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Abstract

Think aloud (TA) has previously been used as a tool that facilitates the development of self-regulatory and reflective practice skills in coaches and golfers (Birch et al., 2022). This pilot study aimed to further explore the use of TA as a tool to facilitate self-regulatory and reflective practice skills by expanding the scope of this research into soccer goalkeepers. Two academy goalkeepers at a professional English soccer club used TA during three separate training sessions over three weeks, listened back to their TA audio and then took part in semi-structured interviews to discuss their experiences of TA. A template analysis, involving the adoption of both inductive and deductive lenses, was undertaken, with Zimmerman and Campillo's (2003) phases and subphases of self-regulation used as a guiding framework. The findings were organised into three themes: forethought phase, performance phase and self-reflective phase. Findings supported the use of TA as a tool to develop both self-regulatory and reflective skills in academy goalkeepers (e.g., enhanced reflective practice, increased self-monitoring). Coaching and support staff may wish to use these preliminary findings and consider the usefulness of embedding TA into their practices as one method for encouraging athletes to reflect on their thought processes supporting them to become independent and active participants in their learning process.

Key words: Applied sport psychology; Metacognitions; Self-monitoring, Goal setting

Self-regulation or self-regulated learning refers to learning that is a result of an individual's self-generated thoughts, actions and behaviours that are directed towards the attainment of their learning goals (Zimmerman, 2000). Self-regulatory skills, such as goal setting, self-monitoring and self-evaluation, have been shown to improve an individual's self-regulatory capabilities (e.g., self-efficacy; Guerin et al., 2010) and self-regulatory resources, such as enhanced motivation and learning towards goal attainment (Zimmerman, 2002). Zimmerman (2000) suggested that self-regulated learners self-generate thoughts, behaviours and feelings that are oriented towards goal attainment, which in turn aids problem-solving processes and can lead to more effective learning. Durand-Bush et al. (2023) described self-regulation competencies (e.g., self-awareness, emotional control, attentional control) as key mental performance competencies within their Gold Medal Profile for Sport Psychology (GMP-SP), highlighting the role of self-regulation as a key contributing factor towards individuals achieving optimal performance. Similarly, when an athlete is in a state of mis-regulation or under-regulation (e.g., an athlete may struggle to manage their emotions or thoughts in response to a stimuli), this has been associated with performance errors (Collins & Durand-Bush, 2014).

Social learning psychologists proposed that self-regulatory processes can be divided into three cyclical phases (Zimmerman, 2002). Zimmerman and Campillo's (2003) phases and subphases of self-regulation describe these three cyclical phases, firstly, the forethought phase refers to how the learner approaches a task and comprises of two forethought phase processes: task analysis (e.g., goal setting) and self-motivation (e.g., self-efficacy beliefs). Secondly, the performance phase occurs during a task and contains two major processes: self-control (e.g., self-instruction, imagery) and self-observation (e.g., self-recording, self-experimentation). Finally, the self-reflection phase occurs after each performance bout and is concerned with deliberate efforts to alter performance and involves two major processes: self-

judgement (e.g., casual attribution) and self-reaction (e.g., self-satisfaction). The cyclical nature of this framework proposes that self-reflections from previous performances impact forethought processes of subsequent performances. For example, an athlete who has high levels of self-satisfaction when reflecting on a performance may experience increased efficacy beliefs and intrinsic interest (forethought phase) in future tasks.

Reflection has been described as a sub-facet of metacognition, which has previously been defined as "the awareness of, and knowledge about one's own thinking and consists of planning, self-monitoring, evaluation and reflection" (Jonker et al., 2010, p. 902). Researcher have explored how elite athletes reflect (Threlfall, 2014) and how this can influence learning (Hauw, 2009; Richards et al., 2009). Reflection has been described in differing ways but typically relates to how individuals look back on an experience and are able to appraise what they have learnt to then take forward into future experiences (Jonker et al., 2012). Research has shown that critical reflection is effective in promoting learning from experience within complex and ambiguous situations. In the context of sport, this is achieved by athletes generating thoughts from actions that may enrich, support, and challenge their understanding (Starbuck, 2009). In Jonker et al's. (2012) longitudinal study exploring reflection in the development of expertise, it was reported that athletes who made the transition from junior national to senior international level had higher reflection scores than athletes who did not reach international status, demonstrating the importance of reflective skills in elite-junior athletes.

In light of the aforementioned research, Dixon et al. (2013) called for alternative approaches that aid, encourage, and facilitate development of reflection-in-action within athletes and coaches. The think aloud (TA) method has been used as an alternative to methods that require the participant (e.g., athlete, exerciser, coach) to think and reflect

retrospectively following performance of a task (e.g., via reflective diaries or journals). TA was originally proposed by Ericsson and Simon (1980; 1993) as a method for generating information about thought processes mediating task performances and involves participants verbally thinking aloud during task performance (reporting concurrently while performing) or verbally recalling thoughts immediately after completing of a task (immediate retrospective reporting; Eccles & Arsal, 2017). For example, Whitehead et al. (2016) encouraged rugby league coaches to think aloud as a technique to facilitate reflection-in-action and delayed reflection-on-action (e.g., by listening back to their recordings). Results suggested that in-action reflections shifted from descriptive to deeper-levelled reflections and coaches felt they had developed increased awareness, enhanced communication, and developed pedagogically as a result. Similarly, Stephenson et al. (2020) conducted a case study into the use of TA with a football coach and the results indicated subjective improvements in self-awareness, pedagogy, and communication skills.

Ericsson and Simon (1993) proposed a verbalisation framework to encourage the use of their TA method. Level 1 verbalisation involves the vocalisation of inner speech, whereby participants simply verbalise their inner thoughts during task performance. Level 2 verbalisation involves the verbal encoding and vocalisation of an internal representation that is not originally in verbal code. These verbalisations should reflect stimuli within the participants' attentional focus such as vocalisation of scents or visual stimuli. Level 1 and 2 verbalisations offer a representation of information held in the short-term memory (STM) and that is involved in the mediation of task performance (Ericsson and Simon, 1993). In contrast to this, Level 3 verbalisation involves the individual explaining their thought processes and as such, requires retrieval of information from long-term memory (LTM) and therefore deviates from the TA method as proposed by Ericsson and Simon (1993).

A recent mapping review of TA research within sport and exercise psychology has highlighted the varied and flexible nature of the TA method (McGreary et al., 2024). The researchers demonstrated how TA has been used to investigate a broad spectrum of topics within sport and exercise psychology, for example, stressors and coping (Nicholls & Polman, 2008; Welsh et al., 2018; McGreary et al., 2020), attentional focus (Whitehead et al., 2018, 2019) and the development of expertise (Runswick et al., 2018). Similarly, TA has been used across a wide variety and sports and activities, such as cricket (McGreary et al., 2020), golf (Oliver et al., 2021), cycling (Whitehead et al., 2018), tennis (Swettenham et al., 2018), soccer (Roca et al., 2021) and wall-sitting postural tasks (Gunn & Taylor, 2021).

More recently, researchers have explored the use of TA as a tool for promoting reflection and self-regulatory skills (e.g., such as increased emotional control). For example, Moffat et al. (2021) used TA alongside attribution retraining for junior tennis players, with results suggesting TA helped to improve the athletes' emotional control and attribution capabilities. Swettenham and Whitehead (2021) explored the perceptions of soccer coaches on their use of TA as a reflective tool embedded into their coaches' practice. Coaches reported TA supported their professional knowledge, interpersonal knowledge, and intrapersonal knowledge. Finally, Birch et al. (2022) investigated TA as a tool to facilitate self-regulation in golfers, whom they interviewed immediately after using TA and again after a six-to-eight-week reflection period. Golfers reported increased levels of self-awareness, with results suggesting TA facilitated self-judgement by increasing the golfers' awareness of the consequences of their thoughts and actions. Such findings have demonstrated the suitability of using TA as a tool to promote self-regulation and reflection in both coaches and athletes.

While attempting to record cognitions during task performance can pose significant practical challenges and may be difficult to achieve in some contexts (Eccles et al., 2006; Jackman et al., 2022), these studies demonstrate the benefit of the TA method in some sport

and exercise settings. Likewise, there is limited research exploring self-regulation, reflective practice of athletes and how this may promote learning (Andersen et al., 2015). Studies that have explored this using TA (e.g., Whitehead et al., 2016; Stephenson et al., 2020; Swettenham & Whitehead, 2022) have focussed on coaches, not athletes, similarly, it is important to note that these studies encouraged level 3 verbalisations, which is not in alignment with the TA method proposed by Ericsson and Simon (1980; 1993).

In with the recommendations of McGreary et al. (2024) who suggested future TA research should further understand the role of TA as an applied tool, this pilot study aims to further extend previous research by investigating the role of TA as a facilitator of reflective practice and self-regulatory skills (e.g., emotional control, attentional control) in soccer goalkeepers. Positionally, the role of a soccer goalkeeper is unique and as the last line of defence, they are under constant pressure with the knowledge that one mistake or lapse of concentration will likely result in a goal for the opposing team (de Castro et al., 2021). Therefore, this pilot study aims to expand the scope of previous research by investigating the use of TA as proposed by Ericsson and Simon (i.e., level 1 and 2 verbalisations; 1980; 1993) as a tool to develop self-regulatory skills and facilitate reflective practice in academy level goalkeepers over a three-week training period.

Methods

Philosophical Position

A qualitative approach was adopted to understand the participants experiences of using TA as a tool to facilitate the development of self-regulatory skills and reflective practice in soccer goalkeepers. Thus the study was guided by a postpositivist paradigm, as self-regulatory phenomena, such as emotional control, goal setting and attentional control are psychological characteristics that exist with the mind and suggested to influence an individual's behaviour

(McGannon & Mauws, 2000). Therefore, this study aligns to a realist ontology that assumes a reality exists, however this is independent from the conceptions that researchers may have of it (Sayer, 2000). We combined this with a constructivist epistemology, which assumes knowledge is theory laden and fallible (Wiltshire, 2018). As researchers, we believe that there can be some level of shared knowledge and truth, e.g., explained by a model or theory (i.e., Zimmerman's, 2000 theory of self-regulation), however, we also acknowledge that there are subjective differences and nuances and that there may be various perspectives of truth (Guba, 1990; Fischer, 1998).

Participants

Participants were two male, academy level goalkeepers at a professional English soccer club academy and were aged 17 and 18. Participants were recruited based on a convenience sampling method whereby participants were initially approached due to being known by a member of the research team (Smith & Sparkes, 2016). Goalkeeper 1 (G1) had 10 years of academy level soccer experience and goalkeeper 2 (G2) had seven years of academy level soccer experience and they would be classified as semi-elite according to Swann et al's. (2015) elite athlete classification system. Participants were contacted by telephone, acquired through the club after agreement was made with the head of the academy. Ethical approval was granted from a United Kingdom (UK) based institution (approval number 22/SPS/019**)** and informed consent was obtained prior to the start of the study.

Materials

A Sony Dictaphone was used to capture the goalkeepers' verbalisations of their thoughts in action during training sessions. A clip microphone attached to the Dictaphone was then fitted to the collar of the player. To allow for recordings to be made during sessions safely, a FreeTrain running vest phone holder was used facing backwards to protect both the

equipment and the participants. To ensure clarity of sound, the clip mic was attached to the side of the goalkeeper's neck on the collar. To keep the mic best attached, the excess wire was tucked into the pocket of the vest. The Dictaphone was kept in the pocket of the vest, which was secured by Velcro. The introduction meeting and post interviews were conducted on Zoom, with the interview recordings being taken by an iPhone XS using the voice memo application.

Procedure

Participants were instructed on how to TA engage in level 2 TA based on adapted instructions developed by Birch and Whitehead (2020), which involved participants listening to example voice recordings of individuals (athletes) engaging in level 1 and level 2 verbalisations. In line with the recommendations of Birch and Whitehead (2020), participants were trained in the use of TA, which involved a series of traditional TA training exercises (counting dots, arithmetic exercise, anagram problem solving task, Ericsson and Simon, 1980). Additionally, participants were given time whilst training to wear the recording device and practice TA. Participants were then afforded the opportunity to ask any further questions about TA. Participants were deemed competent once they had no more questions and the second author felt the participant was confident in verbalising their thoughts in line with level 1 and 2 instructions.

The participants engaged in TA during one scheduled training session per week to achieve high ecological validity, for three weeks (three sessions in total). Each TA session started with goalkeeper-specific drills and was followed by group work with the outfield players (e.g., small sided games) and lasted for an average of approximately 65 minutes, including periods of silence, resulting in 395 minutes, of TA verbalisations. Participants were instructed by the second author to "Please think aloud and say out loud anything that comes

to your mind during training" (encouraging level 2 verbalisations). Participants were also reminded that they were not required to explain their thoughts to avoid participants engaging in level 3 verbalisations and thus deviating from Ericsson and Simon's (1993) TA method. The researcher stood next to the participants goal and there was no communication between the researcher and participants besides reminding the participant to "please continue to think aloud" following periods of perceived silence (i.e., it appeared to the researcher the participant had stopped TA).

Similar to the methodology adopted by Birch et al. (2022), semi-structured follow-up interviews were conducted as a method to explore the participants perspectives and experiences of TA as a tool to develop self-regulatory skills and aid reflective practice. In total, each participant was interviewed three times, with each interview scheduled to take place later the same day as the TA session. Following each TA session (i.e., the scheduled training sessions were participants engaged in TA), participants were sent their recordings and asked to listen back to their training session TA recordings and reflect on their experience. Each interview was conducted via Zoom and with the aim of obtaining rich data and further understanding the participants' personal insights into using TA (Newton & Burgess, 2008). The interview guide was informed by previous similar research such as Whitehead et al. (2016) and Birch et al. (2022), with some questions being repeated throughout each interview and other questions being specific to a certain week. For example, some questions that were repeated include "describe your experience of engaging in TA this week" and "what were the benefits of using TA during training". Whereas an example of a specific question from the final interview would be "Reflecting on your experience of TA, is there anything you would have done differently" and "Without using TA, do you feel you would have been able to recall that situation?". As interviews were semi-structured, this allowed for the flexibility of impromptu probing questions (e.g., can you explain what you

mean by X) during each interview. Interviews ranged from 30 min 11 s to 36 min 14 s in duration with a total of 199 min 47 s of interview collected.

Data Analysis and Rigour

All audio files collected from both TA sessions and interviews were transcribed verbatim and both data sets were analysed as one. To ensure anonymity, participant names were replaced with participant numbers and any names mentioned were replaced with pseudonyms. Data were imported into NVivo 10 and a template analysis was used to analyse the data (King, 2012; King and Brooks, 2016). This was approach was chosen due to its suitability as a 'middle-ground' in terms of inductive and deductive analysis and tentative use of a priori themes (Braun and Clarke, 2022) and the applied and exploratory nature of the current pilot study (Brooks et al., 2015; Schneider et al., 2023). The data were analysed using inductive and deductive methods of analysis and was guided by the research questions and three phases of self-regulation as proposed by Zimmerman and Campillo's (2003) framework. Analysis were conducted independently by the first and second authors, who prior, to the analysis ensured familiarity with the content by reading and re-reading the transcripts. Following this, authors inductively analysed the data, generating initial codes in a systematic fashion by going through the TA data from the first week and then the resulting interview to keep in the chronological sequence the data were collected in. Once initial codes had been inductively generated, the first author deductively introduced a priori themes, guided by the three phases outlined in Zimmerman's and Campillo (2003), with the new data being applied to the existing theoretical framework. The third author acted as a critical friend throughout this process, by providing at both the inductive and deductive stages of analysis. For example, by offering feedback on where a piece of new data may best fit within the existing theoretical framework, this ensured the authors engaged in a process of continual critical dialogue and strengthened the plausibility and defensibility of the results (Smith and

McGannon, 2018). Thick description and use of participant quotes were also provided as an additional quality check procedure within the results section (King & Brooks, 2016).

Results

This pilot study aimed to examine the use of TA as a tool to develop self-regulatory and reflective skills within academy-level soccer goalkeepers. Using Zimmerman and Campillo's (2003) Phases and Subprocesses of Self-regulation as a guiding framework, the results are presented across three main themes. Namely: forethought phase, performance phase and self-reflection phase, (see figure 1). Participants are referred to as G1 (goalkeeper 1), and G2 (goalkeeper 2) throughout the results and W1 (week 1), W2 (week 2), and W3 (week 3) refer to the weeks in which participants engaged in TA and were interviewed. Goalkeepers reported positive effects on performance and developed key metacognitive skills (goal setting and planning, self-observation), identifying areas of strength and improvement, which allowed them to develop action plans targeting their development.

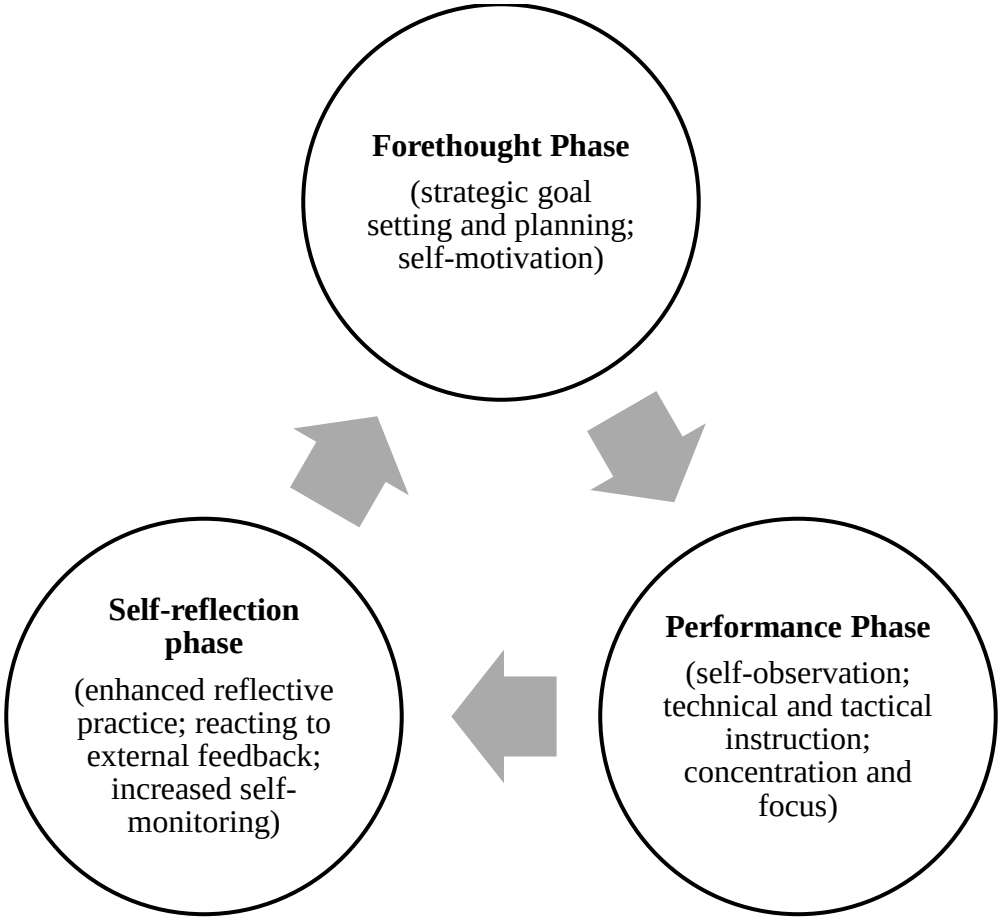

Figure 1. Cycle diagram displaying themes and sub-themes across TA and interview data and processes goalkeepers went through.

Forethought Phase

The forethought phase was underpinned by data from both TA and subsequent interviews. Specifically, this theme related to strategic goal setting and planning whereby participants were setting task specific goals and identifying strategies to achieve these goals. Secondly, within the sub theme self-motivation, participants verbalised motivational strategies and motivation towards improvement as a result of engaging in TA and reflecting on their verbalisations.

Goal setting and planning

Goal setting and planning related to participants setting goals and identifying strategies to facilitate improvement. This was evidenced in both TA verbalisations and interviews. During TA, participants verbalised smaller objectives to achieve within a session or within a skill, for example, “and then work on my body position I were slow to receive because I'm receiving pretty straight on,” (G1, W1, TA) and “Stuff I need to work on. Set position, handling, focus on body going forwards, bringing my hands towards the ball, good shape and catching the ball. Nice” (G2 W2 TA,). This finding provides evidence of how TA can be used by participants to help make their goals more explicit and plans towards technical elements of performance. Likewise, data from subsequent interviews highlighted how participants reflected on previous performance (i.e., reflecting on TA data from previous training sessions) using these reflections to identify areas to improve.

> I needed to improve on my first touch, and I was telling myself that. I remember one instance where I took a touch and it kinda went wide behind me. And then that meant I panicked, or whatever. And then, as well as hitting the ball trying to hit the ball too hard instead of just like, remember Matt [coach] telling me to like, feel into it. So that's, that's what I took from that (G1 1st interview).

This finding offers support to the usefulness of TA as a tool to develop self-regulatory skills, as in this example, the participant described using TA to facilitate reflecting on their performance during a training session and setting new goals to aid their development in the future. Participants reflected on their verbalisations and used these as a base to later reflect on and identify areas of further development.

Self-motivation

This theme related to the motivational strategies employed by participants to achieve the goals they had set. Participants verbalised motivational self-talk and instructional self-talk

statements during performance. For example, “I’ve changed my position, so I was level with it to receive the ball, so I was then able to put the ball out in front of me to play” (G1 W2 TA) and “That save there it was a good save, yeah think I need to hold my hand there felt a bit flicky, but a good set, my touch was very good and my handling, another good touch” (G1 W3 TA). Participants also described the impact of listening back to their TA recordings on their attitudes towards their learning and improvement. For example,

> I've enjoyed looking back on sessions that hadn't been (video) recorded, and still having something to look back on and improve on for next time. So, like, from week two to week three, how can I improve my talking here? Or what's Matt [coach] said for me to improve? So, I just like looking back, especially and also think about what I'm doing (G2 3rd interview).

In this example, participants described being intrinsically driven to identify areas for improvements based on their verbalisations as they progressed through the weeks and then using these verbalisations to look for areas to improve.

Performance Phase

The performance phase was underpinned by both TA and interview data and relates to verbalisations during performance (i.e., during training sessions). The performance phase theme consisted of three sub-themes. Firstly, for self-observation, participants demonstrated increased awareness of their thought processes during performance. Secondly, technical, and tactical instruction whereby participants verbalised and reflected on technical and tactical aspects of performance. Finally, concentration and focus, which reflects participants describing TA as a tool to increase their increase and focus during performance.

Self-observation

Self-observation describes how the participants demonstrated awareness of their thought processes, strengths, and areas for improvement within their performances. For example, G1 verbalises positive aspects of his performance, while also reflecting-in-action, demonstrating increased levels of self-awareness:

> Think my distribution was good, the timing on my crosses was very good, what I need to work on is I need to work on my angle, so when they are heading down the by-line I need to think about positioning. (G1, W3 TA)

Similarly, G2 demonstrated increased levels of self-awareness, by recognising an area for improvement and justifying how it would lead to performance enhancement:

> I'm getting too attached to my near post so next time do not get attached to my near post so stay more in line with the centre of the goal, gives me a better chance of saving either side of me and not just at my near. (G2, W3 TA)

The findings from the TA data were also further supported by the interview data, for example,

> Yeah, I like it because let's say if I did something bad, I'd just be thinking about, I'd just be in my head. But when we speak out loud, it becomes a bit more clear. And you can like, think about it more whatever you are thinking in your head. If you say something out loud, then it sort of goes in more, like take note and say like I got too near to my near post. If I say I say that out loud then next time, I will remember to be more in line with the ball. That is makes it more like it makes me take note a bit more if I say it out loud. Which is insane with like good stuff in that like saying what you did well. (G2, 3rd Interview)

In this example, and in accordance with the forethought phase of self-regulated learning, G2 describes how engaging in the process of TA allowed him to become more aware of his

thought processes and that the process of thinking aloud enhanced the encoding of the information that was being verbalised, which later facilitated memory recall (i.e., remembering what he needed to do better, because he had said it out loud earlier). This increased awareness of thought processes then resulted in control strategies aimed at transferring those thoughts into actions for the future (i.e., via setting learning goals and strategic planning to achieve the learners' task).

Technical and tactical instruction

This theme represents the technical and tactical instructions that participants verbalised and their perceived development in this area as a result of reflecting using TA. G2 articulates how when reflecting on their TA data they had observed themselves verbalising tactical information related to their positional play (referred to as depth) during each of the training sessions:

> I think on the shooting part the main part was the depth in the goal because I think so many keepers get that wrong…like the key part of that is your depth and the goal was I did not really think about it too much when he (the coach) wasn't here It was one of the first things he said to me. (G2, 2nd Interview)

For example, G2 verbalises during a training session "tight, just getting in line for shot now to cross to deal with a cross". TA data from G1 also highlights how they verbalised similar tactical aspects "I think I have done pretty well there I have recognised that my depth out my goal is something to concentrate on" (G1, W3 TA). By verbalising their thought processes participants were able to capture these technical and tactical adjustments that often reflected specific areas the goalkeepers were working on. Participants were then able to listen back to their verbalisations (TA data), which helped to reinforce some of the coaching points they

received from their coaches. For example. G2 described the benefit of having access to the TA data:

> I think it reinforced my coaching messages, that is gonna help me. And obviously, there is no like clear way of knowing but I also I do know that the more I hear like the advice, and stuff, the more likely it is going to get into my mind. I am not sure that I would have done that, like pulled off into a better support position, if I had not have listened to it back. (G2, 3rd interview).

There were similar findings from a technical aspect, with participants verbalising technical aspects of performance and upon reviewing these verbalisations (TA data), demonstrating progress. G1 explains below:

> Yeah, I think it's helped with a lot of improvements I made in my technique, like simplifying the catch, I think still is, still is something that I need to improve on but the fact that I was able to acknowledge that during Think Aloud is something that is good to take on (G1, 3rd interview).

When linking to the performance phase of the self-regulation cycle, it is suggested by the participants interview data that they felt using TA was able to facilitate control strategies such as self-instruction and becoming more self-aware during performance.

Concentration and focus

Participants reported how they experienced improved levels of concentration and focus as a result of engaging in TA. Within the performance phase, a focus of attention is a key component, and G2 described that thinking aloud had a positive effect on their concentration levels during performance:

> It helps your concentration, if you are always thinking, like, when I was younger, I'd be thinking about my tea or something or anything other than football (soccer) when the balls at the other end. I'm not thinking about where my back four is whatever. But like now, focus on the back (referring to players) for what they're doing, what the team's doing, speaking to yourself and speaking to them. It (TA) keeps you so much more engaged (G2, 2nd interview).

For G1 he stated how TA allows him to remain concentrated, particularly at times when there is less activity (i.e., when the ball is away from his goal). "Just keeping yourself involved in the game, especially as a goalkeeper, because you're basically just on your own, so it's like, it's a good way to keep yourself concentrating" (G1, 3rd interview). Participants also reported how TA was helpful in remaining focussed when they were resting, as during goalkeeper training, while one goalkeeper is training, the other is normally resting and observing. For example: "yeah so on this one just focus on like what he (G1) is doing well, so I can copy off him right here and then do what you need to do better" (G2, W2 TA). Here the verbalisations also aligned to identifying areas development within their own performance.

Self-Reflection Phase

This theme describes the processes by which participants used TA to aid the development of reflective skills and was comprised of two sub-themes. Namely, enhanced reflective practice and reacting to external feedback.

Enhanced reflective practice

The goalkeepers reported on how their reflective practice had developed throughout the TA process, as they became more proficient in TA. For example, the verbalisations made in week 1 were considerably less detailed than in week 3, with many verbalisations, brief utterances, even during periods of training when the participants were not performing a skill

404 "Thinking about shape. Short" (G2, W1, TA), "That's poor" (G2, W1, TA), whereas more
405 detailed utterances included "what I did well was noticing where the pressure is coming from,
406 I want to finish noticing where the pressure is coming from" (G1, W1, TA). In comparison,
407 by week 2, participants were verbalising more fluently, with less broken speech, for example:

408 We just got the ball so just thinking about our shape, balls on the right side, our shape
409 looks pretty good, back in now, turn out turn out, cause Jays got the ball show for it,
410 yes, showing for the ball, didn't choose to play but I was there for the option, come out,
411 yes Jay yes, it lovely, just pulled off to show start position, seen Princes run executed
412 well. (G2, W2 TA).

413 By verbalising more during TA sessions, participants were better able to understand their
414 motivations and thought processes when reflecting back on the TA data, which in turn aided
415 their comfortability in TA. Interview data also further supported this finding, for example,

416 I think it's been really good (TA), you know, since week one. And it's got a lot better. And
417 I've been able to use it more effectively. Because obviously, in week one, you know, I'm a
418 lot more uncomfortable with it on and like it's weird speaking to yourself but then by like,
419 week three, it became a lot more normal. I was able to be more comfortable with it on. If I
420 listen back to it, it makes me get a lot more out of it, because of how much better I was
421 with it (TA) (G2 3rd interview).

422 This greater level of depth then offered participants insight into their cognitions during
423 performance, allowing the participant to make more nuanced inferences about their
424 cognitions. Ultimately, this allowed for more critical reflections to be made, such as
425 recognising areas of development and then, in line with earlier themes and consistent with the
426 phases of self-regulated learning, subsequent actions to be planned.

427 ***Reacting to external feedback***

This theme related to how the participants reflected upon and reacted to feedback from an external source (primarily their goalkeeping coach). Participants used their TA verbalisations to reflect on training sessions with a particular emphasis on coach feedback. Likewise, during the TA process, there was evidence of participants engaging in reflection-in-action in response to coach feedback. For example:

> Stepped across now, tight, drive with it, yeah, I was narrowing the angle, but he (coach) says I got too low too quick. So next time focus on keeping my height a bit more, then getting low when he comes really close. (G2, W2 TA)

Further G2 reflects on feedback from the coach:

> Just what he (coach) was saying was from an angle was getting too attached to my near post so next time do not get attached to my near post so stay more in line with the centre of the goal, gives me a better chance of saving either side of me and not just at my near. (G2, W3 TA)

This finding was further reinforced through interpretations of the interview data. Participants highlighted how they would review their verbalisations from training to listen back and reflect on both coaching feedback and their verbal responses. Participants then seemingly used these verbalisations to identify areas of further development and set appropriate goals.

> Yeah, I think you'd remember more points that you need to improve because I feel like sometimes you get told them to improve and then they just leave you with it. And then but say it you realise it yourself; you can go back to the recordings and basically create a big list of things that you need to work on (G1, 2nd interview).

This process then demonstrates cyclical nature of the self-regulatory process, whereby the reflections participants make inform the goal-setting process for further learning to take place (as part of the forethought phase).

Discussion

The aim of this pilot study was to expand previous research that has explored the use of TA as a tool to develop self-regulatory skills and facilitate reflective practice in populations such as coaches and athletes. Specifically, this study explored whether TA promotes self-regulation and aids reflection in academy level goalkeepers. Underpinned by Zimmerman and Campillo's (2003) phases and subprocesses of self-regulation, results support the use of TA as a tool for developing reflective practice in goalkeepers and promoting self-regulated learning.

A notable finding from the present study was participants reported that engaging in TA enhanced their reflective practice, suggesting that as they progressed through the weeks, their verbalisations became more detailed and allowed for them to identify both their strengths and areas of improvement. Faull and Cropley (2009) identified how reflecting on areas of improvement can lead to more independence in problem solving and thus self-regulated learning. However, research suggested when reflecting, individuals can have a tendency towards focussing on negatives (Rozin & Royzman, 2001). The findings from this study demonstrate that TA can be used as a tool to also identify and reflect on positive aspects of performance (as well as areas for improvement), which in the context of elite sport has been shown to combat the tendency to attend to negatives (Ludlam et al., 2016), and can increase an individual's performance (Peláez et al., 2019). In line with Zimmerman's (2000) self-regulated theory, reflecting on positives may lead to improved self-motivation beliefs (e.g., enhanced self-efficacy) and reflecting on areas for improvement can lead to setting goals and strategic planning for their development.

Another pertinent finding suggested participants experienced increased levels of self-awareness, reporting increased levels of self-observation, more technical and tactical

instructions and improved concentration and focus. This finding extends the work of Birch et al. (2022) who also reported increased levels of self-awareness in golfers, with golfers becoming more aware of how their behaviour influences performance as a result of the reflective process. The construct of being a self-aware learner proposes that athletes rather than being a passive receiver of knowledge, take responsibly for their own development (Holland et al., 2010). In becoming responsible, learners identify a change in behaviour through reflective practice (e.g., recognising improvements in focus or increased technical instruction; Gilbert & Cote, 2013). This finding also extends the work of Stephenson et al. (2020) who reported that reflective practice in coaches as an effective tool for promoting self-awareness.

Results also suggested that participants reacted and reflected to external sources, primarily from their coach. Participants reacted to coach feedback during performance (e.g., coaches providing instructions from the side) and when listening back to their audio recordings, reflecting on coaching instructions and feedback. This finding is in alignment with the concept of co-regulation, which can be defined as the interaction with others that temporarily supports self-regulation, which can ultimately facilitate the athlete to regulate independently (Hadwin et al., 2011). This finding offers support to the work of Collins and Durand-Bush (2014) who highlighted how coaches can co-regulate through strategies such as preparatory strategies, performance strategies and self-regulation strategies to help their athletes self-regulate. In this case, participants seemingly used their recordings to review coach feedback as a method to develop self -regulatory skills, such as, reflecting on their perceived strengths and areas of improvements coupled with the feedback from the coach.

Applied Implications

Based on the findings from this study, we offer some applied implications that may be beneficial to practitioners working in this context, such as, sport and exercise psychologists, strength and conditioning coaches and specialist coaches, including goalkeeper coaches. Coaches and practitioners could encourage goalkeepers (and more broadly athletes in general) to use TA to record successful events, potentially overcoming aspects of the negativity-bias (Rozin & Royzman, 2001). If comfortable to do so, athletes could also share their recordings with coaches and collaboratively reflect, this may offer the coach insight into the thought processes of their athlete(s) while also fostering the coach-athlete relationship. As has been demonstrated in previous research (e.g., Whitehead et al., 2016; Stephenson et al., 2020; Swettenham & Whitehead, 2021) coaches could use TA to support their reflections, but to extend on previous research, do so alongside athletes and engage in a collaborative reflective process together as a tool to reflect on strategies used to develop self-regulatory skills within athletes.

Limitations and Future Directions

This is the first attempt of a paper to explore the use of TA as a tool to promote self-regulation and develop reflective practice skills in academy level goalkeepers and only the second to explore this in an athlete population (after golfers in Birch et al., 2022). Nonetheless, it is important to acknowledge the limitations of the present study and propose suggestions for future research to further develop this area. We encourage readers to draw their own conclusions from the study and assess the degree of resonance (Smith, 2018). We also acknowledge that the study was confined to two participants, both of whom play in a specific sport and position and was conducted over a short time period. Therefore, further research is required to develop stronger conclusions about the utility of TA as tool to facilitate self-regulatory skills and reflective practice. Likewise, this study only considered the views and reflections of the goalkeepers and did not include the voice of the coach, and in

a goalkeeper's relationship with their coach, the coach plays a crucial role in their development (Bowes & Jones, 2006). In accordance with the concept of co-regulation, exploring this relationship between the coach and athlete may offer further insight into their role in supporting self-regulation. Therefore, future research may wish to investigate this in more depth. Another limitation is that participants were not guided or instructed to use a guiding framework (e.g., Gibbs' reflective cycle; Gibbs, 1988) when reflecting on their TA data, this decision was taken so as not to overload the participant with learning new skills (e.g., how to TA and learning a reflective cycle). However, future research may wish to consider this to support the reflective process in athletes and assess its impact on the promotion of self-regulatory skills. Finally, akin to the limitation described in Birch et al. (2022), athletes become more aware of their thought processes that can promote self-regulated learning, however, by directing attention towards one's thoughts processes we can temporarily impact performance (Nisbett & Wilson, 1977). While the evidence is overwhelmingly supportive of using TA to capture data, researchers should be aware of the perceived impact of this on performance and may wish to consider extending the TA training period for participants to reduce this impact.

Conclusion

To conclude, this study has provided a useful insight into the effectiveness of using TA as a tool to develop reflective practice and promote self-regulation in a specific athlete population. The study has demonstrated how TA can be implemented as a novel reflective tool for goalkeepers in an academy at a professional soccer club to enhance athletes' reflective practice. The findings have built on previous research exploring the use of TA as a tool to facilitate self-regulation in golfers (Birch et al., 2022) and as a reflective practice tool in coaches (e.g., Whitehead et al., 2016; Stephenson et al., 2020; Swettenham & Whitehead, 2021). The findings from the present study also offer further support to Zimmerman's (2000)

self-regulated theory and Zimmerman and Campillo's (2003) Phases and Subprocesses of Self-regulation by offering evidence to the cyclical nature of their framework. The themes presented demonstrated how the participants reflected on their performance via TA recordings, which influenced their next forethought phase (via goal setting and motivational strategies), performance phase (via increased self-observation, technical and tactical instruction) and self-reflection phase (via developed reflective practice and co-regulation).

Disclosure Statement

The authors report there are no competing interests to declare.

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