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European Journal of Sports & Exercise Science, 2018, 6 (2): 36-60

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ISSN:2278-005X

Think Aloud: An Examination of Tennis Players Acute Stress and Coping Strategies

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ABSTRACT

Coping strategies have an influence on stress-related outcomes and appraisals, which can significantly affect athletic performance in an area which has increased in interest over the years, however limited research done in tennis. The aim of this study was to expand on previous literature examining a relationship between coping and stressors, and the influence upon athletic performance using Think Aloud. Eight competitive tennis players took part. Participants were instructed to verbalise their thoughts, following Level 2 verbalisation Think Aloud protocol (Ericsson and Simon, 1993) between points of a "fast four" competitive set of tennis. Audio-reports were recorded and data were transcribed verbatim, with data analysed as different themes of stressors and coping strategies. Results show that problem-focused coping was the most frequent for both winning and losing participants. Performance stressors were the most frequently reported appraisal for both groups. Different ranges of stressor-appraisals were ultimately influenced by the score and stages of the match, affecting the coping strategy used. Think Aloud has been seen to be a reliable method, with an increase in validity compared to retrospective research, eliminating the amount of time between a stressful experience and the reporting. Findings and TA can aid psychologists and coaches in developing techniques and interventions to improve athletic performance.

Keywords: Think aloud, Coping, Stress, Performance.

INTRODUCTION

Coping

An essential part of successful performance during sport competition is the ability to cope with stressful events [1,2]. Research in this topic has been investigated in several sports, including golf, tennis, table tennis, cricket, volleyball and figure skating [3-9]. One of the first studies examining coping in sport was conducted by Krohne et al. [10]. It had been considered that athletes who were more successful in competitive events and less successful could be distinguished by specific coping dispositions, such as; problem-focused, emotion-focused and avoidance coping. They found that players who exhibited less stressor through specific coping patterns were more successful in performance. Several investigations have also used other sport-specific and coping specific versions to study coping administered a way to find how Australian middle-distance runners coped when experiencing a personal downfall in performance. They found that problem-focused coping was the most used form of coping. On the other hand, conducted a follow-up study in baseball players, finding that problem-focused coping was not related to personal downfall in performance, but more to higher self-efficacy.

Previous research involving coping responses have categorised coping strategies into 3 key themes or functions; problem-focused coping, emotion-focused coping and avoidance coping [11-17]. Problem-focused describes strategies as managing the environment and minimising stress by eliminating the stressor (e.g., technical correction, planning, increasing efforts or concentration). Emotion-focused coping describes strategies to manage emotional arousal and responses to stress (e.g., relaxation, acceptance, positive self-talk and venting emotion). Finally, avoidance coping describes behavioural, cognitive and psychological efforts to disengage from a stressful situation [18] (e.g., humour, blocking, external attribution). Mosewich et al. [17] debated a limitation that a single coping

strategy may be classed within more than a single dimension, lowering accuracy to classify a coping strategy. However, using these dimensions allows researchers to broadly define athlete's response to stress.

Coping strategies play a significant part in countering the negative effects of stressors in a competitive environment [19-21].

The importance of coping strategies and responses in specific sports being investigated are supported by previous literature finding that more coping responses are used in individual sports compared to team sports [22-24] defined coping as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person."

Stress

Stressful events will lead to responses such as increased anxiety, muscular tension, slower decision making and over-arousal [25,26]. It is viewed as a relationship between the individuals and the environment, leading towards two processes: cognitive appraisal and coping.

Nichollas et al. [3] develop a technique to measure acute stress and coping during performance and found sequential patterning of stress and coping as well as revealing TA to be a suitable method of data collection. Different coping strategies are used to deal with different sources of stress [9]. Therefore depending on the state of the competitive situation, the individual may employ different coping strategies to deal with the stressors confronted.

A study by Krohne et al. [10] found that participants who used specific cognitive avoidance coping were more successful in performance than those who did not. However, coping style was not examined in this investigation.

On the other hand, limitations in existing research is that coping data may not be in relation to the stressor [17,27] The use of TA in identifying coping responses in stressor situations can be used as a method of assessment by sport psychology consultants [3]. This aids the process of developing techniques. The inability to examine the intensity of the stressors in this study proved as a limitation due to the inability to compare to competitive stressors.

As a result, examining the stressor situation at different points in a competitive situation may influence the coping strategy embraced by the individual. Research also brings to attention the detrimental effects on several psychological processes if failed to cope with sources of acute stress in high-pressure situations. Poor coping examples include a study [26] determining that poor coping results in reduced focus and an increase in muscle tension.

Appraisals

The Transactional Model of Stress was identified and states that the coping process consists of two types of cognitive appraisals: primary appraisal and secondary appraisal [24]. Primary appraisal focuses on evaluating on whether the demands of a situation are likely to be stressful and the significance [28]. For example, an athlete may recognise a competitive situation as threatening, harmful, beneficial and challenging, events, where coping responses are required [3]. Secondary appraisal consists of evaluating resources and coping responses appropriate to manage stressors and likely outcomes [28]. Different coping strategies are determined to counter and deal with different sources of stress, due to the different appraisals. The coping process continuously changes due to the constant changes in stressors. Both appraisals must be considered to full understand coping and the mechanisms.

Think Aloud

Think Aloud protocol analysis measures cognition within an ecologically valid environment during sport performance providing a better understanding of the real time cognitive process [29]. This highlights the potential for TA analysis to investigate real-time stressors in comparison to a retrospective design used by Stone et al. [30] and more tennis specific by Puente-Diaz et al. [5]. This has been criticised due to either over-reporting or forgetting coping strategies due to a delay in experiencing stressors and reporting coping strategies used Nichollas et al. [3] TA allows researchers to collect data during task performance, minimising event-recall.

Numerous studies focused on the relationship between coping strategies and specific sources of stress, however, afflicted by retrospective recall. Whitehead A, Ericsson KA et al. [31-33] developed a think-aloud protocol which conquers the problem faced in retrospective research by proposing a verbal protocol analysis method. Individuals are instructed to verbalise their thoughts during or immediately after an action, allowing a real-time view on their thought processes to examine the sequences of a cognitive task and better understand cognition in sport events. TA

has been employed in a variety of different sports in order to investigate cognitive thought processes, such as distance running [34] and golf [3]. Ericsson et al. [33] determined three levels of verbalisations which categorise the amounts of verbalisations and processing required; Level 1, Level 2 and Level 3 verbalisations. Level 1 TA is the verbalisation of inner speech; therefore no efforts need to be made to communicate their thoughts. Level 2 TA is the verbalisation of internal representation and verbal encoding, not originally in verbal code. The difference between Level 1 and Level 2 is that Level 2 verbalisations need to be transformed before being verbalised; only the participants focus needs to be verbalised. Level 3 TA verbalisation requires the individual to explain their thoughts, ideas, hypotheses or motives. For example, explaining why they opted to play a drop shot in tennis. Researchers have argued, Level 3 TA verbalisations may distract the individual and impede performance [35]. On the other hand, there is no evidence that Level 1 and Level 2 verbalisations alter performance. However, Level 3 verbalisation requires extended attention, as larger amounts of information is required and process, which may influence cognitive process sequences. Level 2 in previous research Nichollas et al. [3] has been proven to support Lazarus' model and proved a liable method of collecting real-time acute stress and coping data. TA has been used previously in sport to assess decision making and thought processes during sport, however, there is limited research using TA to assess coping in sport, specifically tennis. Ecological validity would be increased due to the utilisation in a field experiment and minimising the event-recall period [32]. Another limitation involves participants reporting verbalisations which are not in relation to thoughts being experienced in that current situation [36].

Tennis Literature

Despite being one of the biggest sports in the world, very few studies have looked at tennis in relation to stress and coping during performance, with the exception of Puente-Diaz Ret al. [5]. They investigated sources of acute stress and coping strategies used in highly skilled tennis player. This study showed that the use of coping strategies and controllability could be predicted through culture. However, a limitation of this study was it was completed with retrospective design, which experienced a time delay between the stressor and recall.

Given the limitations of the previous studies, there is a need for a study to investigate the relationship between stress and coping in tennis through TA. McPherson et al. [37] stated that verbal report analyses can be used to analyse thought processes during competition. In addition, this study also aims to examine specific relationships between coping strategies and stressors, and how coping strategies can affect the outcome of the athlete's performance.

METHODS

Participants

8 male participants took part in this study, with an age range of 18-23 years old (M=20.37, SD=1.19). All participants required to have played at least 3 university team matches in this current season calendar. Participants were assigned to the pseudonyms of Jerry, Nick, Adam, Matt, Steve, Shaun, Jordan, and Sam. Ethical approval was granted from Liverpool John Moores University for this research to be conducted, with informed consent provided by participants prior to data collection.

Design

The design used in this research is with a qualitative approach with a narrative method and member-checking interview. The Think Aloud methodology identifies the cognitive processes during task completion of the participants. The methodological procedures were consistent with the recommendations of Ericsson et al. [33]. The design involves participants verbalising their thought processes (Think Aloud) throughout the task. Tennis was the sport selected for analysis into coping strategies and stressors as a tennis player is confronted with numerous critical situations in a competitive match. A real-life situation in employed which assesses cognitions which may arise in a competitive setting and critical situation. Data were transcribed verbatim and data sets were subjected to protocol analysis [1]. A line-by-line content analysis was conducted to identify stressors and coping strategies [38].

Procedure

Participants were recruited through the researcher due to a relationship with the team and players. With the researcher training at the local tennis centre along with the participants, there is a previous relationship established. Participant information sheets and consent forms were provided to the participants to read and sign before taking part in the study. Participants were informed of potential benefits and specific details about their involvement. The study took

place on indoor plexicushion surface at the participant's home courts. The participants all used their own playing rackets in which they use for competition.

The tennis balls used were HEAD ATP balls, the same balls used for the university team matches. Prior to the data collection, all participants were briefed on TA protocol [33]. Before the start of the matches, all participants took part in a series of TA practice exercises ensuring that they could engage in TA Level 2 adequately [1]. This is to say what they were thinking without explaining their thoughts. They were each assigned to three tasks: 1) counting the number of dots on a page, 2) and arithmetic exercise and, 3) an anagram problem-solving task.

Participants were allocated a partner of a similar ability whom they would play against, with both players being audio recorded. All participants were familiar and comfortable playing against each other as they are members of the same team. Participants were instructed to "Think Aloud" continuously during a 'fast four set' of tennis.

Participants were informed they did not have to talk as the point was going on, however, to resume in-between each point. It was decided that a short set would provide sufficient data due to a point-by-point analysis. The researcher decided that asking the participants to verbalize their thoughts for an entire 'best of three sets' match would be too demanding as the match could last up to three hours.

A competitive setting was presented by informing the players that the winner of the matches will be given a t-shirt, to induce similar stressors experienced during actual competition, for the participants to perform as well as they could [39]. All participants were compensated for their time with a racket grip.

Data Collection

Olympus DM-650 Dictaphones and clip microphones were used to gather real-time verbal data in-between each point. The Dictaphone's were placed in the participant's pocket, with the clip microphone attached to the collar of the t-shirt ensuring verbal clarity.

Data collection commenced when the players made their way onto court. Recording proceeded continuously until the players finished their match. Data collection lasted from 16 minutes to 27 minutes (M=19.75 mins, SD=4.559135). These times varied due to the different scores in each matches and the time players take in between each point.

Data Analysis

Each participant's verbal reports were transcribed verbatim and checked for relevance and consistency [1] through a line-by-line content analysis [38] identifying stressors and coping responses. This was based closely on the work of Nichollas et al. [3].

The verbalizations by the participants must be relevant to the task to be included. Verbalizations were either coded as stressors or coping strategies for comparisons to be made.

Verbalizations, which the researcher deemed to be a concern, were coded as stressors. Verbalizations, which the researcher deemed to be an attempt to managing a stressor, were coded as coping strategies [17]. Previous research involving sources of acute stress among Tennis players [5,40] provide tennis-related stressors.

Similar stressors were assigned a label and rule of inclusion. Further previous research involving coping strategies among Tennis players [5,41] provide 60 items assisting the assessment of coping strategies. Supported by Hardy et al., a further 40 item version assessing the use of coping strategies.

Stressors (Table 1) were grouped into four secondary themes (performance, confidence, physical and external) and coping responses (Table 2) were grouped into four secondary themes (emotion-focused, problem-focused and avoidance coping).

Table 1: Stressor Theme Descriptions and Examples for verbalisations.

Primary Theme	Secondary Theme	Define/Describe	Used Example
	Goal Endangerment	Verbalisations about not reaching the goal intended	"Carry on like this and you won't even get a game"
	Damage in Confidence	Verbalisations relating to lack of confidence	"Not feeling comfortable behind my second serve"

Performance			
	Playing Performance	Verbalisations about poor personal playing performance	"That is such a poor shot"
	Tactical analysis	Verbalisations about poor personal tactical performance	"That serve wasn't wide enough, got punished for it"
	Technical execution	Verbalisations about poor personal execution of a shot	"You have to get under the ball more than that when so close to the net"
	Outcome of point	Verbalisations about the overall outcome of the point	"He got a bit lucky there, clipped the net cord and rolled over"
External			
	External Factors	Verbalisations of external factors which hinder performance	"These courts are not suited to my playing style, very fast paced"
	Lack of Concentration	Verbalisations regarding lack of concentration	"Your heads all over the place"
	Evaluation Apprehension	Verbalisations regarding the way outsiders view their performance	"You can't lose to him; the others won't shut up about it"
	Opponent factors	Verbalisations about the opponent	"Yeah, he hit a good shot, nothing I could do about it"
	Personal Injury	Verbalisations regarding a personal injury	"My shoulder is killing every time I kick a serve"
	Physical Discomfort	Verbalisations regarding a personal injury	"One game in and I'm tired already"

Table 2: Coping Theme Descriptions and Examples for verbalisations.

Primary Theme	**Secondary Theme**	**Define/Describe**	**Used Example**
Problem-focused coping			
	Correction of technique	Verbalisations about correcting technique of previous shot	"Make sure you're split stepping every time he hits a shot"
	Planning of point	Verbalisations regarding planning for the next point	"Look for a serve and volley"
	Increase in Effort	Verbalisations about an increase in effort for the next point	"Come on, keep it going"
	Concentration reminder	Verbalisations about concentrating and focus	"Get your head in the game"
Emotion-focused Coping			
	Attempt to relax	Verbalisations attempting to relax themselves	"Relax, play your game and relax"
	Acceptance of point	Verbalisations about accepting the previous point	"Good shot, nothing I could do"
	Positive Self-talk	Verbalisations around self-talk to motivate themselves	"Well done, that's a brilliant shot!"
	Expressing Emotion	Verbalisations about expressing emotion and frustrations	"Ahhhhh, that's stupid!"
Avoidance coping			
	Humour/Joke about a point	Verbalisations about attempting humour	"You can hit the ball on the strings you know"
	Block of current situation	Verbalisations about ignoring the events of the previous point	"It doesn't matter, let's get this next point"
	External Attribution	Verbalisations about blaming external factors	"Took you 3 games to get going"

Member checking

The member checking procedure was carried out to validate, verify and assess the trustworthiness and accuracy of qualitative results. Similar to Nicholls et al. [3], an adaptation of the [42,43] member checking procedure was conducted. The reports consisted of a point-by-point description of all the stressors and coping strategies which were stated during the match. In the member-check, the reports were provided for the participant, with participants asked to comment on specific moments in the match and accuracy of the qualitative reports. The member checking interviews were prompted by several key questions. Due to the researcher playing tennis at a high level, this allows the participants to feel a sense of security, answering the questions with honesty [44].

Appendix 1: Member-checking questions and definitions provided:

Stress: "Stress refers to the things that cause you negative worry or concern."

Stressors: "Stressors are the individual factors that cause you worry or concern resulting in negative emotions."

Coping: "Coping refers to both thoughts and behaviours that you use, in attempt lessen the impact or manage a stressor and can involve many different things."

1) "Are these stressors and coping strategies representative of this point?"

2) "At (insert score), was this a source of concern to you at the time?

3) "Looking back (insert score), is there any way you feel as though you could have handled this point better?"

4) "Were there any strategies or actions designed to manage stress?"

5) "Are there any stressors or coping strategies that you would like to add to your profile?"

6) "Are there any stressors or coping strategies that you would like to remove from your profile?"

RESULTS

Participants reported 163 stressors from 12 different Primary Theme stressor sources (Table 3), and 273 coping strategies from 11 different Primary Theme coping sources (Table 4). Summaries for all participants are presented in Tables 5 and 6. To illustrate coding of the stressors and coping strategies of the TA data, stressors are followed by the code [S] and coping strategies are followed by the code [C].

Table 3: Frequency of Stressors experienced for total, winning and losing participants.

Primary Theme	Secondary Theme	Overall	Winning Participants	Losing Participants
OVERALL		163	63	100
Confidence		4	1	3
	Goal Endangerment	2	1	1
	Damage in Confidence	2	0	2
Performance		114	40	74
	Playing Performance	40	10	30
	Tactical analysis	18	5	13
	Technical execution	21	6	15
	Outcome of point	35	19	16
External		34	21	13
	External Factors	6	6	0
	Lack of Concentration	1	1	0
	Evaluation Apprehension	2	0	2
	Opponent factors	25	14	11

Physical		11	1	10
	Personal Injury	6	1	5
	Physical Discomfort	5	0	5

Table 4: Frequency of Coping Strategies used for total, winning and losing participants.

Primary Theme	Secondary Theme	Overall	Winning Participants	Losing Participants
OVERALL		273	168	105
Problem-focused coping		153	81	72
	Correction of technique	9	4	5
	Planning of point	67	45	22
	Increase in Effort	71	30	41
	Concentration reminder	6	2	4
Emotion-focused Coping		105	78	27
	Attempt to relax	8	6	2
	Acceptance of point	11	8	3
	Positive Self-talk	79	60	19
	Expressing Emotion	7	4	2
Avoidance coping		15	9	6
	Humour/Joke about a point	8	2	6
	Block of current situation	7	7	0
	External Attribution	0	0	0

Stressors

Table 3 shows the frequencies of the stressor-appraisals reported by the participants. Of the 163 stressor-appraisals reported, 4 were classed as confidence, 114 as performance, 34 as external and 11 as physical. Data shows that participants who won their match reported a lower number of performance stressors (40) than those who lost their match (74). However, participants who won their match reported a larger amount of external stressors (21) than those who lost (13). Overall, a larger amount of stressor-appraisals were reported by those who lost their match (100).

Coping

Table 4 shows the frequencies of the coping dimensions reported by the participants. Of the 273 coping strategies reported, 153 were classified as problem-focused, 105 as emotion-focused coping, and 15 as avoidance coping. Data shows that participants who won their match displayed a larger number of problem-focused coping strategies (81) than lose who lost their match (72). Participants who won their match also reported more emotion-focused coping strategies (78) than those who lost their match (27). Avoidance coping was also more common in participants who won their match (9) compared to those who lost their match (6).

Matt

In terms of the pattern of Matt's responses, during the entire duration of the match, he typically reported one or two stressors followed by a series of coping strategies ranging from two to six attempts. As the match progressed, series of stressor-appraisals decreased whereas series of coping attempts increased. This may have been related to the score

situation as Matt displayed more stressor-appraisals and less coping strategies in the games which he lost in comparison to the games he won. Table 5 and 6 show that he lost the first two games, and won the following four.

Table 5: Stressor (Frequencies), and scores for each game.

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6
Jerry	Performance (2)	Tactics (2)	Performance (2)	Performance (1)	Performance (2)	N/A
	Opponent (2)	Technical (1)	Technical (1)	Tactics (2)	Technical (1)	
	Outcome (1)		Outcome (1)	Opponent (2)	Opponent (1)	
					Outcome (1)	
Won /Lost	Lost	Won	Lost	Lost	Lost	
Nick	Tactics (1)	Tactics (1)	Tactics (2)	External Factor (1)	No Stressors Reported	N/A
			Outcome (3)	Outcome (2)		
Won /Lost	Won	Lost	Won	Won	Won	
Adam	Goal Endangerment (1)	Tactics (2)	Lack of confidence (2)	Technical (2)	Performance (4)	Performance (3)
			Physical discomfort (1)	Tactics (1)	Tactical (1)	Opponent (1)
			Performance (1)			Outcome (5)
Won /Lost	Won	Won	Lost	Lost	Lost	Lost
Matt	Opponent (4)	Outcome (1)	Outcome (2)	Performance (1)	Opponent (1)	Opponent (2)
	Outcome (4)	External factors (1)			Outcome (1)	
		Opponent (3)				
Won /Lost	Lost	Lost	Won	Won	Won	Won
Steve	Physical discomfort (2)	Outcome (1)	Tactics (1)	Performance (1)	Performance (2)	N/A
	Injury (1)	Injury (1)	Injury (1)	Injury (2)	Tactics (1)	
	Outcome (2)	Opponent (1)	Technical (1)	Technical (4)	Opponent (1)	
	Technical (1)	Tactics (1)	Performance (1)	Outcome (2)	Technical (1)	
	Opponent (1)			Physical discomfort (1)	Outcome (1)	
Won /Lost	Won	Lost	Lost	Lost	Lost	
Shaun	External factors (1)	Opponent (1)	Physical discomfort (1)	Technical (1)	External factors (1)	N/A
	Performance (3)	External factors (1)	Injury (1)	Lack of Concentration (1)	Outcome (2)	
	Outcome (1)	Performance (1)		Performance (2)	Performance (1)	
		Goal endangerment (1)		Injury (1)		
				Physical discomfort (1)		
Won /Lost	Lost	Won	Won	Won	Won	
Jordan	Performance (2)	Opponent (1)	Technical (3)	Performance (3)	N/A	N/A

	Tactical (1)	Evaluation apprehension (1)	Tactics (2)	Opponent (1)		
	Evaluation apprehension (1)	Performance (3)	Performance (1)	Outcome (1)		
	Technical (1)			Increased effort (3)		
Won /Lost	Lost	Lost	Lost	Lost		
Sam	Opponent (1)	Outcome (1)	Outcome (1)	Opponent (1)	N/A	N/A
	Technical (1)	Technical (2)	Opponent (1)	Outcome (1)		
		Injury (1)	Tactics (1)	Performance (2)		
			Technical (1)	Technical (1)		
Won /Lost	Won	Won	Won	Won		

Table 6: Coping strategy (frequencies), and scores for each game.

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6
Jerry	Humour (1)	Positive self-talk (2)	Increasing effort (1)	Increasing effort (2)	Increasing effort (1)	N/A
	Positive self-talk (1)	Increasing effort (1)	Planning (2)	Planning (3)	Planning (2)	
	Planning (2)	Planning (1)	Concentration (1)	Humour (1)	Concentration (1)	
	Technical Correction (1)		Venting emotion (1)	Positive self-talk (3)	Relaxation (1)	
			Positive self-talk (1)		Acceptance (1)	
Won /Lost	Lost	Won	Lost	Lost	Lost	
Nick	Planning (4)	Planning (5)	Planning (4)	Planning (3)	Planning (5)	N/A
	Technical Correction (1)	Acceptance (3)	Blocking (1)	Acceptance (2)	Positive self-talk (4)	
	Positive self-talk (2)	Positive self-talk (2)	Positive self-talk (2)	Positive self-talk (4)		
	Increasing effort (1)		Concentration (1)			
			Technical Correction (1)			
Won /Lost	Won	Lost	Won	Won	Won	
Adam	Technical Correction (1)	Positive self-talk (2)	Humour (1)	Planning (1)	Increasing effort (2)	Increasing effort (3)
	Venting Emotion (1)	Planning (4)	Positive self-talk (2)			Positive self-talk (2)
	Humour (1)	Increasing effort (3)	Technical Correction (1)			
	Increasing effort (2)	Technical correction (1)				
	Planning (1)					
Won /Lost	Won	Won	Lost	Lost	Lost	Lost
Matt	Relaxation (1)	Venting emotion (1)	Increasing effort (3)	Venting emotion (1)	Increasing effort (1)	Planning (2)
	Blocking (3)	Increasing effort (2)	Acceptance (2)	Relaxation (2)	Positive self-talk (2)	Positive self-talk (5)

	Positive self-talk (5)	Positive self-talk (3)	Relaxation (2)	Increasing effort (2)	Blocking (3)	Humour (1)
	Venting Emotion (1)	Planning (2)	Venting emotion (1)	Positive self-talk (1)		Increasing effort (4)
	Planning (1)		Planning (1)			Relaxation (1)
			Positive self-talk (3)			
Won /Lost	Lost	Lost	Won	Won	Won	Won
Steve	Positive self-talk (1)	Venting emotion (1)	Increasing effort (1)	Positive self-talk (1)	Increasing effort (3)	N/A
	Increasing effort (4)	Humour (1)		Increasing effort (2)	Planning (2)	
	Humour (1)	Increasing effort (1)			Acceptance (1)	
	Concentration (1)					
Won /Lost	Won	Lost	Lost	Lost	Lost	
Shaun	Increasing effort (1)	Increasing effort (1)	Increasing effort (1)	Increasing effort (3)	Increasing effort (1)	N/A
	Planning (5)	Planning (1)	Planning (4)	Planning (2)	Planning (3)	
	Positive self-talk (2)	Positive self-talk (2)	Positive self-talk (4)	Positive self-talk (3)	Positive self-talk (5)	
	Technical correction (1)	Concentration (1)		External attribution (1)	Technical correction (1)	
				Humour (1)		
Won /Lost	Lost	Won	Won	Won	Won	
Jordan	Increased effort (2)	Increased effort (4)	Planning (1)	Increased effort (8)	N/A	N/A
	Planning (1)	Positive self-talk (1)	Increasing effort (2)	Acceptance (1)		
	Positive self-talk (1)			Positive self-talk (2)		
	Relaxation (1)			Planning (1)		
				Concentration (1)		
Won /Lost	Lost	Lost	Lost	Lost		
Sam	Increasing effort (2)	Increasing effort (1)	Positive self-talk (3)	Increasing effort (4)	N/A	N/A
	Positive self-talk (1)	Planning (1)	Planning (2)	Positive self-talk (3)		
		Positive self-talk (3)	Increasing effort (1)			
Won /Lost	Won	Won	Won	Won		

For example, in the second game which he lost, Matt reported a total of five stressors and no more than 2 coping strategies between each appraisal. Whereas in game 4, Matt only displayed one stressor followed by five coping strategies. This may have been related to winning four points in a row and not losing a point in this current game, resulting in an increase in confidence. Matt's qualitative comments revealed how his stressor-appraisals decreased as the match progressed, entering the later and more important stages of the match. Matt felt there was no pressure to perform well at the beginning of the match, more specifically the first two games which he ended up losing. In game 3, Matt increased the frequency of problem-focused coping increasing in confidence. Positive self-talk and increasing effort coping strategies saying, "Come on, come on! That's nice, putting him under pressure, more of that! [C]". The only stressor-appraisals used in game 3 were outcome stressors, saying "unlucky with my serves today, quite unlucky [S]." In the fourth game, he only reported one stressor after missing a first serve saying, "ah just long, need to start make these first serves [S]" followed by engaging in increasing effort "keep it up, you're playing well, he's scared, keep it going [C]." Matt was losing the sixth game 15-40, however, remained positive saying, "you're still playing well, got him on the ropes, nice vary in shots, come on, keep it going [C]", as well as engaging in problem-focused coping as he won the next four points and the match.

Adam

In terms of the pattern of Adam's responses, he reported a lower number of stressor-appraisals in the games he won in comparison to the games he lost. He began to report longer sequences of stressor-appraisals and fewer coping attempts in the final four games which he lost, compared to the first two games he won. In successful games, he typically reported one or two stressors followed by four to six consecutive coping responses. For example, in game 1, he reported a stressor-appraisal and deployed four consecutive coping strategies post losing a point. There were minimal coping strategies deployed in the games which he lost. For example, in the sixth game, Adam was leading 40-15. Two consecutive stressor-appraisals were reported resulting in the following two points being lost leaving the score at 40-40. A further four stressor-appraisals were deployed in the following two points, resulting in Adam losing the game.

Adam's qualitative comments revealed a high sequence of coping strategies post losing a point in the first two games of the match, with a large use of problem-focused coping. Adam began the match losing the first point saying "oh pressure's on now, can't lost the first game [S]" followed by problem-focused coping and planning strategies, "step in, take it early [C]", resulting in winning the game." Adam continued to use problem-focused coping in the second game which he won. Planning strategies were used, "step in on the second serve, take it early pushing it cross court [C]. Don't hit too hard, aim for corners and come in on the angles [C]." Finding success with planning strategies, he continued to say, "step in, step in. Get to the net more often. You can pass him with any shot, just step in and get to the net [C]." Game 3 noted a change in coping strategies applied. In the previous two games (1 and 2), a stressor was followed by a planning coping strategy, however, this was not implemented in game 3, and Adam consequently losing the game. Game 5 began with Adam commenting on performance stressors, "For god sake, it's an easy ball [S]. Every short ball has been hit in the net, you've got to get up them [S]." Four of the five stressors reported in game 5 were performance stressors, with only two coping attempts, resulting to Adam losing every point this game.

DISCUSSION AND CONCLUSIONS

The findings of this study shows that different coping strategies play a significant role in the ability to cope with a stressor-appraisal, ultimately influencing player performance. The tennis players in this study implemented different types of coping strategies, depending on the stressors encountered. Overall, the results indicated that the tennis players appraised a range of stressors during different stages of the match and performance before deploying a series of coping strategies. Different players experienced a different range of stressor-appraisals at different stages of performance, a lot influenced by the score, also influencing the type of coping strategy used. Results are also consistent with previous literature [24,45] that the coping style and stressor offers little relevance to prediction and explaining use of coping strategies, as no real significant relationships were found between coping strategies and stressors experienced.

A number of findings support previous literature, examining how coping strategies can affect the outcome of an athlete's performance. The appraisal of a stressor determines the coping strategy an athlete will use, a large variety will be used to deal with the appraisals. An important finding supports a previously used hypothesis that problem-focused coping is the most frequently used coping strategy in order to gain an advantage in athletic performance and overcome stressors. Emotion-focused coping and avoidance coping follows this, supporting previous research in coping [46]. Results show that participants who interacted more with problem-focused coping had a greater level of success, as winning participants reported a larger amount of problem-focused coping strategies in comparison to losing participants. Therefore a greater use of problem-focused coping resulted in an increase in athletic performance and overall score. This is consistent with [47] findings that problem-focused coping is negatively related to an increase in competitive anxiety, as the frequency of problem-focused attempts decreased in decisive situations of the match. This could be due to the context in situation profession, that the environments encourage certain dedication and perseverance, behaviours requiring problem-focused strategies.

An area deeply flawed in this study was the significance of avoidance-coping to performance, due to being reflected in a smaller number of transcripts. This supports Burton's hypothesis that the domain in which stress is being experienced will increase the importance of cognitive based coping strategies. Previous research consistently highlights an association between avoidance coping, physical stressors, and external stressors. With only a total of fifteen avoidance coping strategies reported, it cannot be concluded with full reliability that there is an association between avoidance coping and physical and external stressors.

Stressor-appraisals had a significant effect on performance and overall outcome of the participants score and should be noted with importance. Winning participants reported 63 stressors compared to 100 stressors reported by the

losing participants, with performance being the most frequently used stressor for both groups. Performance stressors were cited more by losing participants than winning participants. As expected, there were differences in the frequency of reported stressors between winning participants and losing participants. This partially explains the difference in coping strategies used by both sets of groups. This supports previous stressor and coping relationship literature in sport [17] and the situational hypothesis, due to the individuals appraising stressor situations differently. This is due to there being certain differences in coping attempts which were unrelated to the stressor-appraisals experienced throughout the match. The way a stressor situation is appraised will also influence the coping strategy used, and ultimately effect the frequency of stressors and coping strategies reported, resulting in partial support of the hypothesis that a difference in stressor situations the individual encounters, influences coping.

A final major finding was that stressors reported fluctuated throughout different stages in several of the participant's performances. In Adam's performance, there was a significant increase in stressor-appraisals towards the final two to three games of the match, coinciding with the importance of this stage in the match. The frequency of reported stressors increased during more important stages of competition. This supports the [48] results that the highest number of stressors were reported during the most important periods of competition, compared to the lower number of stressors reported during less important periods. Ntoumanis N et al. states, when an individual is faced with a threat or greater challenge, higher levels of stress, are reported. Furthermore, the importance of the situation or the athlete's commitment to a certain event influences the stressor appraisals [49]. Interestingly, the results collected from Matt's data are not in line with previous research. Results indicate that when appraised with a threat, there was a decrease in stressors and increase in emotion-focused coping. It appears that the context (Leading or losing the match) is a significant factor in the verbalisations of either a stressor-appraisal or coping strategy, and the selection of coping strategy.

This leads to the most important finding that through the analysis of the data, findings are individualised. Both participants showed different reports of stressor-appraisals and coping responses to different situations in the match. Quite clearly, Matt displayed a reduced amount of stressor-appraisals towards the more decisive stage of the match, whereas Adam showed an increase in stressor-appraisals towards the more decisive stage. The same concept and construct even though it is articulated, is not actually seen or perceived the same way by the individual. As findings are individualised, these are implications for applied work and questions whether research can be completed through this methodology. Future research could include a longitudinal study with single study examining, in order for each athlete to be treated individually due to the way they perceive a task differently. This is supported by Lazarus, stating that TA offers possibilities for future research in coping through a longitudinal and individual differences.

With this study completed in a naturalistic environment, collecting real-time data, there is a significant increase in ecological validity. On the other hand, not all the conditions were controlled an external factors may have affected participants performance and results. For example, spectators on the courts next to them may result in an increase in external attribution. The matches played consisted of participants playing against teammates, therefore further research within tournament settings will improve consistency of players thought processes. The use of TA is also a factor within real-time measure, eliminating errors cause by retrospective recall. Retrospective recall with coping has always faced problems in previous literature due to the validity and reliability of the data due to memory decay. As mentioned earlier, in regards to future research, TA has been proven as a feasible method of research, enabling possibilities for further research in coping research such as longitudinal and individual differences. With TA being a useful method of collecting stress and coping data in tennis, there are certain sporting settings where it can be deemed difficult such as football and rugby. It has been proven to be more suitable measuring cognitive strategies than behavioural strategies [45]. Researcher observations or video observations could be a reliable source of measurement, examining the relationship between cognitive and behavioural actions, eliminating the limitation of verbalisations not being in relation to actual behaviour. Ball et al., provided evidence for limitations and criticisms of TA. They argued that certain thought processes are more difficult to verbalise than other, limiting the likelihood of participants verbalising certain thought processes. Another possible limitation of TA is not capturing certain situations where retrospective methods could take place, such as post-match anxiety [32]. Future research could consider the use of the CSAI-2 questionnaire to measure cognitive anxiety.

The importance of the psychological requirements of specific moments in tennis is reinforced by this study. Tennis players will experience different emotions and stressors which will influence performance. Puente-Diaz Ret al. stated that a display of negative emotions can portray an image of weakness, therefore negatively affective performance. Experience coaches and practitioners often encourage competitive tennis players to control their emotions throughout a match. This may leave consultants unaware of the players thought processes. Strength of this study include that it provides several insights for applied practice for coaches and consultants. It also provides an insight into tennis

players' thoughts during an entire set for both successful performances and unsuccessful performances. In tennis, coaches would be able to listen to the player at specific times, including pre-serve planning, following a mistake, following winning and losing a point, and between service games, to evaluate and enhance performance.

The member-checking interview used showed that the stressors and coping strategies recorded were, in fact, consistent with how the participants were feeling while engaging in the task. An important issue of the data collection and analysis was the internal validity. One of the only areas which the study could not cover is examining the intensity of the stressors experienced. This could be considered in future research by examining the description of dispositions (anxiety and stress intensity) and situational characteristics which could enable the prediction of coping efficacy [18].

The small sample size used in the study needs acknowledgement. Eight tennis players were used in the study, which is slightly lower than the amount of participants used in previous literature where a sample of 12 was used [37]. Previous research into measuring acute stress and coping during performance by Nichollas and Polman used a sample of four participants, analysing qualitative data, hence the reason for the sample size. Future research should consider improving validity and generalisability by working with a larger sample size.

In conclusion, findings show that problem-focused coping was the most frequently used coping strategy, having a positive effect on tennis performance, supporting previous findings from other sport studies such as golf [3,46]. Findings also extend current research in the relationship between stress and coping using TA, eliminating the limitations the retrospective design offers. However, the most important finding highlights the need for applied work with future research using a longitudinal study due to the findings being individualised. Athletes perceive tasks differently, and single study examining will be a more suitable methodology to complete this area of research. Findings can also provide coaches and consultants with an insight into tennis players thought processes. With an insight for applied practice, there is an easier assessment of moments in the match where there is a significant increase in stressors, and how the individual can aim to cope with these appraisals.

RECOMMENDATIONS

As a result of health impact has increased the prevalence of overweight and obesity in Albania, we recommend the implementation of strategies that address the prevention and treatment of overweight and obesity in the population.

Due to lack of sufficient information on the prevalence of obesity and risk factors associated with, particularly in certain population groups, will recommend the creation of a national surveillance system that will be managing at least information associated with weight, height and waist circumference.

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