The Role of Emotions in Intuitive Decision-Making: a Study Conducted with Expert Handball Coaches

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ABSTRACT
Decision-making is a complex process influenced by cognitive, perceptual, and emotional factors. In team sports, players and coaches have to react in a dynamic environment requiring real-time adaptation. The naturalistic decision-making (NDM) approach has been used to understand these processes in the context of elite handball. Specifically, this study focused on the role of emotions in intuitive decision-making, involving nine expert handball coaches. Collaborating with these coaches during high-level matches, self-confrontation interviews were conducted. Data analysis was performed using the Recognition Primed Decision (RPD) model and an emotions scale. The results indicate that negative emotions are often associated with diagnostic or mental simulation processes, while positive emotions are linked to simple recognition. These findings suggest the crucial role of emotions in intuitive decision-making, influencing the emotional evaluation of the situation, motivating the search for additional information, and potentially guiding choices in discomforting situations. Thus, integrating emotional dimensions into intuitive decision-making could enhance the understanding and optimization of sports performance.

KEYWORDS
Decision-Making, Intuitive, Emotion, Expert Coaches, Handball

INTRODUCTION

Dynamic situations in the realm of sports are characterized by high stakes, intense time pressure, and numerous uncertainties. The decision-making and emotional processes are central to a wide variety of sports situations, and their consideration is fundamental when studying or developing expert high-level performance. This makes decision-making an essential dimension for performance, especially in team sports (Kaya, 2014). On the other hand, 'emotions are at the heart of each facet of sports practice, whether it is recreational, formative, intensive, competitive, or pursued for health purposes' (Campo & Louvet, 2016, p.22). According to Lee et al. (2015), elite sports represent an intrinsically emotion-laden context, with numerous incidents likely to evoke emotions in the coach's experience, especially in interactions with athletes, opponents, referees, media, or other stakeholders in sports. Contextual elements trigger various emotional experiences and require intense emotional labor from coaches (Petiot, Visioli & Kermarrec, 2023). Studies have been conducted on handball coaches, notably by Debanne et al. (2012), examining the content of communication by professional male team coaches based on the level difference between teams. Some researchers have delved into coaches' emotions, particularly their methods of regulating these emotions (Lee et al., 2013; Braun & Tamminen, 2019). However, recent studies have not explored the role of this emotional dynamic in coaches on their intervention and decision-making.

The Naturalistic Decision Making (NDM) model, exemplified by Klein et al. (1993) and Zsambok and Klein (1997), is tailored to address the intricacies of ill-structured problems, dynamic and uncertain conditions, evolving goals, and high-risk situations coaches frequently encounter (Klein et al., 1993). Coaches operate in high-pressure and emotional contexts, requiring intuitive decision-making strategies, as exemplified by the Recognition Primed Decision (RPD) model derived from Klein's work (1997). This model exists on a continuum between Intuitive Decision Making (IDM) and Rational Decision Making (RDM), encompassing three Situation Recognition Mechanisms (SRMs) that guide intuitive decision-making in sports scenarios (Klein, 1997b; Kahneman & Klein, 2009). These mechanisms include simple recognition (SR) in familiar situations, mental simulation (SIM) under lower pressure, and option comparison or diagnosis (DIAG) in less familiar situations (Klein, 1997b). While self-confrontation interviews with high-level athletes have unveiled salient elements in decision-making, the emotional component has been somewhat understated, despite the potential impact on performance (Macquet & Lacouchie, 2017). Emotions, a key factor in sports performance, manifest in athletes, coaches, and referees and play a crucial role in decision-making (Ruiz & Hanin, 2011; Seve et al., 2007; Laborde et al., 2013). The subjective experience, a major component of emotion, becomes particularly relevant in high-pressure situations, common in sports, which can induce intense emotions (Sander & Scherer, 2014). Despite these observations, the emotional dimension of intuitive decision-making in sports remains relatively underestimated in research, warranting further exploration.

In a sports context, empirical studies conducted using the RPD model in athletes include volleyball (Macquet, 2009), ice hockey (Bossard et al., 2010), football (Kermarrec & Bossard, 2014), and handball (Le Menn & Kermarrec, 2015; Le Menn et al., 2019). However, there is a notable absence of research involving high-level coaches and exploring the connections between emotion and decision-making processes. Interest in the interplay

between decision-making processes and emotions has grown in recent decades (George & Dane, 2016). Emotions, traditionally viewed as biases or hindrances to decision-making, have been a focal point in cognitive approaches to studying athletes, referees, and coaches (Tenenbaum et al., 2013). While studies on stress and negative affects in sports contexts have been conducted, addressing situations labeled as "extreme" and emphasizing dissatisfaction or discomfort (Lebraty et al., 2011; Giordano & Musca 2012; Rix-Lièvre et al., 2013), positive emotions and their connection to decision mechanisms within the Naturalistic Decision Making (NDM) framework have been overlooked. Insights from management sciences have identified emotions as resources for decision-making in various models (Sayegh et al., 2004; Lipshitz & Shulimovitz, 2007; Coget & Keller, 2010; Coget et al., 2011; Naweed & Kingshott, 2019). However, the role of emotions in Intuitive Decision Making (IDM) in the sporting context remains unexplored. Situationally-induced emotions, termed “integral affects”, could potentially play diverse roles in sports decision-making (Mosier & Fischer, 2010). Despite the wealth of studies on coaches focusing on leadership, instructional behaviors, motivational processes, and expertise (Smoll & Smith, 1984; Jones, 1997; Petlichkoff, 1993; d’Arripe-Longueville, 1998 as cited in Saury et al., 2002), a notable gap exists in empirical knowledge on coaches' decision-making processes (Harvey et al., 2015). Coaches, integral to high-performance outcomes through critical decisions, are surprisingly underrepresented in research (Laborde et al., 2013).

The aim of this study was to investigate the role of emotions in the intuitive decision-making of elite handball coaches during high-pressure situations. It has been based on the RPD model and pursued three hypotheses: (1) expert pattern matching and intuitive decisions are often guided by an affective evaluation of the situation, (2) emotion, such as discomfort, may motivate individuals to seek additional information for a more deliberative decision, and (3) if mental simulation induces discomfort, individuals might be inclined to choose an alternative option (Bossard et al., 2022).

METHODOLOGY

Participants and Studied Situations

Our study focuses on nine high-level matches involving expert coaches. All selected matches take place in top-tier championships, featuring elite-level coaches. This approach allows us to thoroughly explore intuitive decision-making and emotions in diverse and high-pressure situations, providing a significant insight into decision-making and emotional dynamics in the world of high-performance sports. The table below presents key details, including different matchups, dates, championship classifications and genders, locations, results, and scores.

Match	Date	Championship - Gender	Locations	Result	Score
La Stella – Rennes Métropole	January	D2 – Women	Home	Won	37 – 24
Rennes Métropole – Le Havre	January	D2 – Women	Home	Lost	25 – 27
PAUC - Nimes	February	D1 – Men	Home	Won	29 – 28
Caen – Cherbourg	February	D2 – Men	Home	Lost	24 – 29
Paris - PAUC	March	D1 – Men	Away	Lost	32 – 37
Cesson – PAUC	March	Quarter-final of the French Cup – Men	Home	Lost	21 – 25
Cesson – Créteil	March	D1 – Men	Home	Won	30 – 28
Rennes Métropole – Bouillargues	March	D2 – Women	Home	Lost	24 – 25
Brest 1/8 de final	April	Champions League – Women – Second Leg Match following a 25-24 Defeat in the First Leg	Home	Won	29 – 26
Selestat – Nice	May	D2 – Playoff accession D1 – First Leg Match	Home	Draw	25 – 25

Table 1. Main Characteristics of the Studied Matches

The selection of coaches was guided by the application of four categories of criteria emerging from the identification of high-level expert coaches' works by Fukizawa and Robin (2020). Our coaches were chosen by meeting at least two of the following categories: (1) the coach's skill level as an athlete (Côté & al., 1995); (2) the

coach's cumulative experience, with a requirement of 10,000 hours of coaching to achieve expertise (Ericsson an al., 2006; Lemyre and al., 2007); concurrently, the number of victories achieved by athletes under their coaching, spanning an extended period and diverse contexts (Saury, 2004); (3) the performance level of trained athletes. These athletes must be in their advanced development phase, i.e., at the elite level, with a minimum of fifteen years of training (Côté and al., 1995); (4) social recognition. The coach must be officially recognized by their federation as among the best in the country and must also enjoy recognition from peers and athletes (Côté and al., 1995; Rolland, 2011; Salmela, 1996). All the coaches we met unanimously emphasized the crucial importance of these encounters, particularly highlighting the impact of victory, both for them and their club. These high-stakes competition contexts appear to place expert coaches in high-pressure situations conducive to the emergence of various emotions.

Data Collection

For each match, we implemented two data collection methods:

(a) To obtain information about the coaches, we used match broadcasts, recordings made by the coaches themselves, and verbalizations using a continuously worn voice recorder by the coaches from the beginning to the end of the match. This allowed us to capture all the coach's verbatim during the action.

(b) Additionally, we collected post-event data by recording self-confrontation interviews. During these interviews, each coach was invited to explain, illustrate, and comment on the relevant elements for them during the match. Here are some examples of questions we posed during the interview to initiate or stimulate the coach's reflection: "What was your intention or goal at that moment?" "What information or cues did you perceive?" "How did you feel during this situation?" Discussions followed the chronological sequence of the situations addressed, although not all actions taken were probed by the researcher. Moreover, during the self-confrontation phase, we ensure that coaches refer to real emotional experiences lived during the match.

Data Analysis

Decision making

We used a category system derived from the RPD model (Klein, 2008) to code the recognition mechanisms of decision-making. The discourse of the defending coaches, along with salient information, their own goals, the actions they chose, and what they could expect, allowed us to identify active cognitive packages (plausible goals, expectations, typical actions, and relevant cues). We assigned a code for each of the salient features: goals (G), action (A), information (I), expectations (E) and knowledge (K). Because we believe that the sports context can generate specific constraints, we decided to conduct an empirical inductive analysis using the RPD model (simple match, diagnose, and simulate). We analyzed verbal reports on each decision separately (Table 1). Coaches successively verbalized many components of a cognitive package, so that the chronology within each short account could be considered an indicator of the identification of the recognition process. For example, a coach said: "I could see that the defender was closing (I), my player goes into the gap (I); I tell him to continue (A)." In this example, relevant cues ("the defender was closing" and "my player goes into the gap") are taken into account to evaluate the situation: the coach told his player to "continue." This approach aimed to elucidate the dynamics of decision-making processes to be considered during the action. We noted/coded this recognition process: I(+I)---A. This type of process, which included the perception of information leading to action. At this stage, we conducted an empirical categorization of the data (Strauss & Corbin, 1998) on the different decisions made by the nine coaches. Typical decisions were defined and named at the end of the analysis.

Verbatim	Cognitive package	Recognition Process
"Alright, we're on a numerical disadvantage in (I), so we're playing without the goalkeeper (A)."	(I) + (A)	Simple match
"I'm substituting the winger (A) due to these two consecutive failures in (I). He's my number 1 winger, the one with the most experience in (I), but on this type of ball, he needs to score (E)."	(A) + 2(I) + (E)	Diagnose
"I'm questioning whether I should change the player, even though he's my best in the defensive organization (K). So, if I replace him with another back player, I'm breaking up my defensive sector (E). Yes, I've already made one substitution, attack-defense (A). I can't make two because I'm on the opposite side of the bench (I). All efforts are made offensively, but defensively... we're ruining everything because we're doing anything in attack (I)."	(K) + (E) + (A) + 2(I)	Simulate

Table 2. Coding of verbatims using the "Recognition Primed Decision (RPD) model"

Emotion

To analyze the verbal data collected during interviews, we chose an inductive approach based on content analysis (Table 2) according to Mayring (2008). This approach allows us to let categories emerge directly from the interviews rather than imposing them a priori using predefined classifications and theoretical concepts. To develop our inductive emotion scale, we focused on two key elements: valence and intensity. After analyzing each coach's

verbatim, we sought common elements to determine an emotion estimation scale on a "positive emotion – negative emotion" scale consisting of 5 points (from -2: extremely negative to +2: extremely positive) that would be applicable to all participants. We examined four essential elements: (1) the direction of emotions, (2) their presence, (3) their frequency, (4) their intensity and weighted frequency. By adopting this inductive approach and developing a scale tailored to the specificities of coaches' emotions during high-stakes matches, we hope to make a significant contribution to understanding emotional dynamics in the context of high-level handball. Our methodology offers an innovative perspective to comprehend coaches' emotional experiences during these crucial moments in the game.

Analysis Coding → Enumeration rules	Definition	Examples
The direction	It can be favorable, unfavorable, or neutral. In our case, positive, negative, or neutral.	"I'm really satisfied with what we're offering; I would even say I'm happy to see that we're applying the instructions." → Positive direction "I'm not satisfied with what we're offering; I would even say I'm annoyed to see that we're not following the instructions." → Negative direction "I'm waiting to see what we're going to offer; the instructions seem to be applied. I'm waiting to see what happens next." → Neutral direction
The presence (or absence)	For certain types of messages, the absence can be an important variable (it may reflect the desire to hide irritation or the inability to find something to say). Presence, on the other hand, indicates whether there is an emotion felt in the coach's discourse.	"Well, I'm dismayed." → Presence of a word indicating dismay "Well, I'm annoyed" (sighs, runs fingers through hair) → Absence of words and presence of gestures indicating dismay
Frequency	It represents the number of times the coach will use verbatims expressing an emotion.	"Well, I'm annoyed; frankly, it's not possible. What we're offering is terrible. I'm really not happy with my center-back; he's playing the wrong way." → High frequency in the anger lexical field, strongly negative emotion "It's interesting; I'm happy at this moment." → Low frequency in the joy lexical field, positive emotion
Intensity and weighted frequency	Intensity is essential in the analysis of values. We can rely on the intensity (semantics) of verbs, adjectives, qualifying attributes, superlatives, etc. Weighted frequency allows us to analyze if certain elements of the language register are more important than others.	"That's good; we're in position. I'm satisfied with what we're offering at the beginning of the match." → No superlatives, positive emotion "That's very good; we're perfectly positioned. I'm really satisfied with what we're offering at the beginning of the match." → Presence of 3 superlatives, strongly positive emotion "Well, this sucks; we're bad." → Informal, significant impact of a negative emotion "Well, this bothers me; we're bad." → Standard, moderate impact of a negative emotion

Table 3. Enumeration rules used to code autoconfrontation interviews and create a scale to observe emotional experience

Relation between emotions and intuitive decision-making

Autoconfrontation interviews served as the foundation for an in-depth exploration of the link between emotions and intuitive decisions made by coaches. To achieve this, we documented all intuitive decisions made by each coach in a table, categorizing them into two columns labeled "positive emotions and negative emotions" (Table 4). Additionally, each emotion was coded using our scale, enabling the creation of a graph (Graph 1). This comprehensive table allowed for a precise categorization of the emotions experienced by coaches during each intuitive decision, providing a visual representation of the emotions associated with the evolution of decisions throughout the match. The resulting graph offered a temporal perspective, highlighting the dynamics between the emotions felt by coaches, the intuitive decisions made, and their evolution during the match. This visual approach

enhanced our ability to discern significant trends and establish concrete connections between emotions and the intuitive decision-making process.

Methodological Rigor

Our qualitative research, guided by Charmaz and Thornberg's (2020) criteria, prioritized credibility, originality, resonance, and utility. Credibility was ensured by aligning coaches' perspectives with our interpretations, emphasizing faithful data representation. Autoconfrontation, proven effective in sports research, enhanced credibility. Anchoring data processing in existing emotional dynamics literature added support. Originality stemmed from our unique emphasis connecting emotions to intuitive decision-making. Resonance was achieved by applying key concepts like emotional experience and triggers, illuminating participants' experiences through verbalizing emotions. Utility was evident in practical contributions, deepening understanding in unexplored handball coaching areas and providing insights into the benefits of verbalizing emotions for trigger comprehension and management, especially during challenging match events. Transferability was ensured with detailed context descriptions for broader applicability. These criteria formed essential pillars, guaranteeing result quality in our interpretative research, crucial given the study's contextual complexity and subjectivity, demanding a rigorous approach for credibility and validity assurance.

Ethical Dimensions

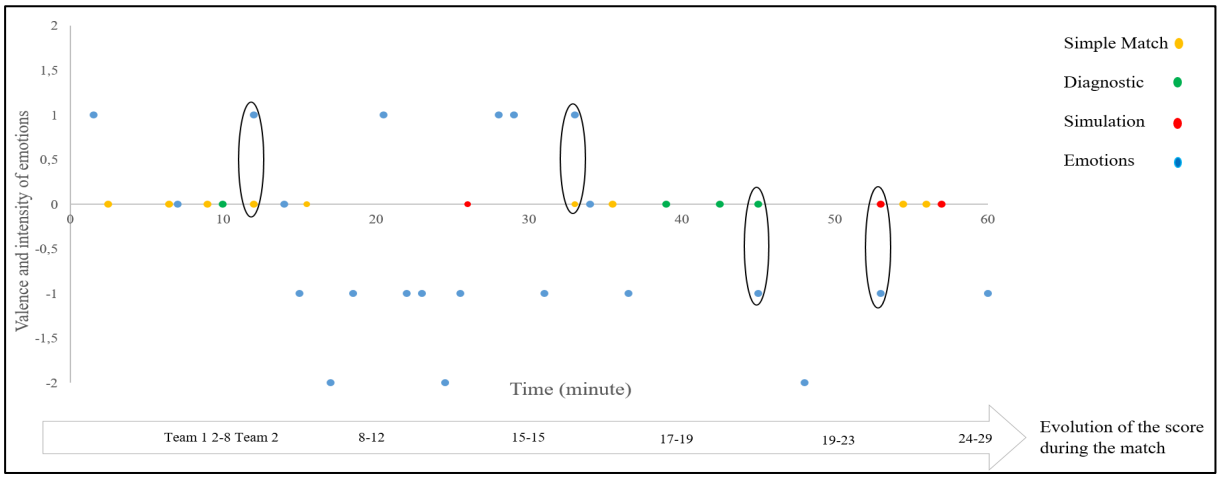
In terms of ethical considerations, all nine coaches willingly participated in the study. Prior to the matches, preliminary discussions were organized to outline the research project. Collaborative efforts were made to select matches of significance for both the coaches and their clubs. Modalities of researcher presence before matches were established, respecting the "performance bubble" of players. The coaches were assured that the collected data would be treated confidentially, reserved solely for scientific and educational purposes.

RESULT

This table (table 4) and graphic (graphic 1) illustrate the relation between emotions and processes of intuitive decisions. The emotions are categorized into positive and negative, corresponding to specific instances of simple match, diagnose, and simulate decision-making processes. Each decision-making process is accompanied by a brief description of the coach’s thoughts and actions, providing insight into the emotional experiences associated with each decision.

	Positive emotion	Negative emotion
Simple Match	It's good. Now, I think he'll go alone (E), and he does (I). I tell him, you need to keep scoring goals (A). Emotion : 1 It's not the moment to complicate the game (I). Stay calm, (A). Let's calm everyone down, (A). We're in a good position, and I'm very pleased." Emotion : 1	And then, he doesn't defend (I). He's still talking to the referees; he's going to continue (I). And then, he's going to annoy me because... look, look, he's talking to the referees. So, I take him out (A), and then I get angry. I get angry. Emotion : -2
Diagnose		At this point, I am angry, but I don't show it (A) because I know it's the beginning of the match (I). So, I think to myself, "Damn, tonight, besides making passes, he's not coming out in defense anymore..." It annoys me. Then, I tell myself in my head, "No commitment at 7 against 6 ..." Even if we score a goal, he'll send the ball to the middle (K), and we'll concede a goal (E). But, it's annoying (hesitation, discomfort). So, I say no, it's 5-1 (A). Emotion : -1
Simulate		I switch (A) with a tactical option, but currently, it's a huge risk because we're slow in the defensive transition (K) It's playing with 7 to re-energize (G) the fast break, but I'm not reassured. So, I think and wait, (A). Emotion -1

Table 4. Links between emotions and intuitive decision-making processes of experts coachs



Graphic 1. Links between emotions and intuitive decision-making processes of a D2 expert coach during a derby

On the graph, we can observe the relationship between emotions and recognition mechanisms. The graph is coded based on the match's timeline, allowing us to associate an emotion with a mechanism. We were able to create a graphical representation of emotions using the emotions scale and decisions using the RPD model. This visualization provides insights into the number of mechanisms associated with emotions during a match. By examining the graph, we can pinpoint the specific moments when emotions influenced the decisions made by the coaches. This enhances our understanding of how emotions interact with intuitive decision-making processes in the context of high-level handball matches. We will delve deeper into this graph by illustrating the impact of emotions (valence and intensity) on different mechanisms. These results are presented in three stages corresponding to the hypotheses proposed in Bossard et al.'s (2022) article. It is important to note that these results are preliminary as the analysis is still in the finalization stage. We will present the correspondence between patterns and intuitive decisions of expert coaches, highlighting the influence of emotion on these processes. Next, we will examine the emotional experience, emphasizing how discomfort can serve as a catalyst for actively seeking additional information before making a more deliberative decision. Finally, we will address the hypothesis of mental simulation and its link to discomfort, examining how this can influence the choice of an alternative option. These preliminary findings provide an initial understanding of the emotional mechanisms related to the intuitive decisions of expert coaches in high-pressure sports contexts.

Intuitive Decisions: Affective Evaluation's Influence in Simple Match

The simple recognition process often appears to be associated with both positive and negative emotions. Indeed, as we can see in this example : "It's good. Now, I think he'll go alone (E), and he does (I). I tell him, you need to keep scoring goals (A)." In this example, the coach expresses a positive emotion linked to the simple recognition process. The use of the expression "It's good" indicates a positive reaction, a satisfaction stemming from the observed situation on the field. The coach intuitively anticipates that the player will act individually ("I think he'll go alone"), an anticipation that proves accurate ("and he does"). Subsequently, the coach guides the player by emphasizing the need to continue scoring goals ("I tell him, you need to keep scoring goals") while expressing satisfaction with the player's action. In summary, this verbalization reflects a positive emotion from the coach, prompting encouragement for the player to persevere. This illustrates a simple recognition process where the positive emotion, triggered by the perceived cues, leads to a specific action. In this case, the positive emotion associated with perceived cues facilitates an intuitive process of simple recognition, highlighting the connection between positive emotions and this particular decision-making mode.

The simple recognition process also is also associated with negative emotions. As exemplified by the coach's statement: "And then, he doesn't defend (I). He's still talking to the referees; he's going to continue (I). And then, he's going to annoy me because... look, look, he's talking to the referees. So, I take him out (A), and then I get angry. I get angry." In this case, the coach expresses a negative emotion linked to the simple recognition process. The coach's frustration is evident in phrases such as "he doesn't defend" and "he's talking to the referees," indicating a dissatisfaction with the observed situation on the field. The coach intuitively perceives that the player's actions are not aligning with the desired defensive behavior ("And then, he doesn't defend"), leading to increasing annoyance. Subsequently, the coach takes decisive action by substituting the player ("So, I take him out"), expressing anger at the player's behavior. In this example, the negative emotion associated with perceived cues triggers a specific action, demonstrating how negative emotion, influence the intuitive decision-making process within the framework of simple match.

The Role of Negative Emotion as Discomfort in Diagnose

The next verbalization highlights how negative emotion impacts the diagnostic process in decision-making."At this point, I am angry, but I don't show it (A) because I know it's the beginning of the match (I). So, I think to myself, "Damn, tonight, besides making passes, he's not coming out in defense anymore..." It annoys me. Then, I

tell myself in my head, "No commitment at 7 against 6 ..." Even if we score a goal, he'll send the ball to the middle (K), and we'll concede a goal (E). But, it's annoying (hesitation, discomfort). So, I say no, it's 5-1 (A)."
The coach expresses frustration and irritation ("I am angry"), but chooses not to show it outwardly ("I don't show it"), aware of the match's timing ("because I know it's the beginning of the match"). The coach reflects on the player's performance, noting a lack of defensive participation ("besides making passes, he's not coming out in defense anymore"), which bothers him ("It annoys me"). The coach's internal reflection underscores his dissatisfaction with the player's defensive commitment ("No commitment at 7 against 6"). Even though he anticipates the possibility of scoring a goal, he also foresees a unfavorable counterattack ("Even if we score a goal, he'll send the ball to the middle, and we'll concede a goal"). This dilemma creates hesitation and discomfort ("But, it's annoying (hesitation, discomfort)"), ultimately leading to a decision ("So, I say no, it's 5-1"). This verbalization illustrates how emotional discomfort can act as a catalyst in the decision-making process, influencing the coach's strategic choices during the match.

Mental Simulation and Negatives Emotions : Exploring Alternative Options
"I switch (A) with a tactical option, but currently, it's a huge risk because we're slow in the defensive transition (K) It's playing with 7 to re-energize (G) the fast break, but I'm not reassured. So, I think and wait, (A)." This verbalization highlights how negative emotion impacts the simulation process in decision-making. The coach mentions opting for a tactical option (switching, I) but immediately emphasizes the risky nature of this decision due to the slow defensive transition (K). The underlying idea is to play with seven players to revitalize the attack, but the coach expresses a lack of assurance regarding this strategy.
The use of the term "huge risk" indicates a negative emotion, showcasing the coach's concerns and apprehension about the situation. The coach doesn't feel reassured about the success of the chosen tactic, leading to uncertainty and a sense of discomfort ("I'm not reassured"). Consequently, the coach decides to step back, reflect, and wait ("So, I think and wait, (A)"), underscoring how the negative emotion linked to mental simulation can influence the decision-making process by encouraging a more cautious and thoughtful approach. This verbalization illustrates how negative emotions can play a crucial role in exploring alternative options during the mental simulation process.

Exploring the Link Between Emotions and Intuitive Decisions: Ongoing Analysis and Processing Projection
We are currently processing the results to explore in depth the link between emotions and intuitive decisions. To visualize and analyze this relationship, we will use a contingency table, which is a statistical tool that allows for the simultaneous presentation of two crossed variables within the same population. In our study, we will cross-reference positive/negative emotions with three recognition mechanisms: simple recognition, diagnosis, and mental simulation. This approach will enable us to examine in detail the strength of the link between these emotions and the different recognition mechanisms. Additionally, we will conduct another contingency table analysis to examine the relationship between typical coach decisions and recognition mechanisms. This cross-analysis will allow us to establish new connections between typical decisions, recognition mechanisms, and emotions. Furthermore, we plan to use a khi-2 statistical analysis, which is a method for assessing the dependence between two categorical variables. This quantitative analysis will help deepen our understanding by determining which emotions are more prevalent depending on the recognition mechanism. However, we will not limit ourselves to quantitative approaches alone. We also intend to incorporate qualitative analysis to complement our understanding of the role of emotions, such as anticipation, regulation, and modification, in the process of intuitive decision-making. This qualitative analysis will enable us to identify and describe more precisely the role of emotions in this process. By combining quantitative and qualitative approaches, we aim to obtain a comprehensive and in-depth understanding of the link between emotions and intuitive decisions.

DISCUSSION

The findings are deliberated in three key phases: (1) Intuitive decisions: examining the influence of emotion in simple match; (2) the role of negative emotion as discomfort in diagnose; (3) mental simulation and negative emotion: exploring alternative options. In our examination of the link between emotions and expert coaches' intuitive decision-making, a key finding is the intimate connection between the simple match and emotions, whether positive or negative. Unlike cognitive approaches suggesting superior decision-making in emotionally neutral contexts (Laborde & Raab, 2016), our results with expert coaches indicate a profound interweaving of emotions and decision-making in the "ecological" context. Positive emotions, such as satisfaction, are identified during simple recognition (Coget et al., 2011). In instances of positive affective evaluation, coaches tend to make decisions such as encouraging players. Conversely, when negative emotions like frustration surface, coaches pivot swiftly, triggering immediate tactical adjustments. This interplay challenges prior research primarily focused on the impact of negative emotions, providing a nuanced understanding of the complex links between emotions and intuitive decisions.
Delving further into the emotional landscape, our study highlights the central role of discomfort as a catalyst within the decision-making process. Negative emotion, such as discomfort, can prompt strategic corrections in unknown situations. This dynamic reveals the coach's adaptability to discomfort, akin to the stress adaptation mechanism observed in high mountain guides (Lebraty et al., 2011) and rugby referees facing emotional discomfort (Rix-Lièvre et al., 2013). Thus, negative emotion leads to an active search for alternative solutions in the face of

adversity and the uncknow. This exploration sheds light on the complex relationship between emotional states and the deliberate, adaptive dimensions of decision-making, challenging prevailing notions that consider emotions solely as obstacles to effective choices (Mosier & Fischer, 2010).

The final facet of our exploration leads us to the realm of mental simulation and its interaction with negative emotions, offering valuable insights into the consideration of alternative options. Building upon the hypotheses proposed by Bossard et al. (2022), our study affirms that negative emotions generated during mental simulation prompt coaches to contemplate alternative options. In situations where caution is evoked by negative emotions, coaches exhibit more thoughtful decision-making, navigating the perceived uncertainty with careful consideration (Giordano & Musca 2012). This section of our findings reinforces the broader framework of naturalistic decision-making, emphasizing the adaptive role of emotions in exploring alternative courses of action during the decision-making process. Through this tripartite exploration, we unravel the intricate connections between affective appraisals, emotional responses, and mental simulation, enriching our understanding of the emotional dimensions inherent in coaches' intuitive decision-making during high-pressure sports situations.

CONCLUSION

This study, focusing on nine expert handball coaches in high-stakes situations, aimed to provide a better understanding of the relations between intuitive decision-making and emotions. In this regard, our results offer distinct insights during coaching activities in competitive situations with stakes. Furthermore, the methodology employed, despite certain limitations, provides added value on various aspects for jointly studying emotions and decision-making. From a scientific and conceptual perspective, our results seem to lend support to hypotheses regarding the integration of emotions within the NDM framework (Mosier & Fischer, 2010; Coget et al., 2011; Bossard et al., 2022). We are aware of the limitations of this study, which relies on a small, specific sample of expert handball coaches. Therefore, the results may not be generalizable to other sports or different levels of expertise. Additionally, data collection and processing methods may introduce biases related to the researcher's subjective perception and the personalities of each coach. Observations were made the day after the matches, which could lead to some distortion of emotional memory and may not accurately reflect the emotions felt at the exact moment of the match. Thus, despite examining various sources of information and using multiple methodological approaches, the credibility and scientificity of the results of this case study may face certain criticisms. Our study is an exploratory research aimed at understanding difficult-to-measure factors. These considerations call for a nuanced interpretation of the results and highlight opportunities for future, more in-depth and diversified research in this area, especially to study how coaches make decisions in situations while having the ability to regulate their emotions. Coaches' awareness of their own emotional reactions and how they manage their emotions based on identified triggers could contribute to more thoughtful and consistent decision-making during a match. Furthermore, identifying emotional patterns characteristic of expertise could potentially lead to training programs aimed at strengthening these emotional skills in future coaches. Ultimately, this study provides an innovative perspective on the link between emotions and intuitive decision-making in the world of sports coaching, bridging the understanding of this link and the enhancement of coaches' performance. Future research opportunities lie in understanding how coaches regulate their emotions during decision-making, paving the way for training programs aimed at enhancing emotional skills in Decision Making in future coaches.

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