Prediction and Evaluation of Athletes' Positive Emotions Based on Emotional Intelligence Theory

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Abstract

Emotional intelligence is the ability to evaluate, express, and control emotions experienced by oneself and others. Emotional intelligence explains and predicts individual achievement, and the complementarity of traditional and emotional intelligence is the key to individual success. The theory of emotional intelligence leads to re-examine the concept and essence of an athlete's intelligence, and raises new questions about the measurement of intelligence and emotion in athletes. In this study, the theoretical model of team emotional intelligence is developed based on emotional psychology, symbolic interaction theory and information processing theory. This theoretical framework is combined with the specific situation of the game, using literature review, interview method, questionnaire method as well as mathematical and tatistical methods that employ a "Team Emotional Intelligence Scale". The researcher seeks to conduct a comparative study on team emotional intelligence of different athletes, coaches and different level teams. The results show that teams with athletes' average age in the range of 20-21 years performs better in team emotional cognitive ability, and poorer in terms of team emotional intelligence and team emotional sharing, evaluation and normative ability. The higher the percentage of athletes' sports rank, the higher the team emotional intelligence; the longer the team's formation years, the stronger the team emotional cognitive ability. The better the team's competition performance, the stronger the team's emotional intelligence and team emotional sharing, evaluation and normative ability, but the weaker the team emotional cognitive ability; the female coaches' team emotional cognitive ability is found to be better than the male coaches' team emotional cognitive ability.

Keywords: Athletes' positive emotions; emotional intelligence theory; prediction and evaluation

Introduction

In a team, even if the emotional intelligence of each member is high, the emotional intelligence level of the team is not necessarily high, in which case, the team cannot be said to be a successful team (Cece, Guillet-Descas, Nicaise, Lienhart, & Martinent, 2019). The emotional intelligence of a team should not be the sum of the members' individual emotional intelligence (van Kleef, Cheshin, Koning, & Wolf, 2019). The traditional theory of emotional intelligence, which focuses on the individual level, no longer perfectly describes the influence and changes of emotions in the interaction of members in the organization and the methods adopted by the team as a whole to manage positive and negative emotional resources for the benefit of team performance (Fritsch, Redlich, Latinjak, & Hatzigeorgiadis, 2021). How to effectively master and regulate the changes in the emotions of team members and the team as a whole in order to improve the performance of the team is a topic worth studying. The emergence of team emotional intelligence and the results of applied research in domestic and international organizations have proven its value. The concept of team emotional intelligence introduced by Druskat in 2001 is derived from the concept of emotional

intelligence proposed (Lalande et al., 2017). It is an in-depth and extended study of individual emotional intelligence in a team context, reflecting the wide range of applications of individual emotional intelligence at both individual and team levels (Campo et al., 2019). Team emotional intelligence is based on symbolic interaction theory, which emphasizes the interaction among team members, and posits that the performance of the team is achieved not only by individual efforts of members but also by enhancing the interaction ability among members. It has been defined by Druskat and Wolff as "the ability to create shared norms to manage the emotional course of a team in a way that facilitates the building of team trust, team identity, and team effectiveness" (Sabiston et al., 2020). Subsequently, Druskat et al. have emphasized the existence of team and individual interactions at the individual, team, and cross-team levels, where emotional awareness and regulation take place (Tamminen & Bennett, 2017). There are two perspectives on the measurement of team emotional intelligence: the first perspective views team emotional intelligence as a member's individual resource, represented by Jordan and Elfenbein.

This study develops a group emotional intelligence evaluation questionnaire to evaluate the emotional

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intelligence of individuals in the team. This scale is divided into self- and other-rated scales, with the average level of individual emotional intelligence in the team representing group emotional intelligence and high emotional intelligence scores representing high emotional intelligence teams (Gilchrist, Conroy, & Sabiston, 2017). Elfenbein views emotional intelligence as an interactive process and relies on different bases in the interactive process, which includes the individual emotional intelligence of team members, the average emotional intelligence of the team, and the highest and lowest emotional intelligence of the team (Doron & Martinent, 2017). The highest and lowest emotional intelligence in the team. The second perspective views team emotional intelligence as a norm of member interaction behavior (Pelliccia et al., 2019). The researchers analyze team emotional intelligence in different team scenarios and develop a 13-factor, 78-question team emotional intelligence scale. Hamme subsequently built on this research by designing a new team emotional intelligence scale, the ECGN, which is a 9-factor, 57-item scale (Broglio et al., 2017). The scale has been validated with good construct validity in students, the military and various organizations as shown in Figure 1. Research on team emotional intelligence in China is limited to the field of management and focuses on the relationship between team emotional intelligence and team performance. Some domestic scholars believe that team emotional intelligence includes three components: the emotional intelligence of team members, the emotional intelligence of a team hand, and the average emotional intelligence of team members. Researchers believe that team emotional intelligence should be composed of team members' emotional intelligence level, team conflict management ability and team learning ability (Mackay et al., 2019). The researchers propose three dimensions of team emotional intelligence: average emotional intelligence of team members; leader emotional intelligence and team emotional integration ability. The researchers validate the team emotional intelligence scale based on the Hamme's revised team emotional intelligence scale among 877 employees in companies and develop a team emotional intelligence scale with 28 questions on 5 factors suitable for cultural scenarios (Scheiman et al., 2019). For the purposes of this study, the researchers design a 4-factor, 16-question team emotional intelligence scale.
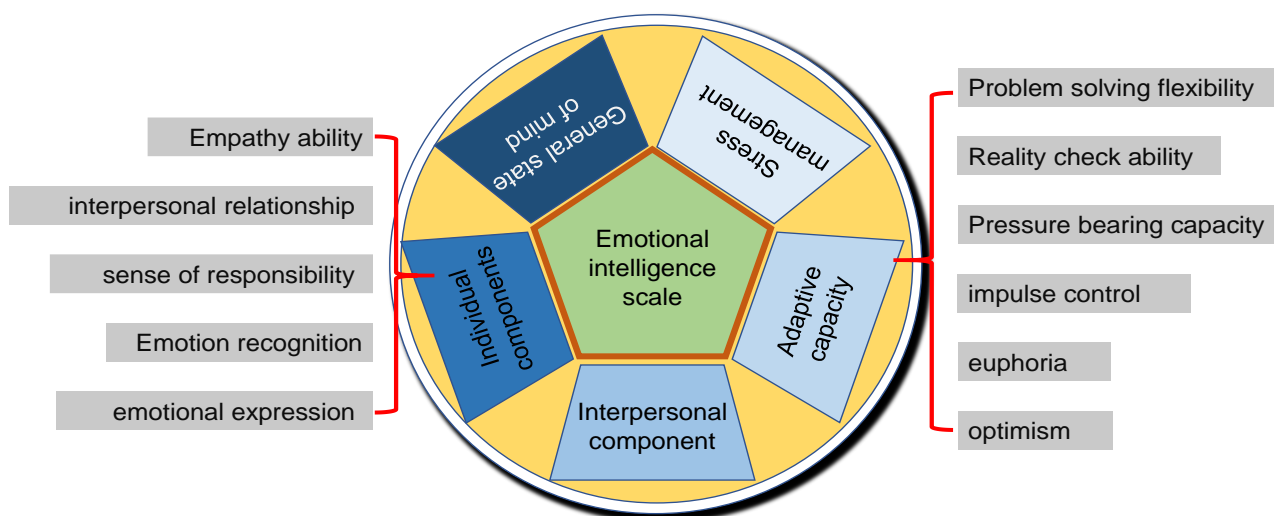

Figure 1. Team emotional intelligence scale

The development or formation of emotional intelligence and its importance in social life have attracted the extensive attention of a number of experts and scholars. However, there are only limited studies that apply the theory of emotional intelligence to sports practice, and the methods of studying the intelligence and emotions of athletes are mostly based on the methods of general psychology and signifying a lack of research methods that hold true for sports related contexts. Emotional problems in sports are important because emotions have a motivating, organizing, maintaining and guiding role in human activity, i.e., emotions have a motivational role. In this paper, the author revisits the issue of motor intelligence and motor emotions through the elaboration of the theory of emotional intelligence in order to provide theoretical guidance for sports practice. This study uses team emotional intelligence theory to explore the perception and management of team emotions in projects. The author attempt to construct a team emotional intelligence model, and then design a simple and practical team emotional intelligence scale, and conduct an empirical study on teams of different levels, coaches and athletes, so as to verify the differences in team emotional intelligence among them, and provide reference for the

study of team emotional intelligence in professional, basketball and soccer teams, and provide a direction for the study of team emotional intelligence in collective projects, team cohesion and correlation of game performance, etc. It also provides a theoretical basis for research on team emotional intelligence in collective sports, team cohesion and game performance. It also can provide another research perspective to solve the development dilemma of three major sports.

Related Works

Members' emotions arise from the interactions with the environment they live in, i.e., the interactions with other members, and such emotions can be transmitted to each other in the team and spread through interaction and communication among members (Landry et al., 2017). Positive emotions can promote the successful achievement of team goals, while negative emotions can affect individual emotions through mutual contagion and lead to a failure to achieve team goals (Mountjoy et al., 2018). For the team, the changes of team members' emotions exist all the time and spread contagiously among each other. Only by mastering the mechanism of emotions affecting behavior can we effectively control members' emotions and effectively predict members' behavior (Manley et al., 2017).

Teams are currently the most effective form of work organization design. Many factors affect the effectiveness of teamwork, and some researchers have conducted tentative studies from the perspectives of team composition, member staffing, and team or member attributes (Windt & Gabbett, 2017). However, despite the wealth of research on teams, there are still some studies that examine team functioning and team performance from an emotional perspective. Changes in team members' emotions can affect their productivity, inter-member identification, trust, and collaboration, and more importantly, the achievement of overall team goals and performance (Kellmann et al., 2018). There is a lack of research on the ways in which emotions affect member behavior and team performance. Emotion is an external state of emotion, such as happiness, satisfaction, liking, fear, anger, etc. (Rajpal et al., 2021). Emotion is mainly expressed in the internal experience of objective things, which may have both positive and negative, and the corresponding emotional states are divided into positive and negative emotions, as shown in Figure 2.

Team emotion is the outward expression of team mood, which is momentary and fickle. Team emotion arises from team members' identification, trust and sense of belonging to the team as well as the external environment in which the team is located (Baggish, Drezner, Kim, Martinez, & Prutkin, 2020). On the one hand, team emotion is derived from team members' emotions from the inside out, and members' emotions are transmitted, processed and integrated into the emotional state of the whole team in the interaction. On the other hand, team emotion comes from the environment in which the team is located, such as the social environment and the competitive environment during the game, and these environmental factors act on the team emotion from the outside to the inside. In short, team emotion is a unique emotional state formed by the interaction of team members' emotions and the team's environment (Ulrich et al., 2018). Research on team emotion starts with the concept of team emotion, and with the increasing depth of research, the connotation of team emotion has changed in different ways, as shown in Table 1.

Table 1.

Structure of team emotional intelligence and influencing factors

Research Perspectives	Emotional Interconnectedness	Perspectives
Emotional event perspective	Team Emotion	Emotions in work situations originate from specific events, and in turn, the emotional changes caused by specific events influence employees' daily behavior and work attitudes.
Emotional structure perspective	Individual Emotions	Five levels of emotions are proposed to exist in organizations: intra-individual emotions, inter-individual emotions, emotions in interpersonal interactions, team emotions, and organizational emotions.
Emotional contrast perspective	Team Emotion	Team-level emotions are different from individual emotions, and are based on the mutual recognition of team members and the ability to share such emotions that facilitate improved behavior.
Emotional integration perspective	Team Emotion	Under the specific team emotion norms, the state of emotional integration is achieved through the infection and display of emotions, which leads to the formation of team emotions or collective emotions.

The research on team emotion mainly relates to the team emotion principle and the emotion infection perspective and its relationship with team creativity and team performance (Nagelli & Hewett, 2017). In their article, they

explore the concept, utility and mechanism of team emotion, arguing that team emotion is different from specific behavioral-level demands, commands and instructions, and that the mechanism of team emotion is emotional infection. In their article, the researchers explore team emotion infection and team organizational structure heterogeneity. Throughout the study time, emotion and organizational structure are seen as interacting with each other, with rapid changes in emotion breaking the original organizational set-up under the characteristic time pressure. Conversely, innovative organizational structures and coordination mechanisms to stabilize emotional changes are important control variables in their studies.
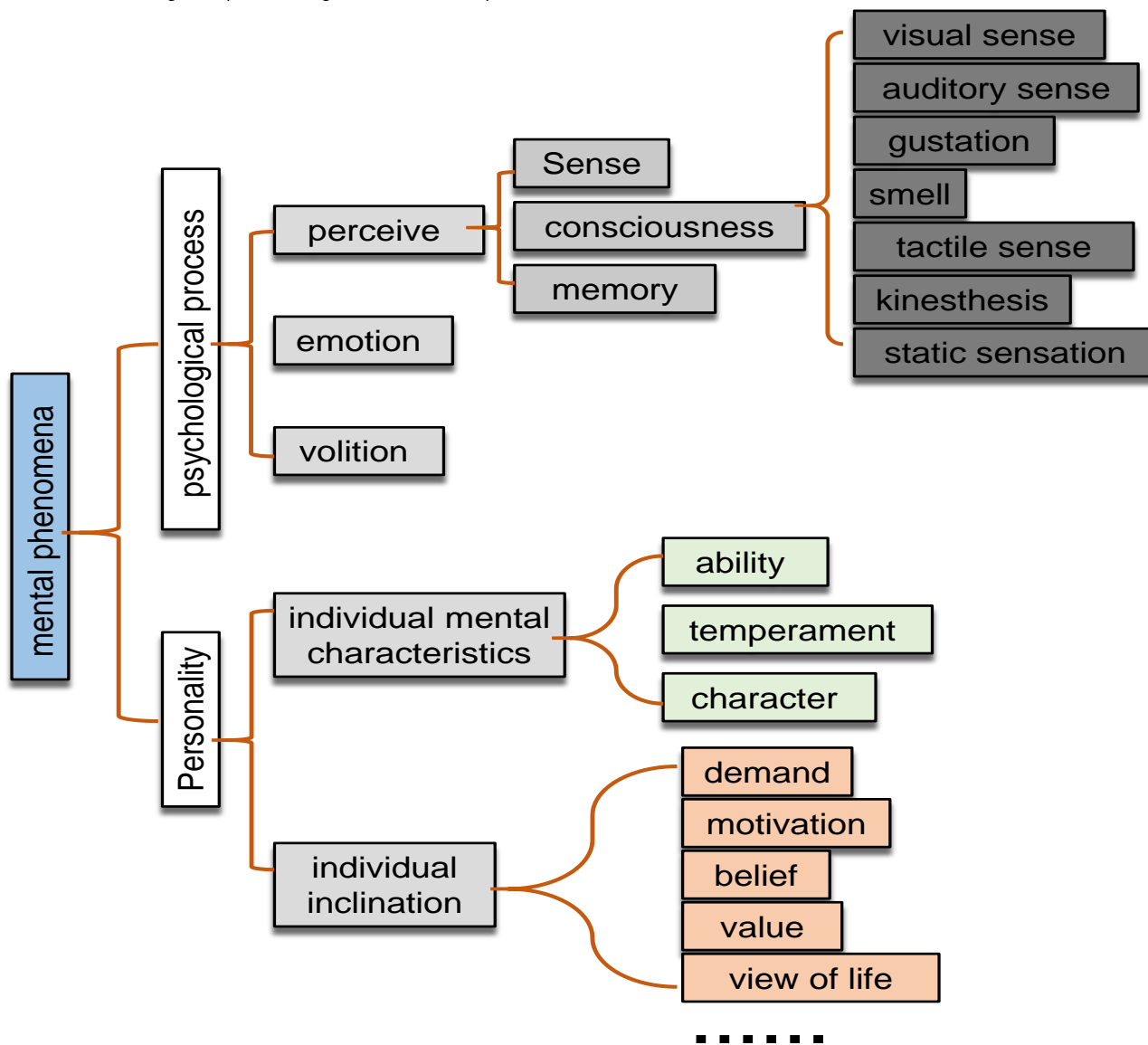

Figure 2. The connection between emotions and objective things

In the article, the researchers elaborate on the sources of information that affect team members' emotions through case studies (Soligard et al., 2017). Leadership behavior or other external information can affect positive or negative changes in team members' emotions; however, information from leaders is the most direct and strongest source of information that affects members. In their article, the researchers describe the mechanisms by which team emotions act on team creativity and team goals. When the team has a positive emotional climate, team members are relaxed, think quickly and flexibly, and have more pioneering cognitive activities, using information media to transmit their new ideas, share new ideas with peers, and learn from each other to form an upward spiral of team thinking. Creative ideas under team orientation are implemented to advance and promote the level of achievement with respect to team goals.

The Role of Emotional Intelligence Theory in Group Exercise

The influence of team emotion on team performance has attracted extensive research by many scholars, and the issues of how to play individual emotions in team work

situations to make the overall team emotions more positive and how to manage emotions in teams have attracted the attention of scholars at home and abroad, and the concept of team emotional intelligence has emerged, and many scholars have described team emotional intelligence from different perspectives, trying to use team emotional intelligence to properly manage and regulate team emotions, as shown in Table 2.

In summary, team emotional intelligence has been described by various scholars from different perspectives; however, there are some common points, all of which consider the relevant factors in the team operation process. The interaction of team members is the smallest unit of team operation, and emotions are generated in the interaction between individuals and individuals, and between individuals and the environment. Therefore, team emotional intelligence should be described from the perspective of team members' interactions.

Table 2.

Structure of team emotional intelligence and influencing factors

Research perspective	Adjustment range	Perspectives
Interactive perspective	Individuals - Teams	Team members bring their own traits and emotional experiences into the team and interact with the emotional experiences of other team members. Through a series of integration processes, the emotional intelligence input of team members interacts with the emotional intelligence of the leader, which will eventually lead to team emotional intelligence.
Regulation perspective	Individuals	Focuses on ability to regulate and control multiple emotions in a team in an integrated manner.
Structural perspective	Individuals	Team emotional intelligence may include the ability of the team to successfully develop the norms in the team and an integrated intellectual system that contributes this energy to the larger organization.
Normative perspective	Individuals - Teams	The team's ability to create shared norms to manage the emotional journey to build team trust, group identity, and team effectiveness is the team's ability to manage and influence the emotional processes that occur during team interactions.
Rule perspective	Team	While team emotional intelligence can be perceived by members of the work team and can reliably shape team emotional rules, team emotional intelligence can also be experienced by observers outside the team.
System perspective	/	Emphasis is placed on explaining emotional intelligence from a systems theory perspective, integrating individual emotional intelligence to form team emotional intelligence, and not only paying attention to individual emotional intelligence but also to the integration of individual emotional intelligence, which can reflect the clarity of team goals.
Intellectual perspective	/	Drawing on Mayer et al.'s definition of individual emotional intelligence, this perspective describes team emotional intelligence as the ability to perceive, understand, and manage emotions.
Process perspective	/	The team's ability to perceive, recognize, understand and manage the emotions of the entire team. High team emotional intelligence is able to successfully manage its emotional state, understand its environment/goals and interact with the larger organizational emotional system.

Based on this, the team emotional intelligence used in this study is derived from the proposed team emotional intelligence based on the symbolic interaction theory, cognitive evaluation theory and the team dynamics theory, Wolff et al. creatively propose that there are two kinds of emotions in team operation, individual and team. It is further explained that team emotion is an extension of individual emotion and cannot be separated from individual emotion, and the starting point of the study should start from individual emotion to reflect the overall team emotion. The difference between the two mainly relates to the different levels of interaction, with individual emotions taking place between members and team emotions taking place between the team and the team. However, both mood changes should take place under the team goal orientation.
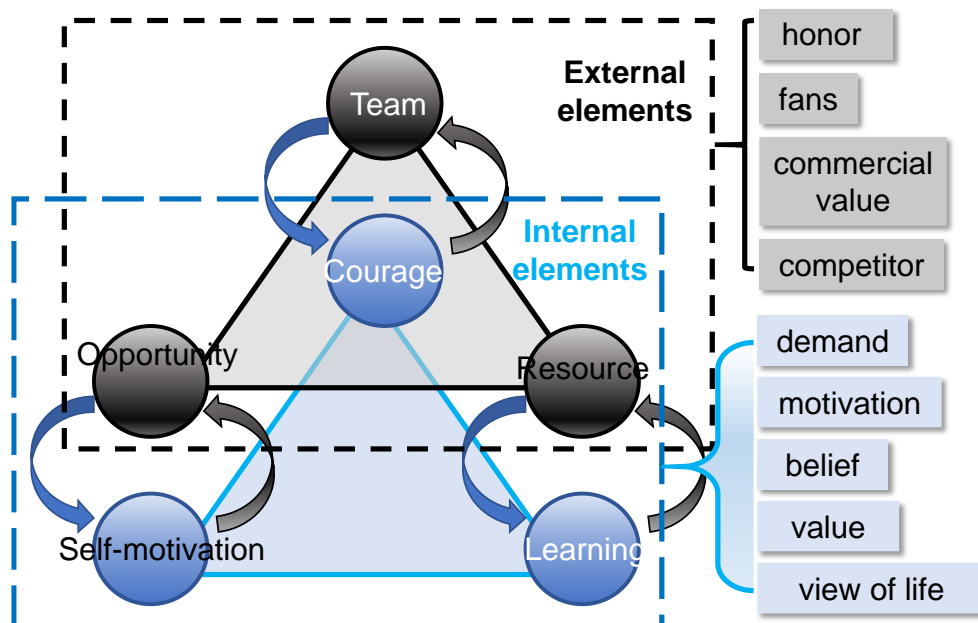
Figure 3. Team emotional intelligence structure

Teams are the most popular form of work design today, and research on team effectiveness has been a hot topic for many scholars. Among the many influencing factors, some scholars believe that current theories and research are not *'behavioral'* enough for practitioners to develop and maintain effective work teams. Several scholars have begun to address the issue of team effectiveness from an emotional perspective. Emotion is an external state of emotion, such as happiness, satisfaction, liking, fear, anger, etc. Emotion is mainly expressed in the internal experience of objective things, which includes both positive and negative, and therefore, the corresponding emotional state is divided into positive and negative emotions. Team emotion is the external expression of team emotion, which is momentary and fickle. Team emotion arises from team members' identification, trust, and sense of belonging to the team as well as the external environment in which the team is located. On the one hand, team emotion is derived from team members' emotions from the inside out, and members' emotions are transmitted, processed, and integrated into the emotional state of the whole team in the interaction. On the other hand, team emotion comes from the environment in which the team is located, such as the social environment and the competitive environment during the competition, and these environmental factors act on the team emotion from the outside to the inside.

In short, team emotion is a unique emotional state formed by the interaction of team members' emotions and the team's environment. There are limited studies focusing on team emotions in sports, and in their article, Hong et al. review the research on individual emotions in sports, while looking forward to the research prospects of team emotions in sports. While foreign scholars' research in the

field of team emotion has yet to bear some fruit, its implications are still not obvious. The research on team emotion intelligence in the field of sports in China has not yet been entered by researchers. Most of the domestic research on team emotions in the field of management has been conducted in terms of emotional labor, organizational climate, and team cohesion. Therefore, a study on team emotions in the field of sports is highly desirable. The selection of the research object we study not only encompasses team emotion in collective projects, but also team emotion in coaching teams or sports teams of non-collective projects. The author has been able to draw on the experience of foreign and domestic studies and use experimental and measurement methods to conduct innovative research. The study of team emotions in sports remains a relatively unexplored area of study. This paper explains that sports team leadership can essentially be described as an emotional process, and that the leader's perception of changes in members' emotions in sports situations, and whether individual and team emotions are the same emotion is an important topic for future sports team-related research. One study illustrates the gradual process from generating emotions to acting from the perspective of the mechanism of individual emotion occurrence, as shown in Figure 4.

The emotional intelligence of a team member can determine his position and ability in the team; however, its impact on the performance of the whole team also requires interaction with other members in order establish and maintain good interpersonal relationships, mutual trust, mutual recognition, and a sense of effectiveness. In a team, it is necessary to establish a norm that members can follow to effectively regulate emotional processing and promote

positive emotions that can contribute to the harmony of interpersonal relationships, trust, and recognition of the team, and consequently, improve team effectiveness. The established emotional norms enable members to correctly perceive and interpret emotional events, and to reasonably evaluate and share them with other members to form positive team emotions. The emotional norms established by the team are formal or informal guidelines, which eventually form the invisible rules shared by members through their understanding and acquiescence in the process of interaction. Team norms can effectively manage and regulate members' individual emotional intelligence, while guiding team members' emotions toward team goals and performance. Due to the wide variety of cultural

backgrounds and personality traits of team members, they are unable to properly identify, handle and express their emotions in the face of various emotional problems that arise in the team, thus affecting the overall performance of the team and the development of the team. The team emotional norms established in this study are oriented to the team's goals, and the team emotions are managed in a positive direction through the emotional norms, which are transmitted among the members through interaction to form positive team emotions that promote the achievement of team goals. Therefore, this study argues that the essence of team emotional intelligence is the ability to establish team emotional norms to solve team emotional problems.
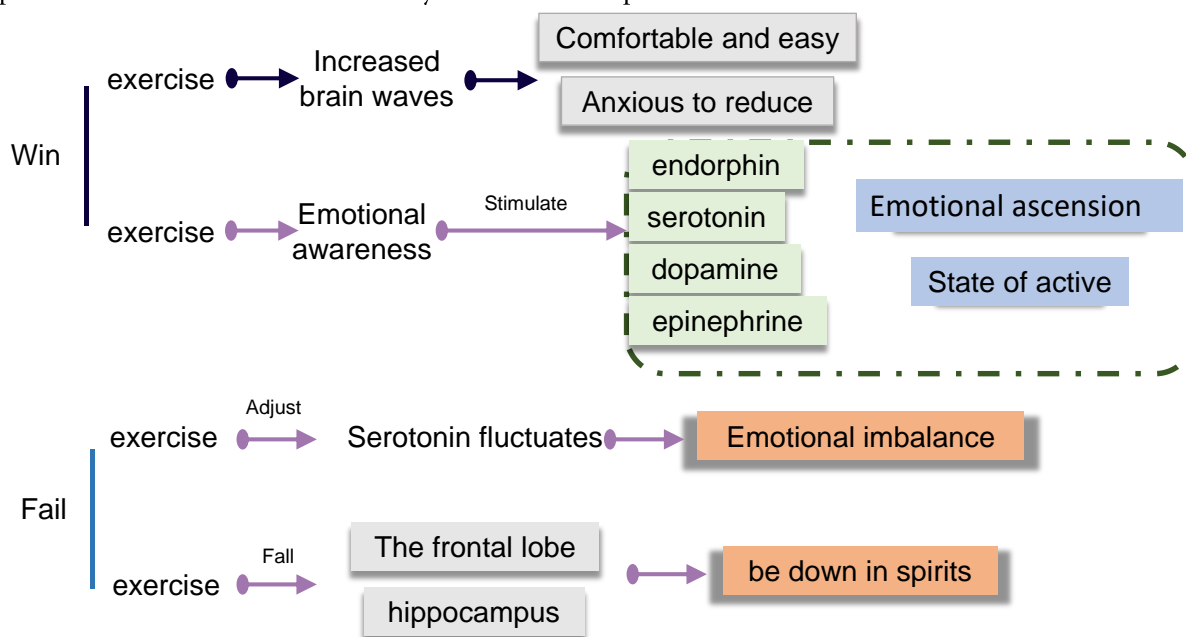

Figure 4. Emotional journey

The extension of individual emotional intelligence to the team level las down the foundation of team emotional intelligence. In the long-term research on team emotional intelligence, scholars have not formed a unified concept and expression of team emotional intelligence. Team members communicate and interact their emotional characteristics such as emotional traits, emotional intelligence, and affect with other team members. Druskat and Wolff argue that team emotional intelligence is the processing of emotions through established norms to manage them and form positive emotions to achieve trust and identification with the team to form high performance of the team. Druskat argues that team emotional intelligence should be based on team interaction, where individual emotions are effectively regulated and positive emotions are transferred, therefore interaction is seen as the key to team emotional intelligence. In the description of team emotional intelligence, all scholars describe it from

different perspectives; however, there are some common points, say, scholars consider team emotional intelligence as a kind of ability, and they all consider the relevant factors in the process of team operation to describe it. The interaction of team members is the smallest unit of team operation, and emotions (individual emotional intelligence) are also generated in the interaction between individuals and individuals, and individuals and the environment. Therefore, this study believes that team emotional intelligence should consider the overall team emotion more from the interaction between members.

Research Methodology

In this paper, a model of team performance and team emotional intelligence is constructed, and some mediating variables such as cohesion and conflict management in the role of both are also elaborated. In one article, Hongyu Ma explains that group cohesion includes four dimensions of group task and interaction attractiveness, group task and

interaction consistency. It argues that team emotional intelligence includes three dimensions of individual emotional intelligence, leadership emotional intelligence, and emotional intelligence integration ability. In summary, this study concludes that team emotional intelligence is a cultural norm of team emotion. And cohesiveness is a measure of the relationship between team members. Firstly, the concept of team cohesion and the concept of team emotional intelligence are different. Secondly, the structural dimensions and measures of team cohesion and team emotional intelligence are different. Lastly, team emotional intelligence may generate cohesion and can cause other outputs of social capital such as security, trust, and team identity. Team emotional intelligence should be viewed as an antecedent variable of cohesiveness. Team emotional intelligence is a team competency that focuses on the identification and management of emotional information in team

Table 3.

Questionnaire

interactions and is the team's ability to develop positive team emotional norms.

In this paper, interviews are conducted with psychology and domain experts, coaches, and leaders to obtain the materials needed for this study and to construct a team emotional intelligence model. Interviews are conducted with psychology experts and training experts regarding the procedure and reliability test of the Team Emotional Intelligence Scale. In addition, questionnaires are administered to psychology, training, and domain experts to determine whether the content validity of the preliminary scale met the requirements of this study. Prior to the survey, the experts are given a detailed explanation of the test development process and test objectives. A survey of professional clubs and high-level college teams is conducted to validate the Team Emotional Intelligence Scale again to test the reliability of the scale, as shown in Table 3.

Type of exercise	Type of movement	Length of exercise	Emotion Type
Basketball	Group Exercise	48 minutes	Group Emotions
Soccer	Group Exercise	81 minutes	Group Emotions
Table Tennis	Personal Movement	5 innings	Personal Emotions
Badminton	Personal Movement	3 innings	Personal Emotions

Exploratory factor analysis is conducted using Spss23.0 software and combined with Amos23.0 software for structural equation processing and designing the Team Emotional Intelligence Scale, and the resulting scale is analyzed for internal consistency reliability, retest reliability, rater consistency reliability, and content validity. Correlation and regression analyses have also been conducted using Spss23.0 during the empirical study.

Overall Analysis of Emotional Intelligence Levels

Figure 5 shows the results of the descriptive statistics of the total score of the volleyball team emotional intelligence as well as the scores of each subscale. From the statistical results, the average score of the surveyed teams is 68.9698 and the median score is 69.00, indicating that the surveyed teams reached an intermediate level of team emotional intelligence. The results of the team emotional intelligence score may be since most of the units surveyed are high level college teams and only a few professional teams are surveyed. From another perspective, it also shows that the surveyed teams and team members have some room for improvement in overall emotional awareness and regulation, and the higher the team emotional intelligence score, the higher the level of team emotional intelligence. Unfortunately, there is still a lack of attention to athletes' emotions at all levels of team training in China. There is a

lack of adequate psychological and emotional training given attention by the head coach in the training program from the grassroots reserve training system to the level of national team. Due to the unequal number of questions in each sub-scale (3-6), the study is unable to make a comparison of the total score of each scale, but only the mean and median scores from each sub-scale. The mean score of the team emotion sharing sub-scale is 24.0110 and the median score is 25.00. The difference between the two scores is the largest difference in the data presented. The reasons for this are two-fold: firstly, during the process of questionnaire distribution interviews with athletes learned that many athletes, especially female athletes, are reluctant to share their positive and negative emotions, especially negative emotions, with their peers during competition, they think that sharing positive emotions can give everyone a boost and negative emotions will spread. However, this study argues that the sharing of negative emotions is the basis of mutual trust. If negative emotions are shared, not only do they get released, but it also makes peers or players build mutual trust and confidence-building.

This further improves trust and team cohesion levels between team members. Secondly, it prevents any lack of sharing of emotions on the field due to the athletes' personality. The mean score of the team emotion

perception subscale is slightly higher than the median score, indicating that as athletes grow older, their feelings and understanding of their own emotions and the emotions of others grow as well. The mean scores of the team emotion evaluation and team emotion regulation sub-scales can be considered equal to the median score,

indicating that the athletes' emotion cognitive ability grows with age, but the emotion evaluation and emotion regulation ability needs to further improve so that they can improve their "emotional quotient" and thus enhance their level of team emotional intelligence.
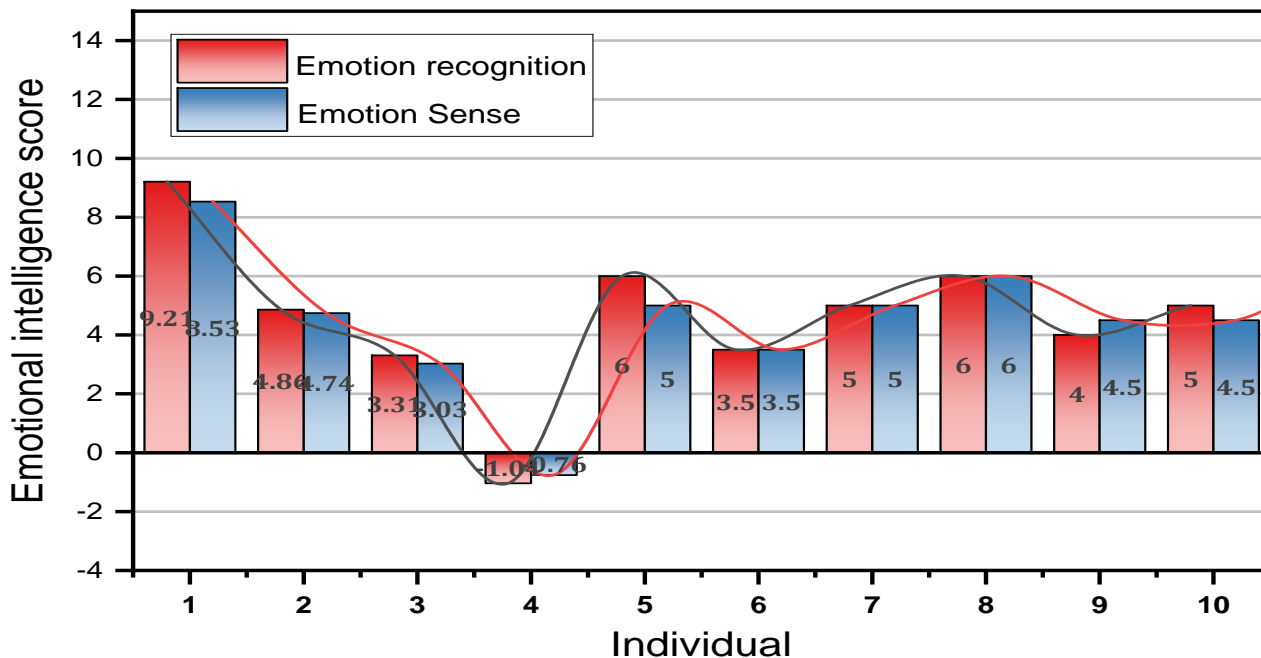

Figure 5. Total team emotional intelligence score and subscale descriptive statistics

Comparison of the Emotional Intelligence of Volleyball Team Teams by Gender

Emotional Prediction

A multivariate analysis of variance (ANOVA) is conducted on team emotional intelligence of volleyball teams by gender using gender as the independent variable and team emotional intelligence total score and team emotional perception, sharing, evaluation, and normative subscale scores as the dependent variables. The results show that there is no significant difference between the total team emotional intelligence score and the sharing, evaluation, and normative subscale scores of the volleyball team by gender. The team emotional perception subscale scores are highly significantly different (F=6.977, p=.009<0.01). Figure 6 shows the results of the total team emotional intelligence scores, the scores on each dimension and the between-subjects effect test for the different gender volleyball teams. In the team emotional cognition dimension, the scores of the volleyball teams of different genders are 10.04 and 10.73 on the team emotional cognition dimension, respectively, with a non-significant difference in the between-subjects effect (F=6.977, p=.009<0.01).

This indicates that the women's volleyball team has better

team emotional perception than the men's volleyball team. The reason for this analysis may be because female athletes differ from male athletes in perceiving others and collective emotions; females have an innate advantage in emotional cognition, are more emotional, perceive more delicately, and pay more attention to the input process of emotional information. Males have a higher threshold for perceiving emotions, perceive more ruggedly, and focus more on the process of processing and outputting emotional information. On the team emotion sharing dimension, the volleyball teams scores 24.33 and 23.68 on the team emotion sharing dimension by gender, respectively, with no significant difference between subject effects (F=2.373, p=.124>0.05).

This indicates that the gender factor does not directly affect the volleyball team team's ability to share emotions. The reason for this analysis may be because the sharing of emotional information depends more on the introverted and extroverted characteristics of the athletes' personalities. On the team emotion evaluation dimension, volleyball teams of different genders score 15.01 and 14.56 on the team emotion evaluation dimension, respectively, with no significant difference between subject effects (F=2.473, p=.117>0.05). This indicates that the gender factor does not directly affect the volleyball team's ability

to evaluate team emotions. The reason for this analysis may be since professionally trained male and female volleyball athletes converge in the way they evaluate emotions in the game. Similarly, on the team emotion norm dimension, the volleyball teams score 19.71 and 19.85 on the team emotion sharing dimension by gender, respectively, with no significant difference between the subject effects (F=.139, p=.710>0.05).

This indicates that the gender factor does not directly affect the ability to regulate team emotions in volleyball teams. The reason for this analysis may be due to the formation of some implicit norms such as coaches, captains, star players, and team atmosphere after professional training. Volleyball teams of different genders score 69.10 and 68.83 on the total team emotional intelligence scale, respectively, with no significant difference between subject effects (F=.077, p=.782>0.05). This indicates that the gender factor does not directly affect the emotional strength of the volleyball team. This finding may be so due to the volleyball-specific emotional processing developed by male and female athletes after years of volleyball-specific study, training and competition that override some gender differences.
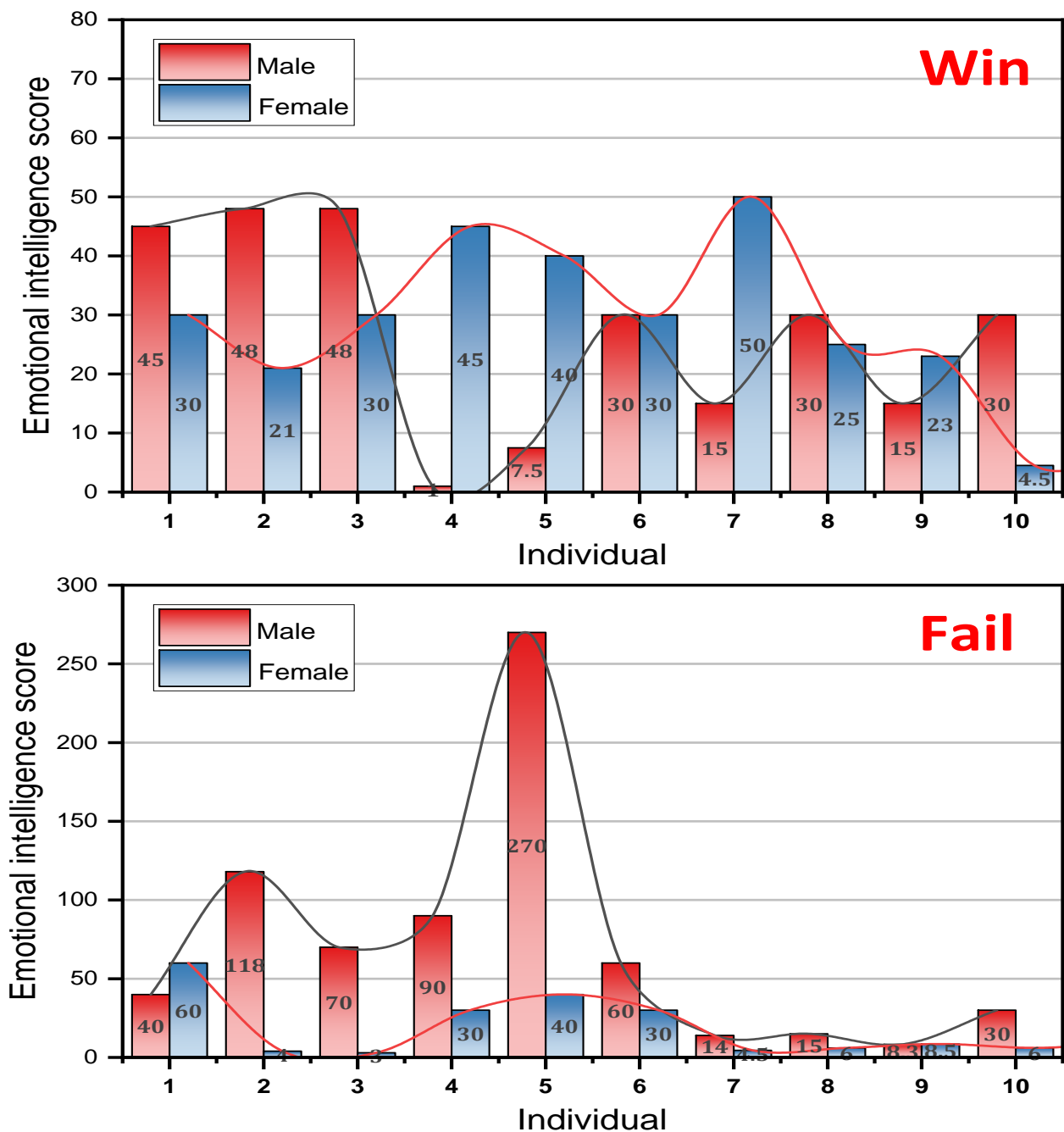

Figure 6. Total team emotional intelligence scores, dimensional scores, and between-subjects effects by gender for volleyball teams

The most frequent occurrence of the different game scenarios that can make team members and the team as a whole change emotionally in the statistics is the consecutive turnovers scenario. In the interviews, respondents understand that the opponent played a good match in the game, and they do not show a big emotional change, especially because the opponent is understandably stronger than our team and we are able to play a good match in the game. This scenario will not show a drastic change of emotions. However, if the same teammate of our team has a continuous mistake, there will be a drastic change of emotion between teammates and the team. The missing player will have an emotional state of remorse, self-blame, loss, anxiety, etc., and the teammates will have an emotional state of complaint, lack of understanding, anger, etc. Teammates will choose negative attitudes and behaviors towards the subject of the emotional event due to the emotional event, and this emotion will spread infection in the interaction between teammates, and lead to a low emotional state of the whole team.

Among the game specific scenarios, the second highest percentage of respondents talked about when key points (balls) are missed. In the interviews, the researcher found that when everyone on the sports team field is playing every ball with full concentration, each team member's emotions are high and focused, and every player on the field is reminding himself/herself to handle every ball

properly and not to let the ball fall to the ground. Especially when the key points or key balls such as 23 points to 24 points, 24 points to 25 points or 13 points to 14 points in the deciding game, 14 points to 15 points, everyone is thinking in one place and making efforts in one place, as shown in Figure 7. However, suddenly there is a mistake at this time, this mistake will be like a needle stabbing a balloon blown up like everyone deflated. All the previous concentration, self-reminding, high concentration, and high emotions will be reduced to nothing. This is when the overall mood of the team goes down the drain and it is hard to adjust back up. Some players in the interview directly express their helplessness about this situation arising, and even thought that sometimes it is hard to adjust to this emotional drop until the end of the game.

So, in this case, the effective measure is to give the ball to the core or star player of the team. This shows that in the game scenario when key points (balls) are missed, the team members and the team as a whole have a big emotional change directly affecting the outcome of the game. Turnovers when the score is alternately rising, key ball scores, simple ball errors, and small deficit situations are mentioned third to sixth most frequently overall. In these game scenarios, team players are more likely to experience emotional states of disappointment, helplessness, and remorse. Scoring a critical goal resulted in emotional states such as pride, confidence, and happiness.
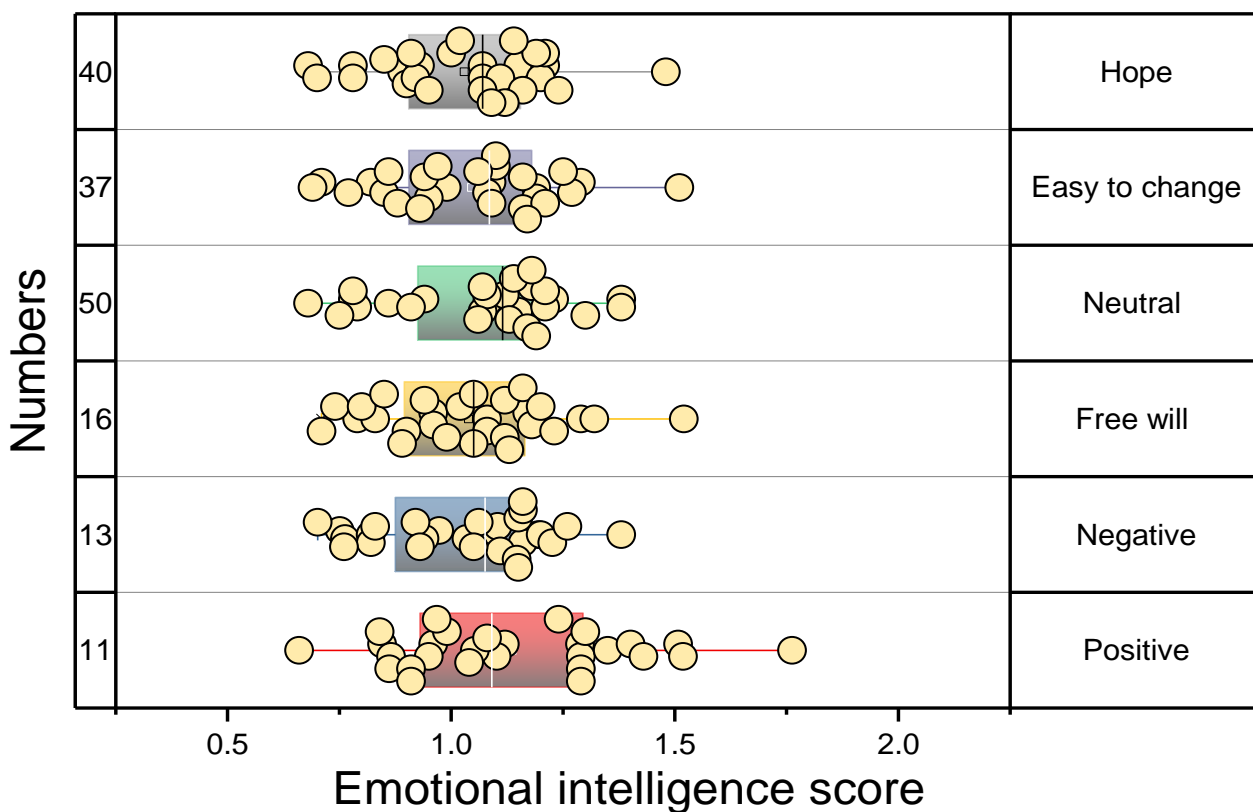

Figure 7. Athlete in-competition sensory classification criteria

The frequency and intensity of these two diametrically opposed emotional states are frequent in the game and do not affect team members and the overall emotional changes of the team to the same extent as the first two. Mistakes when the score is alternately rising and mistakes when the score is small and trailing can make the players anxious to tie the point and lead to nervousness, lack of relaxation in technical movements, lack of openness in vision and the mentality of taking the bull by the horns, which can further deteriorate the team mood. Through interviews with 15 high-level athletes of different sport levels, 10 specific scenarios that affect a large change in team mood during a game are identified. There are many scenarios that affect mood changes during a match, for example, opponent interference also affects team mood to a certain extent; serve errors also affect team mood changes; referee and line judge misjudgments and other match scenarios can affect the mood changes of team members and the team. However, considering that there is some crossover between different game scenarios, for example, serve errors can be incorporated into the simple ball error scenario, and referee and line judge misjudgments can be incorporated into the referee misjudgment scenario. Moreover, all aspects of the game can have a large or small impact on team members and overall emotions. Based on the results of the interviews and suggestions from experts and coaches, the most emotionally charged scenarios are selected for this study without considering those scenarios that are too detailed and low-level.

This study is designed as exploratory work on team emotional intelligence in general, and emotional intelligence of coaches and athletes. This study is also a comparative study of team emotional intelligence of athletes, coaches, and sports teams as well as a comparative research into team emotional intelligence of different level teams. By studying the correlation between team emotional intelligence and leaders and members' individual emotional intelligence, it is concluded that team emotional intelligence is highly correlated with coaches' emotional intelligence and lowly correlated with athletes' emotional intelligence. This finding supports the prediction that team emotional intelligence and individual emotional intelligence are separate concepts. Further regression analysis of the three is then conducted, concluding that coaches' emotional intelligence and athletes' emotional intelligence are predictive of team emotional intelligence, however, coaches' emotional intelligence is more predictive. By examining the overall level of different teams, it is found that the team emotional intelligence of different teams reached above the medium level. Further, the team emotional intelligence of different athletes, sports teams, and coaches are compared. For athletes: there are significant differences in team emotional intelligence between genders on the team emotional cognitive subscale. Teams with average age in the 20-21 years range of athletes have significantly higher levels of team emotional cognition than teams in other age ranges; teams with significantly lower levels of team emotional sharing than teams in other age ranges; teams in the 21 and 25 years age range, especially in the 25 years age range, have significantly higher levels of team emotional evaluation than teams in other age ranges; teams with average age in the 20 years range score significantly lower on the team emotional norms dimension than teams in the other three age ranges.

Overall, teams with average age in the 20-21 year-range perform better on the team emotional cognition level and worse on the overall level of team emotional intelligence and the sharing, evaluation, and normative levels. The proportion of sports rank correlate significantly with team emotional cognitive level, positively below 52.9% and negatively above 52.9%; the proportion of team sports is highest in 52.9-62.5% and team emotional sharing level of professional teams, as shown in Figure 8; the proportion of sports rank is negatively correlated with team emotional evaluation and team emotional normative level. Overall, the level of team emotional intelligence increases with the increasing proportion of athletic rank, but the team emotional intelligence of high-level college teams is lower than that of professional teams. The increase in athletic years can improve the level of team emotional cognition; the level of team emotional sharing and evaluation shows a trend of increasing and then decreasing with the increase of athletic years, and the node of athletic years is about 6 years; the level of team emotional norm does not show a regular change; in general, the increase of athletic years in high level college team will increase the overall level of team emotional intelligence with it, but in terms of emotional management such as sharing, evaluation, and norms are not as good as professional teams. In terms of sports teams, the increase of team years can significantly improve the level of team emotional cognition, but it has no significant effect on the improvement of team emotional sharing, evaluation, regulation, and the overall level of team emotional intelligence. Team performance is significantly correlated with team emotional intelligence, and teams with good performance had low levels of team emotional cognition, but high levels of team sharing, evaluation, norms, and overall team emotional intelligence.

As for the coaches, the gender of the coaches is seen to

significantly influence the level of team emotional cognition, and the female coaches significantly improve the level of team emotional cognition, but does not significantly influence the overall level of team emotional intelligence, team emotional sharing, evaluation and normative level; the age of the coaches significantly influences the level of team emotional cognition, sharing, evaluation and normative level, and the level of team emotional cognition gradually decreases as the age of the coaches increases. As the age of coaches increases, the level of team emotional awareness decreases and the level of team emotional sharing, evaluation, and regulation increases. The coaches' age does not significantly affect the

overall level of team emotional intelligence; the coaches' titles have significant effects on the level of team emotional evaluation, but not on the level of team emotional cognition, sharing, regulation and the overall level of team emotional intelligence. The higher the coaches' titles, the higher the team emotional evaluation level; the coaches' years of coaching can significantly affect the overall team emotional level and the team cognitive, sharing, evaluation and normative levels, and the team emotional cognitive level gradually decreases, the team emotional sharing, evaluation and normative levels and the overall level gradually increases as the coaching years increase.
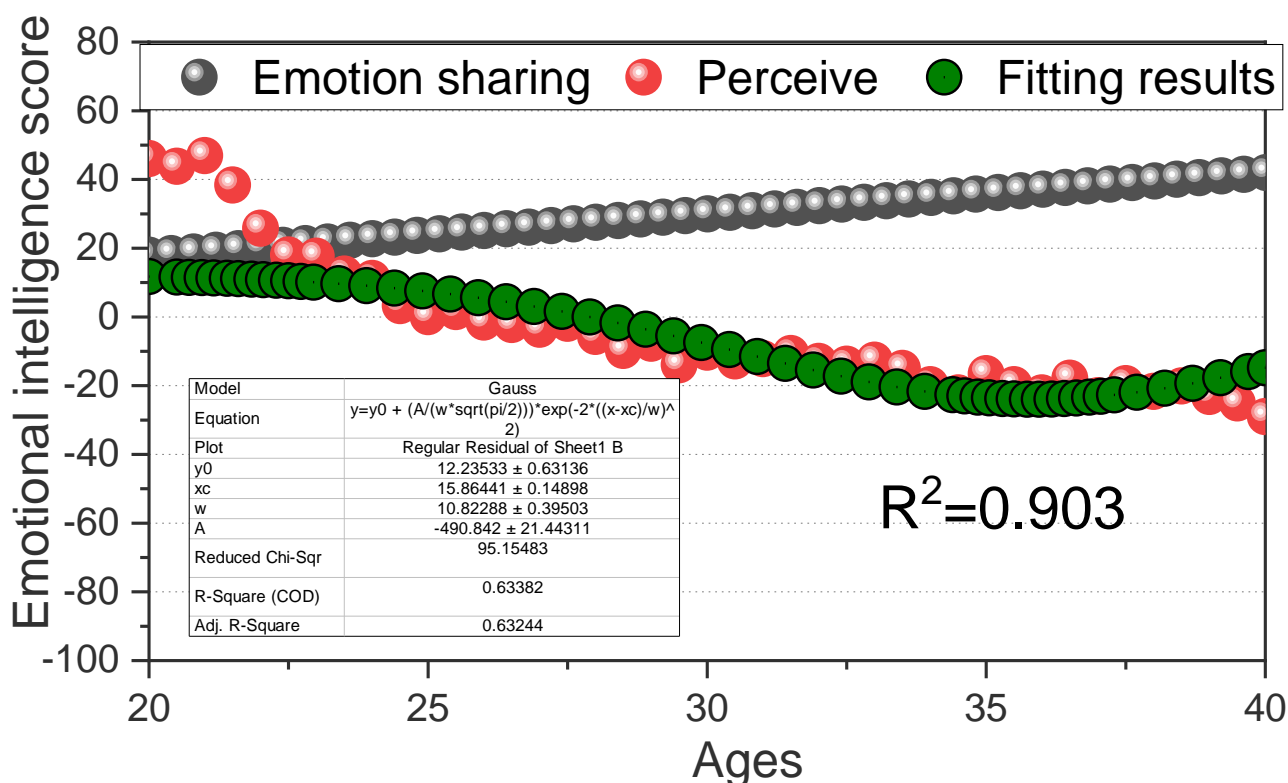

Model	Gauss
Equation	y=y0 + (A/(w*sqrt(pi/2)))*exp(-2*((x-xc)/w)^2)
Plot	Regular Residual of Sheet1 B
y0	12.23533 ± 0.63136
xc	15.86441 ± 0.14898
w	10.82288 ± 0.39503
A	-490.842 ± 21.44311
Reduced Chi-Sqr	95.15483
R-Square (COD)	0.63382
Adj. R-Square	0.63244

$R^2 = 0.903$

Figure 8. Correlation between team movement level and mood

Conclusion

This study establishes a theoretical model of team emotional intelligence, including four dimensions; team emotional cognition, team emotional sharing, team emotional evaluation, and team emotional norming, based on existing research on team emotional intelligence, symbolic interaction and information processing theories, and the characteristics of sports. It has been found that the team emotional cognitive ability of athletes with average age in the range of 20-21 years performs better, and team emotional intelligence and team emotional sharing, evaluation and normative ability were poor. The higher the percentage of athletes' sports rank, the higher the team emotional intelligence; the longer the team's team length,

the stronger the team emotional cognitive ability. The better the team performance, the stronger the team emotional intelligence and team emotional sharing, evaluation, and regulation ability, but the weaker the team emotional cognitive ability; the female coaches' team emotional cognitive ability is stronger than the male coaches. The older the coaches are, the stronger the team emotional intelligence and team emotional sharing, evaluation, and standardization ability, but the weaker the team emotional cognitive ability. The higher the coaches' titles, the stronger the team emotional evaluation ability. The longer the coaches' coaching experience, the stronger the team emotional intelligence and the ability to share, evaluate and regulate team emotions, but the weaker the team emotional cognitive ability.

References

Baggish, A., Drezner, J. A., Kim, J., Martinez, M., & Prutkin, J. M. (2020). Resurgence of sport in the wake of COVID-19: cardiac considerations in competitive athletes. 6-12. doi:http://dx.doi.org/10.1136/bjsports-2020-102516

Broglio, S. P., McCrea, M., McAllister, T., Harezlak, J., Katz, B., Hack, D., & Hainline, B. (2017). A national study on the effects of concussion in collegiate athletes and US military service academy members: the NCAA–DoD concussion assessment, research and education (CARE) consortium structure and methods. *Sports medicine, 47*(7), 1437-1451. doi:https://doi.org/10.1007/s40279-017-0707-1

Campo, M., Champely, S., Louvet, B., Rosnet, E., Ferrand, C., Pauketat, J. V., & Mackie, D. M. (2019). Group-based emotions: Evidence for emotion-performance relationships in team sports. *Research quarterly for exercise and sport, 90*(1), 54-63. doi:https://doi.org/10.1080/02701367.2018.1563274

Cece, V., Guillet-Descas, E., Nicaise, V., Lienhart, N., & Martinent, G. (2019). Longitudinal trajectories of emotions among young athletes involving in intense training centres: Do emotional intelligence and emotional regulation matter? *Psychology of Sport and Exercise, 43*, 128-136. doi:https://doi.org/10.1016/j.psychsport.2019.01.011

Doron, J., & Martinent, G. (2017). Appraisal, coping, emotion, and performance during elite fencing matches: a random coefficient regression model approach. *Scandinavian journal of medicine & science in sports, 27*(9), 1015-1025. doi:https://doi.org/10.1111/sms.12711

Fritsch, J., Redlich, D., Latinjak, A., & Hatzigeorgiadis, A. (2021). The behavioural component of emotions: exploring outward emotional reactions in table tennis. *International Journal of Sport and Exercise Psychology*, 1-19. doi:https://doi.org/10.1080/1612197X.2021.1877324

Gilchrist, J. D., Conroy, D. E., & Sabiston, C. M. (2017). Experienced and anticipated pride and shame as predictors of goal-directed behavior. *Journal of Sport and Exercise Psychology, 39*(6), 438-442. doi:https://doi.org/10.1123/jsep.2017-0011

Kellmann, M., Bertollo, M., Bosquet, L., Brink, M., Coutts, A. J., Duffield, R., . . . Heidari, J. (2018). Recovery and performance in sport: consensus statement. *International journal of sports physiology and performance, 13*(2), 240-245. doi:https://doi.org/10.1123/ijspp.2017-0759

Lalande, D., Vallerand, R. J., Lafrenière, M. A. K., Verner-Filion, J., Laurent, F. A., Forest, J., & Paquet, Y. (2017). Obsessive passion: A compensatory response to unsatisfied needs. *Journal of personality, 85*(2), 163-178. doi: https://doi.org/10.1111/jopy.12229

Landry, C. H., Allan, K. S., Connelly, K. A., Cunningham, K., Morrison, L. J., & Dorian, P. (2017). Sudden cardiac arrest during participation in competitive sports. *New England Journal of Medicine, 377*(20), 1943-1953. doi:10.1056/NEJMoa1615710

Mackay, D. F., Russell, E. R., Stewart, K., MacLean, J. A., Pell, J. P., & Stewart, W. (2019). Neurodegenerative disease mortality among former professional soccer players. *New England Journal of Medicine, 381*(19), 1801-1808. doi:10.1056/NEJMoa1908483

Manley, G., Gardner, A. J., Schneider, K. J., Guskiewicz, K. M., Bailes, J., Cantu, R. C., . . . Randolph, C. (2017). A systematic review of potential long-term effects of sport-related concussion. *British journal of sports medicine, 51*(12), 969-977. doi:http://dx.doi.org/10.1136/bjsports-2017-097791

Mountjoy, M., Sundgot-Borgen, J. K., Burke, L. M., Ackerman, K. E., Blauwet, C., Constantini, N., . . . Meyer, N. L. (2018). IOC consensus statement on relative energy deficiency in sport (RED-S): 2018 update. *British journal of sports medicine*, 1-11. doi:10.1136/bjsports-2018-099193

Nagelli, C. V., & Hewett, T. E. (2017). Should return to sport be delayed until 2 years after anterior cruciate ligament reconstruction? Biological and functional considerations. *Sports medicine, 47*(2), 221-232. doi:https://doi.org/10.1007/s40279-016-0584-z

Pelliccia, A., Solberg, E. E., Papadakis, M., Adami, P. E., Biffi, A., Caselli, S., . . . Schmied, C. M. (2019). Recommendations for participation in competitive and leisure time sport in athletes with cardiomyopathies, myocarditis, and pericarditis: position statement of the Sport Cardiology Section of the European Association of Preventive Cardiology (EAPC). *European heart journal, 40*(1), 19-33. doi:https://doi.org/10.1093/eurheartj/ehy730

Rajpal, S., Tong, M. S., Borchers, J., Zareba, K. M., Obarski, T. P., Simonetti, O. P., & Daniels, C. J. (2021). Cardiovascular magnetic resonance findings in competitive athletes recovering from COVID-19 infection. *JAMA cardiology, 6*(1), 116-118. doi:10.1001/jamacardio.2020.4916

Sabiston, C., Pila, E., Crocker, P., Mack, D., Wilson, P., Brunet, J., & Kowalski, K. (2020). Changes in body-related self-conscious emotions over time among youth female athletes. *Body image, 32*, 24-33. doi:https://doi.org/10.1016/j.bodyim.2019.11.001

Scheiman, J., Luber, J. M., Chavkin, T. A., MacDonald, T., Tung, A., Pham, L.-D., . . . Tierney, B. T. (2019). Meta-omics analysis of elite athletes identifies a performance-enhancing microbe that functions via lactate metabolism. *Nature medicine, 25*(7), 1104-1109. doi:https://doi.org/10.1038/s41591-019-0485-4

Soligard, T., Steffen, K., Palmer, D., Alonso, J. M., Bahr, R., Lopes, A. D., . . . Mountjoy, M. (2017). Sports injury and illness incidence in the Rio de Janeiro 2016 Olympic summer games: a prospective study of 11274 athletes from 207 countries. *British journal of sports medicine, 51*(17), 1265-1271. doi:http://dx.doi.org/10.1136/bjsports-2017-097956

Tamminen, K. A., & Bennett, E. V. (2017). No emotion is an island: An overview of theoretical perspectives and narrative research on emotions in sport and physical activity. *Qualitative Research in Sport, Exercise and Health, 9*(2), 183-

199. doi:https://doi.org/10.1080/2159676X.2016.1254109

Ulrich, R., Pope, H. G., Cléret, L., Petróczi, A., Nepusz, T., Schaffer, J., . . . Simon, P. (2018). Doping in two elite athletics competitions assessed by randomized-response surveys. *Sports medicine, 48*(1), 211-219. doi:https://doi.org/10.1007/s40279-017-0765-4

van Kleef, G. A., Cheshin, A., Koning, L. F., & Wolf, S. A. (2019). Emotional games: How coaches' emotional expressions shape players' emotions, inferences, and team performance. *Psychology of Sport and Exercise, 41*, 1-11. doi:https://doi.org/10.1016/j.psychsport.2018.11.004

Windt, J., & Gabbett, T. J. (2017). How do training and competition workloads relate to injury? The workload—injury aetiology model. *British journal of sports medicine, 51*(5), 428-435. doi:http://dx.doi.org/10.1136/bjsports-2016-096040