to the behaviors (Furley, 2021). Arm-movements where not operationalized with limited focus on specific behaviors but based on the contextual factors leading to the behavior. This view on behaviors can increase external validity. To operationalize the variables coded in this study, considerable discussions between experienced football players, coaches and researchers were carried out, including collective video analysis of some players` behavior to make sure most behaviors and possible meanings were included. Considerable work with operationalizations were conducted to increase the concept validity (Thomas et al., 2015). One limitation of the current study relates to the definition of performance outcome, as "performance success" is only defined as team success, more specific game status and game result. A possibility had been to define performance outcome based on the following 10 seconds of the play after an NVB, e.g. as the result of different game situations (LeCouteur & Feo, 2011). Descriptive coding, and specifically coding based on contextual factors, rely on the subjective evaluation of coders and there is limited availability of standardized procedures for unbiased, detailed, and complete documentation of human NVB (Bente et al., 2008). Such manual coding of behavior can also be associated with measurement errors. To strengthen the understanding of the players` behavior and better understand the context we coded one player in one match at the time. Furthermore, all the coders have several years of experience with football, both as players and coaches, and therefore they most likely have a good understanding of the context. Furley (2021) has outlined that there exists a universal understanding of NVB, but, however, the inter-reliability in the current study is a limitation. Results of Cohens kappa reveal good agreement for coding the same NVB between the coders in this study ($k = 0.7$), which we considered acceptable for real world observation, but a value of agreement over 0.8 (very good) would have strengthen the results (Altman, 1991). Lastly, the results of the video analyses were 27,819 coded situations, including several subcategories

for tactical NVB and triggers for the emotions. Consequently, I could not include all the data and chose to present descriptive results and tests on the "main" categories (tactical, positive, and negative NVB).

There exists limited research on NVB in football, and as far as I know no study is conducted the same way as this. Therefore, I do not have any similar studies to compare the results of this study to. This is a limitation as the validity and reliability of the code window is unknown (Scholtes et al., 2011). Furthermore, the theoretical framework are two rival theories (Crivelli & Fridlund, 2019; Ekman & Cordaro, 2011) and one emotion model (Van Kleef, 2009). There is a possible limitation that players` "facial expressions" were not analyzed, due to the BET being based on facial expressions (Ekman & Cordaro, 2011). Facial expressions are one of the major nonverbal behaviors and what people often rely on to create meaning with messages being sent to them (Eaves & Leathers, 2018). However, the video footage made it almost impossible to code players` facial expressions. Even if I have done my best to rule out and discuss possible additional elements and explained every methodological approach implemented, I cannot rule out that there are variables possibly not controlled for. There are some factors and variables that possibly cannot be controlled for at all.

5.7 Implication for coaching practice

The findings of this study contribute both to theoretical knowledge and to coaching practice. The main purpose was to provide information about how much and what type of nonverbal behaviors elite women football players encode during a match. The results in this study are mostly descriptive statistics, consequently, implications of the results must be deliberated thoroughly. First and foremost, the results are important for player development. Some of the best teams and players in the world have been coded and their characteristics are presented. Therefore, this study may give important implication for coaching young and upcoming talents on important aspects of NVB, in different playing positions. This study also provides information of the captains` role in NVB, which might be interesting for the young athletes wanting to be a captain or in a "leader role". Furthermore, it is important for managers and coaches to be aware of what type of NVB their players encode at specific times of the match or at different game statuses and game results. That winning teams and teams ahead are more positive than losing teams and teams behind, which could indicate that positivity can influence game result, should therefore be given attention by coaches. First and foremost this awareness could guide coaches` instruction during matches. It should be noted that the results

do not indicate causality, which means that teams` good performance could be a predictor for and/or consequence of NVB. Managers and coaches should also look at players NVB when recruiting as it could give indication on who to recruit or not to recruit. The results presented do not indicate a "perfect player", but it is likely that a lot of negative players on the pitch is not optimal and that players that tactically direct teammates is more beneficial. Consequently, managers and coaches should look at what type of players they have in their team and further look at players` communitive skills and leadership qualities before they recruit them. The current results and previous studies indicate that different roles in teams are needed to enhance performance. Further research is needed to give more implications for coaching practice.

5.8 Future research

Future research should continue investigating tactical and emotional nonverbal behaviors of women football players in match. Further descriptive analyses with high validity and reliability are needed. In this study all teams in one league (Women´s Super League in England) were coded in one match, but information of NVB from several games from several teams could allow for more precise knowledge on the relationship between NVB, game status, and game result. Furthermore, analyses of some of the best women players in different positions over a longer period should be conducted and presented as positional roles players are assigned to fulfill. The primary purpose in investigating teams and players over a longer period, will be mapping what characterize the best teams and players NVB when they win, lose and draw. It is likely that there is no conclusional requirements for positions and players but there are specific roles needed in a team for good performance, therefore, further research on formal and informal athlete roles should be conducted. In line with this, future research should also investigate coaches` NVB during a match and explore the relationship between players` NVB and their coachs` NVB. Future research should also consider the way they operationalize performance outcome. A potential way of looking at NVB and performance could be analyzing the following five to ten seconds, or more, of the game after a specific NVB.

It is also recommended to compare WSL with a lower ranked league to provide information about what separates some of the best teams and players from the rest. Further research should also analyze teams from other countries with other cultures, so that the possible cultural differences in NVB could be addressed. In this study, players` NVB were coded

based on an assumption about what the decoder perceived. Therefore, the players intension with the NVB encoded needs be investigated, as well as what the decoder perceived and experienced. This can be done either through questionnaires or interviews shortly after a game where video of the NVB is shown. NVB in this study was limited to arm-movements because the video footage received did not facilitate seeing players` facial expression. Further research on players` NVB including all behaviors, facial expressions, attitude, and arm gestures, is recommended because it would give a broader, and more complete, understanding of players` NVB. Including all nonverbal behaviors would also increase the validity.

5.9 Summary

Research on the relationship between NVB and sports performance is a growing field as communication is recognized as important in team sport (Furley, 2021; LeCouteur & Feo, 2011). Previous studies have provided influential knowledge on dominant and submissive NVB (Bijlstra et al., 2020; Furley et al., 2012), celebration and touch in teams (Kraus et al., 2010; Moesch et al., 2015, 2018; Moll et al., 2010; Ronglan, 2007), behavioral performance and score-related differences (Durdubas et al., 2021; Furley & Schweizer, 2014a, 2014b), and contextual and personal NVB variables (Brimmell et al., 2018; Furley et al., 2018; Furley et al., 2019; Leitner & Richlan, 2021). Combined, these studies have provided important contributions to the field of NVB in sports. However, to this day no research has investigated how elite women football players engage in NVB in a match, and what characterize their NVB.

The overall purpose of this study was to provide information about FA Women´s Super League players` tactical and emotional nonverbal behaviors in a match. NVB were coded descriptive using Hudl Sportscode. The results provided revealed that WSL players had a mean frequency of 2.15 nonverbal behaviors per minute (*SD* = 1.141) and an average of 214.88 in a full match. Most of the nonverbal behaviors were coded as tactical 85.4%, with directing teammates as the most common NVB (63% of all the behaviors). Emotional NVB were most of the time positive (60.6%). Mean frequency of tactical, positive, and negative NVB differed in the playing positions, indicating that position and “main task” on the field affect distribution of NVB, or the opposite. Teams ahead encoded more positive NVB compared to negative NVB, compared to teams behind and at level. Furthermore, winning teams were more positive than losing teams and tied teams, and losing teams were more negative than winning teams and tied teams. Indicating that game result and game status

influence the players emotional behaviors and that celebration and group cohesion possibly influence team performance. There were also found a significant difference in tactical behavior between tied teams compared to winning teams and losing teams. Captains had a higher frequency of positive and tactical NVB, but not negative, compared to the rest of the players. These results provide to the field of roles and leaders in sport, more specific athlete roles in teams, as they indicate that captains in WSL teams appears as motivational leaders and/or task leaders in their teams. A relationship was also found between emotional behavior the last ten minutes of the game and game result. Winning teams appeared to encode significantly more positive NVB the last ten minutes of the game compared to losing teams and tied teams, while losing teams appeared to encode significantly more negative NVB the last ten minutes of the game compared to winning teams and tied teams. These results seem to be strong, but the tests did not determine causality. Meaning it could be that teams ahead the last ten minutes encoded more positive emotions for that reason and necessarily did not encode positive emotions which resulted in them winning the match. This causality applies to most of the results, so one need to be careful when interpreting them. Lastly, there were not found a relationship between NVB and game location. The current study where the first to descriptive code elite women football players` NVB in a match, wanting to inspire further research to be conducted with similar research methodology.

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Appendix

Appendix A Approval from the Norwegian Centre for Research Data

Appendix A

Approval from the Norwegian Centre for Research Data

NSD NORSK SENTER FOR FORSKNINGSDATA

Meldeskjema

Referansenummer

459744

Hvilke personopplysninger skal du behandle?

- Navn (også ved signatur/samtykke)
- Bilder eller videoopptak av personer
- Lydopptak av personer

Prosjektinformasjon

Prosjekttittel

Kroppsspråk hos fotballspillere i Premier League og FA Women's Super League

Prosjektbeskrivelse

Vi skal analysere fotballspillere i de engelske ligaene Premier League og Women's Super League for å undersøke hvordan deres kroppspråk i en kamp henger sammen med spillerens og lagets prestasjoner i den samme kampen.

Begrunn behovet for å behandle personopplysningene

Vi trenger videoopptak av fotballspillerne for å kunne analysere spillernes kroppspråk, og det vil være mulig å identifisere spillerne gjennom opptakene. I noen av analysene i etterkant av datainnsamling kan det være aktuelt å vurdere våre analyser opp mot variabler slik som spilleres karrierehistorikk, kontraktslengde og prestasjonsnivå i andre kamper. Slik informasjon vil hentes inn fra offentlig tilgjengelige/publiserte databaser og analyser om disse spillerne (det finnes hundrevis av slike kilder). I rapportering av resultater i studentoppgaver og eventuelle artikler vil spillerne være anonyme.

Ekstern finansiering

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Thomas Elinam Jenssen, elinam1997@live.no, tlf: +4741003993

Behandlingsansvar

Behandlingsansvarlig institusjon

Norges idrettshøgskole / Institutt for idrett og samfunnsvitenskap

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Geir Jordet, geirj@nih.no, tlf: +4790780250

Skal behandlingsansvaret deles med andre institusjoner (felles behandlingsansvarlige)?

Nei

Utvalg 1

Beskriv utvalget

Profesjonelle fotballspillere

Rekruttering eller trekking av utvalget

Profesjonelle fotballspillere som er i troppen og spiller i et engelsk fotballag i Premier League og FA Women's Super League.

Alder

16 - 37

Personopplysninger for utvalg 1

- Navn (også ved signatur/samtykke)
- Bilder eller videoopptak av personer
- Lydopptak av personer

Hvordan samler du inn data fra utvalg 1?

Ikke-deltakende observasjon

Grunnlag for å behandle alminnelige kategorier av personopplysninger

Allmenn interesse eller offentlig myndighet (art. 6 nr. 1 bokstav e)

Redegjør for valget av behandlingsgrunnlag

Prosjektet sikter på å frambringe kunnskap om hvordan fotballspillere på det høyeste nivået i verden (Premier league for menn og Women's super league for kvinner), i verdens største idrett (fotball), kommuniserer nonverbalt i fotballkamper. Fotballkamper på dette nivået har stor offentlig interesse og er allerede gjenstand for grundige analyser av hundrevis av analysefirma/private analytikere som publiserer og offentliggjør sine analyser til fans over hele verden. I tillegg gjør alle impliserte klubber sine egne analyser av både egne og motstanderlagenes spillere, som de så benytter for å skaffe konkurransefordeler for sine lag. Når det gjelder kroppsspråk/nonverbal kommunikasjon i kamp foreligger det per i dag imidlertid helhetlige, omfattende og teoretisk funderte analyser, som gjør at disse delene av en spillers prestasjon enten ignoreres eller feilvurderes som et resultat av grov synsing/forutinntatthet. Enkelt sagt betyr dette at man ikke vet noe

om hvordan spillere kommuniserer med hverandre på banen i kamp. Dette gjør at det tas beslutninger om spillere på mangelfullt eller feil grunnlag, som kan ha en rekke negative konsekvenser for enkeltspillere, slik som at spillere rekrutteres på feil grunnlag (man tror en spiller vil passe inn i et lag, men det viser seg at de ikke passer inn ELLER at man ikke tror en spiller vil passe inn, som faktisk ville passet svært godt inn) eller at man ikke er i stand til å coache/utvikle spillere på måten man effektivt kan kommunisere med sine medspillere fordi man ikke har relevante analyser/kunnskap om dette. Samlet gir dette at det vil kunne ha stor allmenn nytte å frambringe kunnskap om dette feltet.

Data til dette prosjektet kommer fra allerede eksisterende videoopptak av offentlige avholdte fotballkamper som av klubbene selv og ikke minst av media allerede granskes i detalj og så vurderes/kommuniseres offentlig. Innhenting av samtykke for å studere og analysere disse allerede eksisterende videoopptakene virker derfor unødvendig. Samtykke er også helt urealistisk (umulig) å forvente gitt at spillere og lag på dette nivået i profesjonell fotball (de to største ligaene på henholdsvis herre- og kvinnesiden) får hundrevis av henvendelser hver eneste uke, og de vil ganske enkelt ikke svare. Dette er også i tråd med publisert policy i ledende idrettsvitenskapelige tidsskrift (i.e., Journal of Sports Sciences) at profesjonelle idrettsutøvere må påregne å gjennomgå en del både tester og analyser som en del av sitt yrke, og at dette unnlates fra normale krav til innhenting av samtykke (Winter & Maughan, i en editorial med tittel: "Requirements for ethics approval", publisert i Journal of Sports Sciences i 2009). Gitt at data om enkeltspillere heller ikke skal offentliggjøres medfører dette prosjektet ingen direkte personulempe for den enkelte spiller, og innhenting av samtykke virker overflødig og dermed lite hensiktsmessig. Hvis vi følger dette betyr det imidlertid at vi må påregne ekstra strenge krav til å ivareta spilleres rettigheter i dette, som blant annet tilsier høye krav til datasikkerhet, sikker kommunikasjon og full konfidensialitet i rapportering av resultater.

Den store majoriteten av spillerne i populasjonen vi skal undersøke er over 18 år (høyst sannsynlig minst 95%, kanskje også 100%). Spillere er imidlertid spilleberettiget i disse to ligaene vi skal analysere ved fylte 16 år, som betyr at det kan forekomme spillere ned til 16 eller 17 år i vårt datamateriale. Det vil være viktig å inkludere disse fordi de er fullverdige medlemmer av de ulike lagene og ved å ta disse vekk vil det gå ut over verdien på analysen av de lagene dette gjelder. Med det sagt vil kravene til datasikkerhet og full konfidensialitet selvsagt også gjelde for disse spillerne, og prosjektet vil ikke medføre noen personulempe for den enkelte spiller.

Informasjon for utvalg 1

Informerer du utvalget om behandlingen av opplysningene?

Nei

Begrunn hvorfor du ikke informerer utvalget om behandlingen.

Av samme årsak som skrevet i punktet over (mtp spørsmålet om samtykke) er vi litt usikre på om det er hensiktsmessig å forsøke å informere spillere og lag om et slikt prosjekt, da data til prosjektet kommer fra allerede eksisterende videoopptak av offentlige avholdte fotballkamper som av klubbene selv og ikke minst av media allerede granskes i detalj og så vurderes/kommuniseres offentlig. I tillegg kommer det faktum at profesjonelle idrettsutøvere må påregne å gjennomgå en del både tester og analyser som en del av sitt yrke, som medfører andre informasjons- og samtykkekrav (Winter & Maughan, Journal of Sports Sciences, 2009) OG at vi ikke vil publisere resultater der det er mulig å identifisere enkeltspillere. Til slutt vil størrelsen og populariteten på disse klubbene tilsi at informasjon sendt til spillere sannsynligvis ikke vil tilfalle de aktuelle spillerne.

Vi er derfor innstilt på å ikke sende slik informasjon, men etter dialog med NSD har vi skjønt at prosjektet uansett må gjøres offentlig tilgjengelig på andre måter. Vi har derfor tatt NSD sin anbefaling til følge og gjør informasjonen offentlig tilgjengelig på en egen nettside om prosjektet.

Tredjepersoner

Skal du behandle personopplysninger om tredjepersoner?

Nei

Dokumentasjon

Hvordan kan de registrerte få innsyn, rettet eller slettet opplysninger om seg selv?

Hvis vi sender informasjon til klubbene om dette prosjektet kan vi legge til rette for at det er mulig å kontakte veileder/prosjektansvarlig og/eller en av de involverte masterstudenter og dermed vil det bli sendt og vist en oversikt over vedkommende sine personopplysninger som blir behandlet og formålet og hvorfor de blir behandlet.

Totalt antall registrerte i prosjektet

100-999

Tillatelser

Skal du innhente følgende godkjenninger eller tillatelser for prosjektet?

- Annen godkjenning

Annen godkjenning

Vi har hatt dialog med "Norges idrettshøgskoles etiske komite" (NIHs interne forskningsetiske organ) om dette prosjektet. Svaret fra dem (ved leder Anne Marte Pensgaard og jurisk Peder Utne) lød: "I og med at dere utelukkende skal studere allerede innsamlede data (videomateriale), så kan ikke jeg se at vilkåret om direkte intervensjon er oppfylt. Videre synes heller ikke prosjektet – av det lille jeg sitter på av opplysning – å ha noen etiske betenkeligheter med hensyn til «betydelig potensiale for skade eller belastning». De konkluderte derfor med at "Prosjektet er IKKE fremleggelsespliktig for NIHs etiske komite."

Behandling

Hvor behandles opplysningene?

- Ekstern tjeneste eller nettverk (databehandler)
- Mobile enheter tilhørende behandlingsansvarlig institusjon

Hvem behandler/har tilgang til opplysningene?

- Prosjektansvarlig
- Student (studentprosjekt)
- Interne medarbeidere
- Andre med tilgang til opplysningene
- Databehandler

Hvilken databehandler har tilgang til opplysningene?

Hudl som leverer videoanalyseprogrammet Sportcode vil potensielt ha tilgang til opplysninger.

NSD stilte i sin kommentar til vårt innsendte meldeskjema spørsmål ved om det foreligger en databehandleravtale. Dette foreligger. Vi har vært i kontakt med Hudl om dette punktet, og de gir oss følgende svar, med en link til denne avtalen: "The way we treat your data is outlined in Section 9 of the EULA incorporated into our agreement. You can find it here: https://www.hudl.com/en_gb/eula Hudl remains compliant with GDPR provisions as outlined in that link above. We have a Data Protection Officer that can be reached for any specific inquiries"

Andre som har tilgang til opplysningene

En tidligere student ved NIH, Yaw Amankwah, blir brukt som rådgiver på dette prosjektet og tilfører viktig ekspertise. Han innordner seg imidlertid de samme krav til datasikkerhet, konfidensialitet og etiske retningslinjer som andre studenter som er involvert i prosjektet.

Tilgjengeliggjøres opplysningene utenfor EU/EØS til en tredjestat eller internasjonal organisasjon?

Nei

Sikkerhet

Oppbevares personopplysningene atskilt fra øvrige data (koblingsnøkkel)?

Ja

Hvilke tekniske og fysiske tiltak sikrer personopplysningene?

- Opplysningene anonymiseres fortløpende

Varighet

Prosjektperiode

15.09.2021 - 30.06.2022

Skal data med personopplysninger oppbevares utover prosjektperioden?

Ja, data med personopplysninger oppbevares til: 31.05.2027

Til hvilket formål skal opplysningene oppbevares?

Forskning

Hvor oppbevares opplysningene?

Internt ved behandlingsansvarlig institusjon

Vil de registrerte kunne identifiseres (direkte eller indirekte) i oppgave/avhandling/øvrige publikasjoner fra prosjektet?

Nei

Tilleggsopplysninger

Prosjektet er et studentprosjekt som involverer følgende masterstudenter: Thomas Jenssen, Mariken Kleppe og Malin Knai. I tillegg kommer følgende bachelorstudenter: Joshua Stenersby, Joanna Bækkelund, Marlene Myhrer og Josefine Frøshaug. Alle studentene forventes å skrive studentoppgaver basert på dataene i dette prosjektet.

I forrige spørsmål om varighet og langtidsoppbevaring av data har vi oppgitt at vi vil bevare dataene i 5 år, og dette stilte NSD spørsmål om, der vi eventuelt ble bedt om å begrunne dette. Årsaken er at dette forskningsprosjektet er et første eksplorerende prosjekt i det som kan bli en lang rekke prosjekter framover og hvis resultatene tilsier at dette er et interessant løp å forfølge videre vil vi være interesserte i å se på longitudinelle data knyttet til våre variabler - altså, hvordan forandrer disse spillerens kroppsspråk seg over tid, når de kommer i ulike lag osv. Dette vil være et eget forskningsprosjekt som vi selvsagt vil søke NSD om på nytt for å gjennomføre, men for nå blir det da altså nødvendig å bevare dataene utover den perioden det inneværende prosjektet varer.