







# Optimizing Youth Basketball Training Through the Novel and Entertaining Approach of Self-Perception Evaluation Channel

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**Abstract:** In basketball training, players are required to make quick and accurate decisions while maintaining clear self-perception of competence in the game. This study proposed the basketball perception evaluation channel as an innovative approach to adjust players' perceptions of competence. Twelve youth male players participated in the study, which involved video feedback and questioning tests, to assess their decision-making awareness and self-confidence level in offensive, defensive and overall performance. The results indicated that there were differences between the self-confidence levels and decision-making awareness of players, revealing instances of overconfidence or underconfidence in their basketball abilities and highlighting inaccuracies in the players' perceptions of competence. The basketball self-perception evaluation channel demonstrated a fun and creative approach for evaluating and observing the abilities and psychological states of players, aiding them in becoming aware of their actual basketball abilities and confidence states, and assisting coaches in providing targeted training and team management.


## 1 INTRODUCTION


The abilities to efficiently make decisions based on accurate self-perception and precise tactical execution are essential elements for players in achieving success on the court (Causar & Williams, 2013). Sports psychology research has shown that decision-making awareness of players contains self-perception components that represents their beliefs about what they can achieve (Ruiz Perez et al., 2014; Tenenbaum et al., 2002). In the context of sports, self-perception refers to ability, learning, and confidence regarding sports skills (Fox & Corbin, 1989). Players may rely on these perceptions to make decisions about their performance (Ruiz Perez et al., 2014). As a result, the self-perception that occurs when players


are exposed to stimuli requiring them to make decisions, which is crucial to their ability to perform at a high level in basketball (Hodges et al., 2006). Within this context, one of the most relevant aspects of self-perception is confidence of players in their decision-making awareness (Coll, 2009; Feltz, 2007). This volitional component is essential, as decision-making requires favourable psychological availability (Ruiz Perez et al., 2014).


In basketball, self-confidence affects players' movement speed and decision-making on the court (Hepler, 2016). In a fast-paced basketball game, even a second of hesitation can result in a loss. Therefore, confidence is a necessary cognitive factor for peak performance in adolescent players, and it is crucial for players to be confident in their decisions and act


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without hesitation (Hepler & Feltz, 2012; Lee et al., 2021). However, players with high levels of confidence make decisions quickly and confidently, but this does not guarantee that their decisions are correct (Hepler & Feltz, 2012). Due to the fact that some players with high levels of confidence and an inaccurate evaluation of their actual basketball ability may be overconfident on the court (Ortega et al., 2013). Overconfidence in players reflects a difference between their perception of competence and reality. McGraw et al. (2004) discovered that majority of players were overconfident by analysing the correlation between their level of confidence and their satisfaction with the results of shooting tests. Sports psychological studies have revealed that most players are not aware of this psychological condition (Ruiz Perez et al., 2014). Additionally, players especially value feedback from their coaches (Amorose & Nolan-Sellers, 2016). However, it poses a challenge for coaches to timely observe changes in players' confidence states in each tactical scenario. This is likely attributed to the fact that coaches primarily assess the performance of their players through technical skills, such as shooting accuracy, dribbling speed, and ball handling, and physical characteristics like strength, speed and agility (Fiander et al., 2023; Guimarães et al., 2021). As a result, they may not be adept at identifying changes in psychological states of players with accuracy and consistency (Baghurst et al., 2021).

Reviewing previous studies, some researchers have concentrated on sports confidence. Lee et al. (2021) explored the impact of achievement goal orientation and error perception on sports confidence, revealing that the foundation of players' confidence was rooted in skill enhancement. This research advocated for players to maintain a positive and optimistic attitude in the face of errors. Fransen et al. (2015) investigated the factors contributing to varying levels of team confidence in basketball and football, identifying high-quality performance as the most critical element influencing team confidence. These studies have been dedicated to examining the factors that influence sports confidence and strategies for its cultivation. However, fewer studies have further tested whether there is an appropriate state of confidence.

Additionally, some researchers were interested in the self-perception of participants in sport activities. For instance, Malette et al. (2008) examined the relationship between youths' self-perception and their engagement in physical activities, proposing a three-factor model to enhance the understanding of physical self-concept within the Jamaican youth.

Vlachopoulos et al. (2014) developed a short form of the physical self-perception profile to streamline the assessment of physical activity. These articles primarily focus on the assessment methods self-perception in youth sports activities. For the relationship between self-perception of competence and actual performance in sport, Kolovelonis and Goudas (2019) found that students had misjudged their abilities to a similar extent in sports. Kolovelonis et al. (2022) employed a shooting test to calculate students' calibration index, bridging the gap between self-perception and actual performance. However, these investigations predominantly focused on the cognitive of technical skills. Moreover, in the field of sports science, research examining decision-making awareness in youth invasion games was primarily centered on football, with a noticeable scarcity of studies on basketball (Inns et al., 2023). Therefore, there is limited research exploring the differences between basketball players' states of confidence and their actual tactical knowledge of basketball in decision-making scenarios.

To addressing the above research gap, in this study, we introduced the basketball self-perception evaluation channel, which helped coaches and players better understand players' perceptions of their basketball abilities through the differences of self-confidence and decision-making scores in different tactical scenarios. This approach not only contributed to a promising method for enhancing basketball training and evaluation experience but also served as a bridge to the research questions we aimed to investigate. Therefore, this study is aimed to explore the following research questions:

- How can players be assisted in understanding their psychological states and the level of basketball tactical knowledge through the differences between their self-confidence and decision-making awareness?
- How can coaches identify players with inaccurate perception of competence in improving training strategies and team management?
- How can the innovative and entertaining basketball self-perception evaluation channel contribute to enriching the youth sports industry?

## 2 METHODS

The study primarily involved the use of the video-feedback and questioning method. It consisted of 10 basketball game videos that were edited and designed

for assessing decision-making awareness and self-confidence level among players.

## 2.1 Participants

As a pilot case study, 12 male basketball players were recruited from a high school basketball team in Southwest region of China. The age of all of players ranged from 14 to 17 years old, and they have been playing basketball for an average of 3 years at a varsity level. All participants were required to sign an informed consent form after being informed about the study.

## 2.2 Instrument

### 2.2.1 Video-Feedback and Questioning

Video-feedback and questioning method is used to define and establish a tactical oriented training system for players, which consider the interaction elements between players and other environmental factors. Some studies have demonstrated that the combination of video-feedback and questioning has been applied to verify efficacy on decision-making (Domínguez et al., 2011; Gil-Arias et al., 2016), skill execution (García-González et al., 2014) and tactical knowledge (Gil-Arias et al., 2015). Through video feedback and questioning, players can estimate their decision-making capacity, develop their tactical perception, and identify fast and detailed movement cues as well as specific patterns in the game (Pagé et al., 2019). In this study, 10 video clips of basketball tactical skills of offensive and defensive were edited and customized from professional basketball match to assess the basketball decision-making awareness of players (FIBA, 2022).

### 2.2.2 Procedure

During the experimental sessions, participants were required to predict the next movement of a given basketball player in 10 basketball tactic video clips. The entire experimental process was conducted within a single day. Before the start of the experiment, researchers utilized two prepared non-experimental video clips to explain the rules of the experiment and answered relevant questions from participants.

To ensure efficient and accurate responses from participants the video clips were designed to include a brief masking period of one second, in which the rest of the scene were concealed, and only the position of the player that needs to be identified on the basketball court was visible. After this period, the

video clip commenced and lasted approximately 6 seconds, showing the player interacted with other players. Subsequently, the video paused, and 3 possible options were presented to participants. Participants were then given 3 seconds to select the next movement that they believed was appropriate for the player or provide an answer that was not among the three options.



Figure 1: Screenshot of one of the videos used during the experiment sessions.

In this study, the scoring for each of the three options for each video was based on reviews from two head coaches. The best action received a score of 4, an acceptable action received a score of 3, and a suboptimal action received a score of 2. If a player provided an answer that was not among the three options, it was categorized as other action and scored 1 point. After making their decision for each video clip, participants were asked to rate their own level of confidence in their decision on a 4-point Likert scale, ranging from "not at all confident" to "completely confident". The utilization of this approach enabled researchers to understand whether confidence scores of a player difference from their decision-making scores. This was an effective method of identifying the psychological characteristics of players, such as an inclination towards overconfidence or a deficiency in confidence.

## 3 DATA ANALYSIS AND RESULTS

Data on the players' decision-making awareness and self-confidence were collected in offense, defense, and overall performance. The scores were determined by the mean score for each tactic, with a higher mean score indicating greater ability and confidence. This analysis identified differences between players' confidence and their actual decision-making abilities, highlighting the accuracy of their self-perceptions.

### 3.1 Analysis of the Decision-Making Awareness in Different Tactics

Data from Figure 2 shown the distribution of decision-making awareness scores, with all players

scoring above 2 points across different tactics. In offensive tactics, most players scored above 3 points, with Player No. 5 scoring the lowest (M=2.29) and Player No. 10 the highest (M=3.62). Defensive tactics scores were generally lower, with only half the players scoring above 3 points. Player No. 4 showed strong defensive awareness (M=4.00), but his offensive awareness was lower (M=2.48), suggesting a potential focus on defensive roles could benefit the team.

In overall performance, the team demonstrated advanced decision-making abilities, with most players scoring above 3 points. Player No. 10 demonstrated the highest level of decision-making awareness, positioning him as the most knowledgeable in different tactics on the team. In contrast, Player No. 5 consistently scored the lowest, underscoring a significant need for improvement in his understanding of tactics.



Figure 2: The scores of decision-making awareness in different tactics.

### 3.2 Analysis of the Self-Confidence Level in Different Tactics

Figure 3 illustrated that most players rated their confidence above 3 points. In offensive tactics, six players rated their confidence at the highest level (4 points), but Players No. 4 and 5 showed lower confidence (M=2.29). In defensive tactics, Players No. 4 and 5 again lacked confidence (M=2.33), while others rated their confidence above 3 points. Coaches could develop targeted training to boost confidence, especially for Players No. 4 and 5.

Player No. 3 exhibited a significant difference in confidence between offensive (M=2.86) and defensive tactics (M=3.33), indicating a need to adjust his mental approach to offensive scenarios.



Figure 3: The scores of self-confidence level in different tactics.

### 3.3 Differences Between Self-Confidence and Decision-Making Awareness

In this study, by comparing the mean (M) values of decision-making awareness and self-confidence as shown in Figure 4, we identified differences between players' actual basketball knowledge and their confidence levels across various tactics. These differences indicate whether players exhibit overconfidence or underconfidence, reflecting the accuracy of their self-perception. The confidence state (CS) for each tactic was calculated as follows:

$$CS = M_{SC} - M_{DM} \tag{1}$$

Where  $M_{SC}$  represented the mean self-confidence score, and  $M_{DM}$  represented the mean decision-making awareness score. Positive values indicate overconfidence, negative values suggest underconfidence, and zero represents an accurate self-perception.

The overall concentration of players' confidence states was analyzed across different tactics by calculating the mean and standard deviation. This analysis helped identify the team's overall performance and pinpoint players who significantly deviated from the average. For instance, the concentration range of players' confidence in offensive tactics was 0.02 to 1.12 (M±SD 0.57±0.55), in defensive tactics it was -0.35 to 1.45 (M±SD 0.55±0.90), and in overall performance, the range was -0.09 to 1.17 (M±SD 0.54±0.63).

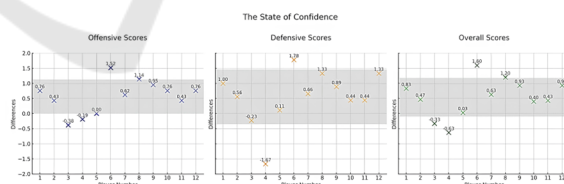


Figure 4: The differences between self-confidence and decision-making awareness scores.

As Figure 4 illustrated, Players No. 3 and No. 4 showed below-average confidence in both offensive and overall performance. Player No. 3 had the least confidence in offense with a difference of -0.38, while Player No. 4, despite a slightly better score with a difference of -0.19, was still below the team average. Player No. 5, with a neutral difference of 0, may need encouragement to be more audacious in line with the team's overall confidence in offense. Player No. 4's confidence in defense was

significantly lower than the team average with a difference of -1.67, indicating a need for special attention from the coach. Both Players No. 3 and No. 4 would benefit from psychological support to improve their confidence and integration into the team.

Regarding overconfidence, Player No. 6 showed extreme confidence across all areas, with differences of 1.52, 1.78, and 1.60 in offense, defense, and overall performance, respectively. This could lead to overestimation of abilities and impulsive decisions. Player No. 8 also demonstrated overconfidence in offense with a difference of 1.14, requiring adjustments to his tactical awareness. Players No. 8 and No. 12, with confidence levels of 1.33 in defense, also need to recalibrate their self-assessments to avoid extreme psychological states.

The team exhibited a tendency towards overconfidence in offense, with a minimum average range value of 0.02, compared to -0.35 in defense. While confidence can enhance performance, underconfident players, as indicated by scores below 0, need timely support to avoid negatively impacting the team. The coach should address both overconfidence and underconfidence through targeted psychological counseling, team-building activities, and tactical training to promote cohesion and improve overall performance.

#### 4 DISCUSSIONS

This study aimed to propose a method that would assist players in evaluating the accuracy of their self-perception of competence, based on the differences in self-confidence and decision-making awareness scores that represented their psychological states of overconfidence or underconfidence. In basketball, confidence is crucial for enhancing competitive performance, but such confidence must be grounded in an accurate self-perception of individual abilities and align with team objectives. Therefore, the study further developed an assessment method—the Basketball Self-Perception Evaluation Channel, as shown in Figure 5, which effectively highlighted psychological features among players, pinpointing those who were likely overly confident or lacked confidence. Players can identify their self-perception of competence through evaluation channel to engage in self-regulation and provide an appropriate emotional and psychological response, and coaches observe this evaluation channel to adjust their players' states and reactions accordingly (Urquijo et al., 2023). This identification holds substantial practical

importance for team management and the psychological guidance of players. In addition, the basketball self-perception evaluation channel was used to answer three research questions.

- How can players be assisted in understanding their psychological states and the level of basketball tactical knowledge through the differences between their self-confidence and decision-making awareness?

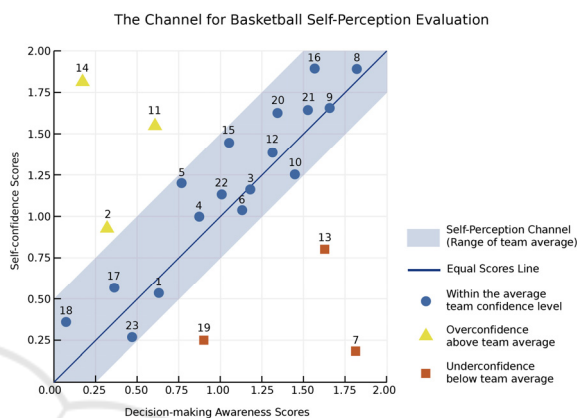


Figure 5: The basketball self-perception evaluation channel.

In this study, the self-perception evaluation channel signified the average range of team confidence. Assuming the team consisted of 23 players, the majority of players' scores falling within the self-perception channel area, indicating that their confidence states were consistent with the overall team. Additionally, the equal scores line represented the differences between self-confidence scores and decision-making awareness scores were zero. Notably, the equal scores line was located towards the lower region in the self-perception channel, as most players exhibited a tendency towards overconfidence, with only a minority achieving a match, reflected by a zero difference. This pattern aligns with the findings of the present study and corroborates the conclusions of other research, demonstrating that overconfidence is a prevalent psychological tendency in competitive sports (McGraw et al., 2004). Therefore, the equal scores line was positioned towards the lower portion of the self-perception evaluation channel.

Players situated outside the channel demonstrated significant differences from the average team confidence states, indicating not only their confidence states above or below the team average performance but also a substantial inaccuracy in self-perception of competency. Within sports, sustaining overconfidence can positively influence team performance, and it is advantageous for young

players to foster a positive self-view during their formative years for the benefit of their future sporting careers (Lee et al., 2021; Zaveritiaeva et al., 2018). Nonetheless, it is crucial for a player's self-confidence to be maintained within a certain range to prevent the emergence of an extreme psychological state characterized by blind confidence. For example, as shown in Figure 5, Player No. 14, who had a low decision-making awareness score but a high self-confidence score, exemplifies someone who is overly confident in their answers despite the reality. Furthermore, the difference between his self-confidence and decision-making awareness scores was the largest in the team, positioning him as the most overconfidence player exceeding the team's average level. Conversely, Player No. 7, with a high decision-making awareness score but a low self-confidence score, reflects a lack of belief in his abilities. Additionally, the difference between his self-confidence and decision-making awareness scores, being the smallest in the team, positioned him as the player with the most significant lack of confidence below the team's average level. For some players within the self-perception channel range, such as Player No. 5, although positioned within the average range, it was still perceptible that his self-confidence score was higher than his decision-making awareness score. Therefore, he could engage in reasonable self-regulation, and learning to prevent the development of an extreme state.

The positioning of each player on the axis represents the difference between their self-confidence and decision-making awareness scores, providing them with a visual understanding of their competence and confidence states within the team. Consequently, this approach facilitates the further development of self-regulation skills among players, crucial for achieving optimal performance and excellence (Altfeld et al., 2017; Kolovelonis et al., 2022). Furthermore, providing players with approach on managing their self-perception of competence during the learning process enables them to swiftly assess their abilities relative to the team. This understanding facilitates their integration into the team by identifying roles that best suit their characteristics, thereby adapting to the team's style and enhancing team cohesion (Scott et al., 2021).

If these differences in psychological states are not managed and adjusted timely, they could potentially lead to a decline in team collaboration and overall performance evaluation.

- How can coaches identify players with inaccurate perception of competence in

improving training strategies and team management?

The evaluation channel enabled coaches to observe, compare, and pinpoint potential psychological risks through the evaluation channel, thus enabling the delivery of timely coaching interventions that foster a more stable and harmonious team environment. As illustrated in Figure 5, there were six players whose confidence states fell outside the channel, indicating significant differences from the average range. Specifically, Player No. 7, positioned in the area of underconfidence, exhibited the lowest confidence state within the team, necessitating immediate observation and intervention by the coach. Similarly, attention and adjustment were required for Players No. 19 and No. 13 to return them to the normal range of the team's psychological state. Preventative interventions for Players No. 23 and No. 10 were also crucial to prevent further deviation. The evaluation channel served as an early warning mechanism to help coaches develop the micro-level training plan, allowing the coaches to identify not only players displaying extreme psychological states or unfavorable psychological inclinations but also facilitated the strategic design of training sequences among players (Kinnerk et al., 2023). This approach allowed prioritization of attention towards individuals requiring immediate focus, thereby averting the negative progression of psychological states within the team.

Moreover, as team leaders, coaches positively engaging with players demonstrating negative tendencies can cultivate an environment where players feel valued, connected, and cared for, significantly reshaping the team's overall confidence dynamics and forging meaningful coach-athlete relationships (Fransen et al., 2015; Gosai et al., 2023; Morris et al., 2023). Crucially, when coaches accurately identify players' personalities, comprehend the subtleties in their confidence states, and adeptly manage extreme emotional responses, they can leverage these insights to deliver focused, targeted instruction, thereby building meaningful relationships and improving communication with their players. Such strategic coaching has profound positive effects on players' development and success within the game (Hodgson et al., 2017; Felty & Liu, 2024).

- How can the innovative and entertaining basketball self-perception evaluation channel contribute to enriching the youth sports industry?

The basketball self-perception evaluation channel introduced in this study offered an innovative and entertaining methodology from traditional court-bound training without time and location constraints. This approach provided a varied training mode which could be extended into an online training system that match the sports engagement trends observed after the epidemic and enrich the training practices available to players (Benedict et al., 2024). Additionally, it allowed coaches to delve into the underlying causes of players' overconfidence or underconfidence to further establish caring practices within the team, thereby facilitating to develop the holistic athlete development approach in sports industry (Gano-Overway, 2023). Therefore, the innovative evaluation channel has the potential to significantly improve the basketball training industry by introducing new aspects to team training, enhancing observation techniques, and deepening the understanding of youth player psychology.

## 5 LIMITATIONS AND FUTURE DIRECTIONS

A limitation of this study was the small sample size, as the data were collected from only one small team of 12 players. This limitation limits the scientific validity of the data analysis methodology, particularly the reliance on basic computational methods such as simple arithmetic and averaging instead of more complex statistical tests. To address this limitation and the challenges posed by the small sample size, future iterations of this research will aim to include a larger basketball team. This expansion will not only improve the generalizability of the findings, but will also enhance the scientific rigor of the analysis methodology.

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