AROUSAL AND BEHAVIOUR OF COACHES DURING COMPETITION

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ABSTRACT

This thesis investigated whether a relationship exists between the intra-competition psychological and psychophysiological arousal levels of basketball coaches and their behaviour during the match. The participants in Study 1 were four male basketball coaches, aged between 28 and 50 years, three who coached junior female teams and the other a senior women's team coach. The study examined the relationship between coaches' behaviour and arousal level. Trait anxiety was measured at the commencement of the study, using the Sport Competition Anxiety Test (SCAT). State anxiety was measured prior to each match using the Competitive State Anxiety Inventory-2 (CSAI-2). Heart rate of the coaches was measured at 5-second intervals for the duration of the three games for which each coach was studied, using the Polar 4000E heart rate telemetry system. At the same time, the behaviour of the coaches was videotaped during those matches, and their comments during the matches recorded via a remote microphone. Coach behaviour, as recorded on video-tape, was coded subsequent to the games using the Coaching Behaviour Assessment System (CBAS). Mean heart rate (HR) varied considerably between coaches and for the same coach in different games. These HR values represented widely varying percentages of the maximums estimated by the age-adjusted method. Using the CBAS, coding revealed large differences in the number of coaching behaviours exhibited per game both between coaches and for the same coach in different games. The majority of observed behaviours came from only seven of the 12 CBAS categories, with three coaches showed specific technical instruction (TIS) as their most frequent behaviour, and the other coach showing verbal punishment (VP) as their most frequent behaviour. An ANOVA indicated that there was a significant difference between the frequencies of use of different categories of behaviour, $\underline{F}(6,18)$

= 4.17, p < .05. The CBAS is divided into two classes, reactive behaviours and spontaneous behaviours. A comparison of the frequency of use of behaviours from these categories revealed that spontaneous behaviours were used twice as frequently as reactive behaviours. An ANOVA revealed this difference to be significant, $F_{(1,3)}$ = 11.26, p < .05.

Study 2 was designed to be more precise in the manner in which game situations were defined and measured, particularly with regard to specific events in the game that might be deemed stressful to the coach. The aims of Study 2 were: (a) to compare arousal levels of coaches in stressful game situations and non-stressful game situations, (b) to compare coach behaviours in stressful and non-stressful game situations, and (c) to examine the relationship between coach arousal levels and behaviour. The participants were 13 male and 4 female basketball coaches, aged 21 to 56 (M=36.61, SD=10.17). They coached teams representing their local association. The coaches were video-taped during a match they coached, wearing a HR monitor, and had their verbal behaviour recorded by remote microphone. Their coaching behaviour was coded utilising the CBAS. The average HR's of the 17 coaches varied from 125 beats per minute to 83 beats per minutes (M=104.09, SD=12.09). As in Study 1, the HR values represented widely varying percentages of the maximums estimated by the age -adjusted method. A paired t-test confirmed that there was no significant difference between coach HR's when their team was winning and losing during the same game, t (16) = -1.208, p> .05. There was large variation in the number of behaviours that were representative of the various categories of the CBAS exhibited by the 17 coaches. The most frequently used behaviour was specific technical instruction (TIS) followed by verbal reinforcement (VR). A score gap of less than 5 points was deemed to be likely to be experienced as stressful by the coaches.

ANOVAs were performed on game state, behaviour categories, and on the interaction between the frequency of spontaneous and reactive behaviours and the two categories of game state. A significant difference was found for frequency for CBAS categories, $F_{(1,27)} = 8.185$, $p<.01$. A significant difference was found for the difference in total behaviours that were either spontaneous or reactive, $F_{(1,27)} = 15.568$, $p = .001$. No significant difference was found for the interaction between the frequency of spontaneous or reactive behaviour and game state, $F_{(1,27)} = 3.071$, $p.05$. Two independent raters with experience of coaching junior basketball teams, were asked to view the 17 games in Study 2 to identify events that they deemed as stressful to the coach. The raters varied greatly in both the total frequency of events they considered to be stressful to the coach and in the specific events they identified as stressful to the coach within each game. Between the raters there was also little agreement as to what was a stressful event within a game, with one rater observing nearly three times the number of stressful events noted by the other rater.

The aim of Study 3 was to use the views and interpretation of individual coaches of their thoughts and behaviour about selected game situations to elucidate the patterns observed in Study 2. Examination of arousal levels and coach behaviour for those situations was undertaken in Video Cued Stimulated Recall Interviews to determine whether coach interpretations were linked to their arousal or behaviour. The participants were five coaches who participated in Study 2. They coached in games where the game status changed frequently during the segments of the game they were shown. The participants were interviewed using an unstructured interview approach within two weeks of being observed in the Study 2 game. The participants were shown excerpts of the Study 2 video-tape and asked to report on their thoughts and feelings regarding the respective excerpts. The results indicated that the coaches

were very mindful of their responsibilities as coaches of junior players. They considered themselves to be role models, which was the basis for the need to be in control of their behaviour. The coaches also reported that they placed emphasis on the developmental aspects of their role, such as, developing skills, and sportsmanship, as opposed to a win-at-all costs approach. The coaches claimed that they had awareness of how their behaviour related to the state of the game, and that at times those behaviours were not as they would desire. The coaches also described rudimentary techniques for regaining control, when they recognised that they were acting in ways contrary to the role they perceived they should play.

The results of Studies 1 and 2 were very similar. It was concluded that coaches at this junior developmental level did not show highly predictable patterns of arousal associated with phases or situations in the game. Coaches did demonstrate use of specific coaching behaviours, many of which were consistent with effective coaching. Again, their coaching behaviours did not fit patterns that related to game stage or state. Nor was there a relationship between arousal levels, as measured by HR, and coaching behaviour in either study. The results of Study 3 indicated that coaches at the junior developmental level focused more on the development of individual and team skills than on game outcome and they also paid attention to the need to behave as a role model. It is proposed that the developmental goals of these coaches influenced their arousal and behaviour, and in particular the relationship between arousal and behaviour. Implications for future research and the development of coaches are discussed.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

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CHAPTER 1: INTRODUCTION

The increased professionalism of coaching in Australian sport has its roots, to some extent, in the perceived poor performance of the Australian Team at the 1976 Montreal Olympics (Daly 1991). Australia has a proud sporting heritage and the general public has high expectations of its representative teams. From that time, there has been a substantial increase in both the quality and quantity of resources available to athletes. Over the past 25 years, this has been reflected in the development of sporting institutes and academies around the country (Daly 1991). Concurrently, there has been an increase in the number of full-time positions in the professional sports e.g., Australian Rules Football, Soccer, and both codes of rugby. Coaches in these sports have moved from being part-time to being fully employed by Clubs or Associations. With the increased professionalism of sport has come an greater number of positions for career coaches. This has meant that coaches have had to pursue professional qualifications at increasingly higher levels and to continue to upgrade their qualifications to meet the demands of the coaching environment (Bloomfield 2003). The Australian experience mirrors earlier developments in other countries, such as the USA, Canada, and the UK.

From the coaches' perspective, continuation of their employment is largely dependent on the results they achieve. This can increase the stress on coaches as they strive for success, and, in some circumstances, it can have adverse effects upon the coach's performance. Since Sydney was awarded the Olympic Games in 1993, the Australian Sports Commission has made available significant funds for the creation of professional coaching positions. The continuation of these positions depends on the outcomes generated in the particular sports as a result of the programs instigated.

Indeed, several Olympic programs had their funding reduced as a result of not being able to match the agreed upon performance criteria for re-funding. As Taylor (1992) indicated, the coaches are under great pressure, because their positions may be at risk. Again, this situation arises in many countries where professional coaching occurs.

For the majority of coaches in Australia who do not receive remuneration for their coaching, pressure still exists to achieve whatever outcomes are deemed satisfactory by the association or club administrators that appoint them. Those outcomes may be related to win/loss ratios, successful performances in finals, the development of players, or a combination of these. Failure to achieve these outcomes may result in the coach not being re-appointed.

Coaches, administrators, and researchers have proposed that there is a connection between the behaviour of the coach during competition and the performance of the individual or team in that competition. It has been proposed that this occurs because coaches are responsible for a number of activities that directly relate to the ultimate performance of the individual or team, such as planning the relevant match strategies and making adjustments to them as the game unfolds. The extent to which the performance of these activities creates stress for coaches will vary between individuals. Nonetheless, the expectations associated with the trend toward coaches being professional are likely to increase the stress that coaches perceive to be associated with their teams' performance. Studies have indicated that on certain physiological measures, e.g., heart rate, coaches show marked changes during competition that appear unrelated to physical exertion, but relate to the

environment in which they are coaching (La Voie & Yaschyshyn, 1973; McCafferty, Gliner, & Horvath, 1978). McCafferty et al. observed:

> it is obvious from the heart rate response that the amount of stress on the coach varies considerably and that it depends on the importance of the particular contest...(and there) appears to be a considerable amount of oscillation in the heart rate response precipitated by the events during the contest (p. 70).

Given the increasing pressure associated with well-rewarded professional coaching, it is important to understand whether the level of arousal that individual coaches record in competitive situations affects their behaviour. Equally it is important to understand whether the same is true for coaches who coach on a voluntary capacity. Although there is a vast literature relating arousal and anxiety to performance in athletes, little research has been undertaken on the effects of arousal levels, both physiological and psychological, on the subsequent behaviour of the coach. To date, the research on coach reaction during matches has been concerned with the effect of the game situation upon their physiological stress levels (McCafferty et al.). This thesis investigated whether a relationship exists between the immediate pre-competition and intra-competition psychological and psychophysiological arousal level of coaches and their behaviour during the match.

CHAPTER 2: LITERATURE REVIEW

The literature review begins with a discussion of the definitions to be used during the thesis. The need for clarity of definitions relates to the manner in which terms, especially in the area of arousal, are often used interchangeably to describe similar states. The review then moves on to discuss the various types of anxiety often experienced by people and the definition of each type. The relationship between arousal and performance is discussed, as are the theories that underpin the relationship. The various methods of measuring anxiety are described, as are examples of the various tests that have been used. The literature review then indicates what research has been undertaken into how stress and anxiety affect coaches individually and in competitive settings. The review then cites the various studies that have been undertaken into coaching behaviour in general, and coaching behaviour during competition in particular. The final part of the review examines the limited research available on the relationship of arousal and behaviour in coaches.

Definitions

Arousal, Stress, and Anxiety

In sport psychology the terms stress, arousal, and anxiety are often used interchangeably, sometimes leading to confusion (Gill, 2000). Arousal may be defined as the "intensity dimension of behaviour, the general state of activation or excitation that ranges on a continuum from deep sleep to extreme excitement" (Gill, 2000, p. 113). Selye (1975) defined stress in similar terms to arousal, referring to a non-specific physiological response. Arousal and stress are neutral in terms of direction of emotion. High arousal or stress can reflect joy or exhilaration, worry or

fear. Low arousal or stress can reflect relaxation or boredom. In common parlance, confusion is created when people use the term stress to indicate what Selye termed "distress", being mindful that Selye was referring to physiological stress. It is now common practice to use the term stress to refer to emotional or psychological stress.

Selye used the word distress to describe the negative reaction of an individual in response to a specific set of circumstances, as opposed to the term "eustress", which he used to signify a positive response to a set of circumstances. Whether arousal leads to eustress or distress, one aspect of which is anxiety, depends upon the individual's subjective appraisal of the situation and whether they perceive themselves having the capacities to cope with the situation (Martens, 1982). Likewise, McGrath (1970) proposed that stress occurred as a result of a substantial imbalance between capacity and demand. Stress is a response to a subjective interpretation of a particular situation. It is possible to conceive stress in three ways, first, stress can refer to the situation, where the stimulus is a stressor. Second, stress can be thought of as an interpretation, where the process or interpretation is called stress, due to the psychological interpretation by an individual of their inability to cope with the demands of a specific situation. Third, stress can be conceived as a response where the response is the stress reported.

Trait and State Anxiety

Much of the research on psychological stress is relevant to the investigation of anxiety, since anxiety is generally regarded as a product of stress and a mediator of its influence on behaviour (Martens, 1971). Gould and Krane (1992) described anxiety as "feelings of nervousness and tension associated with activation or arousal of an organism". For a long time, anxiety was considered to be a unitary concept. It

was proposed that some people were anxious, that is, they would become anxious in a wide variety of situations that they perceived as threatening. Others were non-anxious people, who would rarely become anxious. Speilberger (1966) established a distinction between anxiety as a state that fluctuates over time, dependent on the circumstances that an individual is currently experiencing (state anxiety), and anxiety as a stable condition, referring to the extent to which an individual is predisposed to anxiety (trait anxiety).

Anxiety and the Stress Process

Martens, Vealey, and Burton (1990) developed an independent model of competitive anxiety, following the work of Speilberger (1966) and McGrath (1970). They preferred to use the term stress, rather than anxiety to denote the overall process, for two reasons; "anxiety is too often associated only with personality traits, which constitute only the stimulus part of the process...and...stress is often considered to be more than only a stimulus variable" (Martens et al., p. 9). Martens et al. used a three stage model to describe the stress process. First, they proposed the existence of an objective demand or stimulus. This is followed by the threat, or mediator, between the demands of the environment, and the response capability of the individual. Dependent on the individual's appraisal of the situation, Martens et al. borrowed Speilberger's term state anxiety reaction to describe the response. Martens et al. (1990) further defined state anxiety indicating that it "represents the momentary anxiety state precipitated by the interaction between the person's level of trait anxiety and the current discrepancy between environmental demands and response capabilities" (p. 7).

Multidimensional State Anxiety

A further distinction has been made between cognitive and somatic components of state anxiety. This distinction was first noted by Liebert and Morris (1967), who referred to the worry and emotionality components of anxiety. Then Davidson and Schwartz (1976) and Borkovec (1976) used the terms cognitive anxiety and somatic anxiety to describe worry and emotionality respectively. Martens et al. (1983) further developed this distinction, creating a test to measure cognitive state anxiety and somatic state anxiety separately in the sport competition context. Somatic anxiety is the subjective experience of the physiological arousal associated with state anxiety. It is the individual's interpretation and report of their bodily reactions. Often the actual bodily reactions and the experience of them will be similar, but in some circumstances and for some people they can diverge. Martens et al. (1990) gave the following definitions of cognitive and somatic anxiety. "Cognitive anxiety is the mental component of anxiety and is caused by negative expectations about success or by negative self-evaluation" (p. 6), whereas somatic anxiety refers to "the physiological and affective elements of the anxiety experience that develop directly from autonomic arousal, e.g., rapid heart rate, shortness of breath" (p. 6). Gould, Petlichkoff, Simons, and Vevera (1987), writing of this latter distinction, indicated that the components of state anxiety are important, because each is related to performance in a different manner. In the area of research on academic learning, it has been shown that the cognitive component of state anxiety most consistently interferes with academic performance (Morris, Davis, & Hutchins, 1981; Wine, 1980). In sport, Martens, Burton, Vealey, Bump & Smith, (1983) indicated that somatic anxiety usually reaches its peak prior to competition, and is

usually dissipated by the physical activity associated with warming-up and performing. Somatic anxiety is likely to have more effects in sports where vigorous activity does not occur, such as archery or shooting. First, there is no vigorous activity before or at the start of competition to help dissipate the somatic reactions. Second, tremor and other muscular effects can affect movement production in such precision sports. The level to which cognitive anxiety rises depends on the subjective perception of the impending situation. Cognitive anxiety can, therefore, be high well before the event and subsequently remain high during and even after performance, such as when the player knows they must face opponents whose records are stronger than their own. Alternatively, cognitive anxiety may dissipate as circumstances change, when, for example, those opponents withdraw. Equally, prior to the event, cognitive anxiety may be low, but a change of perception as the event proceeds may cause it to increase. This might happen if a player feels lethargic and notices an opponent is playing exceptionally well. In a later paper, Martens et al. (1990) predicted that cognitive anxiety would be negatively related to performance and that somatic anxiety would display a curvi-linear relationship to performance. Studies by Burton (1990) and Krane (1990) showed some support for both these propositions, but other studies were not supportive (e.g., see Gould et al. 1984 & 1987). These changes in levels of anxiety may be reflected in the behaviour of the individual. Studies by Burton (1988), Gill and McElroy (1990), and Krane and Williams (1987) support the differentiation of cognitive and somatic anxiety using the CSAI-2.

In later research, Jones (1991, 1995), Jones and Swain (1992), suggested that to understand multidimensional anxiety one needs to take into account the intensity and the direction of the anxiety experienced by the athlete. Intensity refers to the

severity of the symptoms experienced, whereas direction refers to whether the anxiety is experienced as facilitative or debilitative to performance. Further support for the notion that anxiety may be experienced as either facilitative or debilitative has been provided (Jones & Hanton, 1996; Ntoumanis & Biddle, 2000; Ntoumanis & Jones, 1998; Perry & Williams, 1998;).

<div align="center">Theories of the Arousal-Performance Relationship</div>

As this thesis is concerned with the relationship between arousal and coach behaviour, it is necessary to examine briefly previous theory and research relating arousal and behaviour. The following is a brief summary of the area included for contextual purposes. A number of theories and models have been proposed relating arousal to behaviour predominantly of athletes. The focus on athletes has possibly been due to the association people make between an athlete's performance and the eventual outcome. The theories and models include Drive Theory, the Inverted-U hypothesis, Catastrophe Theory, and the Individual Zone of Optimal Functioning hypothesis. Drive theory was the first major theory used to describe the relationship between arousal and performance (Hull, 1943). Hull proposed that behaviour or performance is a function of drive and habit strength. Thus"when a complex task is well learned and habit strength is high, correct responses should dominate under high levels of arousal (Raglin, 1992). Drive theory describes a linear relationship between arousal and performance. Martens (1971), in a review of 18 studies, found that only three clearly supported drive theory. Landers (1980) in a subsequent review cited evidence contrary to Martens (1971) review, suggesting that it was premature to reject drive theory. Raglin (1992) argued that due to methodological and empirical

problems, including the use of experimental stressors, drive theory has fallen into disfavour.

The most popular proposition of the 1980's, used to describe the relationship between arousal and behaviour, was the Inverted-U hypothesis (Yerkes & Dodson, 1908). Although its origin is clearly much earlier, it is only in the last 30 years that this relationship has been systematically applied to human performance. Briefly stated, those who supported the application of the inverted-U to arousal and performance proposed that as arousal increases there will be a progressive increase in performance until an optimal point is reached, usually in the moderate arousal range. If arousal increases beyond this point, then a gradual decrease in performance will be experienced. Landers and Boutcher (1986) noted "that although the exact shape of the curve does not exactly match the idealised pattern...the decrement in performance at high levels of stress does occur across studies with considerable regularity" (p. 172). Oxendine (1970) indicated that it was possible that the optimal level of arousal for an individual depended upon the specific demands of the sport. In sports that involve gross motor activities, especially associated with strength or power, a high level of arousal is essential for optimal performance, whereas in sports requiring complex movements or fine-grained skills, high arousal levels are likely to interfere with optimal performance. Raglin (1992) stated that, despite the fact that Oxendine's proposal was not based directly on research, it has exerted significant impact on the conceptualisation of the inverted-U. According to Randle and Weinberg (1997 the inverted-U proposal has increasingly been scrutinised and criticised on a number of grounds, including its lack of theoretical underpinning, its failure to consider the

multi-dimensional nature of arousal, and its failure to accurately measure points along the arousal continuum.

Although the Inverted-U hypothesis was parsimonious and intuitively appealing, Fazey and Hardy (1988) criticised it on three grounds. They suggested that the Inverted-U does not recognise the multi-dimensional nature of arousal, it lacks sound experimental support, and it lacks predictive ability. They argued that when an athlete becomes stressed and over aroused their subsequent drop in performance is sometimes quite drastic, and not the gradual decrease as suggested under the Inverted-U hypothesis. Further, they proposed that following a catastrophe, performance does not simply return to the optimal level with a moderate drop in arousal. Rather, arousal must drop well below optimal and performance can then build again. Fazey and Hardy proposed an application of Thom's (1975) Catastrophe Theory to the arousal-performance relationship. In it, they included both cognitive and somatic state anxiety components. Utilising this model, they argued that when cognitive anxiety is low, as somatic anxiety increases, an inverted-U emerges, but the model predicted that if both cognitive anxiety and physiological arousal are high, resultant performance is grossly affected, that is, the catastrophe is experienced. They also suggested that task difficulty and increased demands on the attentional space of the performer affect the relationship between anxiety and performance, due to the increased cognitive demands. For example, a well rehearsed gymnastics move places less attentional demand on an individual than a poorly rehearsed move of similar complexity.

Another approach that disputes the assertions of the Inverted-U hypothesis was developed by Hanin (1978,1986, 1999), who called it Individual Zone of

Optimum Functioning (IZOF). This approach utilises an idiographic (individually oriented) approach, as opposed to the nomothetic (group based) approach of other assessments (Hanin & Syrja, 1995). Hanin postulated that individual athletes tend to perform best when their pre-competition anxiety level is within a relatively narrow band or zone, half a standard deviation above or below the mean optimum anxiety level for that person in that activity. If their arousal level is higher or lower, then performance deteriorates. For each sport, and for different levels of expertise, variability exists as to the appropriate zone. According to Hanin (1986), athletes are able to predict their level of pre-competition anxiety several days prior to competition. Accuracy of prediction is increased for more competent performers, and performers are more precise when predicting competitions that will be difficult. Research by Hanin and Syra (1995) further developed the effect of emotion as applied to positive and negative affect in athletic performance. This is referred to as PNA (positive and negative affect), forming four global affect categories, (a). pleasant, functionally optimal emotions (P+), (b). unpleasant, functionally optimal emotions, (N+), (c). pleasant, dysfunctional emotions, (P-), and (d). unpleasant, dysfunctional emotions (N-). Krane (1993) found that, whilst performance suffered when an individual's level of cognitive and somatic anxiety were above their optimal zones, performance did not suffer when anxiety was within or below their ZOF of cognitive and somatic anxiety. Research by Annesi (1997) suggested that the correct in-zone, out-zone classifications might be compromised by the use of the CSAI-2 to establish levels of anxiety retrospectively.

Hanin and Syra (1995) examined the validity of the IZOF model extended to include positive-negative affect (PNA) content and intensity in athletic performance.

The IZOF model attempts to utilize current emotional states and established individual criteria to predict successful and unsuccessful performance for an individual (Hanin, 1999). Rather than rely on nomothetic scales, they considered that it was more appropriate to construct idiosyncratic scales using athlete-generated items, with each athlete choosing four to five positive and negative items from a positive-negative stimulus list. Since Hull (1943) first postulated drive theory, a gradual movement has occurred in terms of how the anxiety-performance relationship has been viewed. Initially, the relationship was seen to be linear in nature and it was believed that habitual responses would dominate, when an individual was highly aroused. The most popular hypothesis in sport psychology research during the 1970's and 1980's, was the Inverted-U (Yerkes-Dodson, 1908), which indicated that optimum performance would occur at moderate levels of arousal. Anxiety was viewed as a uni-dimensional construct, until researchers, such as Spielberger (1966), began to make the trait/state distinction. Since that time, the measurement of anxiety has focussed upon its multi-dimensional nature, and further developments in anxiety-performance relationships reflected this. Hanin (1978) suggested that rather than one template existing for all athletes, each athlete had their own narrow band or zone in which their optimum performance occurred. The approach that is currently attracting the most interest, if not research, is the catastrophe theory approach (Fazey & Hardy, 1988). Fazey and Hardy emphasised the way in which the interaction between cognitive anxiety and somatic anxiety affects the performance of the individual.

The relationship between arousal and performance is still not clear. This is perhaps due to the difficulty of establishing how arousal is operationalised, and how

it is subsequently measured, and whether what is being measured is reflective of a person's levels of arousal. It is increasingly being seen as idiosyncratic to the individual player concerned, and thus can be best understood by making on-going measurements in a range of situations.

Measurement of Anxiety

The two main methods of measuring anxiety are psychometric tests, which largely rely on self-reports, often gathered by paper and pencil tests, and psychophysiological tests, which are based on the measurement of a specific physiological parameter, such as heart rate, and an inference being made about the level of anxiety dependent on the result of the test.

Psychometric Tests of Anxiety

The majority of psychometric tests of anxiety are paper and pencil tests. As with the early theories of anxiety, the initial tests were general anxiety tests. They measured global anxiety, being general or manifest tests, or being developed for measuring anxiety in the context of taking tests, such as school examinations. Two examples of early tests are the Test Anxiety Questionnaire (TAQ; Mandler & Sarason, 1952), and the Manifest Anxiety Scale (MAS; Taylor, 1953). Both scales were used mainly for academic and test situations. Spielberger (1966) was one of the first to make the state/trait distinction, but Cattell (1962), for example, had previously discussed it. Speilberger, Gorsuch, and Lushene (1970) operationalised this distinction, by developing the State-Trait Anxiety Inventory (STAI), consisting of two 20-item scales. Instructions referred to how the person "generally feels" for the trait anxiety or A-trait scale and how the person feels "right now" or "at this moment" for the state anxiety or A-state scale. Individuals were required to respond

to each item on a four point scale. The STAI was originally used in education and clinical settings, before becoming widely used in the late 1970s and early 1980s in sport.

Martens (1977) considered that the state-trait distinction was useful, but did not consider the STAI sensitive enough to be predictive in sport environments. This lead to the development of the Sport Competition Anxiety Test (SCAT), as a measure of trait anxiety in sport. It consists of 15 items with a three-choice, Likert-type response. Both a children's scale (ages 10-15) and an adult scale were developed. The SCAT has been widely used and possesses good reliability and validity (e.g., Martens et al., 1990). In the late 1970s, Martens also created a sport specific state anxiety test, the Competitive State Anxiety Inventory (CSAI), based on Speilberger's State Anxiety Inventory. It was not considered to be successful, as it did not possess good validity. Martens subsequently modified his approach to the measurement of anxiety, adopting the multidimensional conception of anxiety proposed by researchers, such as Liebert and Morris (1967), in the academic examination area. Martens, Burton, Vealey, Bump, and Smith (1983) developed the Competitive State Anxiety Inventory-2, (CSAI-2) to assess the multidimensional nature and aspects of state anxiety in the context of sport competition. The CSAI-2 consists of three scales, measuring cognitive and somatic state anxiety, and state self-confidence, each consisting of nine items. The items that constitute the self-confidence scale were originally intended to be reversed items on the cognitive scale, but subsequent factor analysis revealed there to be an independent dimension that was identified as self-confidence (Martens et al., 1990). Raglin (1992) suggested that the trend towards sport specific instruments has occurred "despite the efficacy of

general psychological measures in sport settings" (p. 249), but research has supported Martens' (1977) claim, with clearer relationships emanating from the research using sport specific measures, e.g., Gould, Petlichkoff, Simons and Vevera (1987), Burton (1988).

Psychophysiological Measures of Arousal

Another approach as a means of making judgements about an individual's psychological state, has been the use of psychophysiological indicators, such as heart rate and galvanic skin response, to infer an individual's level of arousal. Sternbach (1966, as cited in Hatfield & Landers, 1983) defined psychophysiology "as a body of knowledge concerned with the inference of psychological processes and emotional states from an examination of physiological measures" (p. 244). Although the use of psychophysiological measures is not new, sport researchers have been frustrated by the lack of consistent agreement between physiological measures and psychological questionnaires, and between the physiological measures themselves (Hatfield & Landers, 1983). According to Hatfield and Landers, this has lead researchers (e.g., Martens, 1977) to abandon this type of research in favour of self-report measures. One solution to this was demonstrated by Lacey (1953, cited in Hatfield & Landers, 1983), who suggested that the individual should be used as the level of measurement, rather than using a comparison between individuals as the level of measurement. If this is done, responses show a unidirectional pattern of change. Equally problematic has been the finding that an individual may show different patterns across response systems, but the patterning is unique for an individual (Lacey & Lacey, 1958). This has been labelled "response stereotypy" by Lacey, Bateman, and Van Lehn (1953).

One of the methodological problems overcome by psychophysiological measures is that of achieving in situ readings of participants' arousal, as opposed to the more usual method of paper and pencil tests, which can only be utilised prior to and following competition in most sport contexts. The use of psychophysiological indices is particularly effective, if the participants are not involved in sports with high physical demands, which often cause gross changes in psychophysiological measures. Such low physical activity level sports include golf, snooker, and darts. Restrictions on the movements of coaches during events in many sports lead to the potential for study of coach arousal levels using psychophysiological indicators. One problem with relying on such measures has been the inferences made of the results. Simply having an elevated score on a particular measures does not in itself mean that this level of arousal can be inferred to reflect an elevated level of anxiety. Studies by (Jones & Swain, 1992, 1995) have indicated that athlete's are capable of distinguishing between arousal that is likely to be experienced as facilitative or debilitative.

The measurement of anxiety has taken several forms, e.g., paper and pencil tests and measures of physiological states, and has paralleled the development of hypotheses that view anxiety as multi-dimensional, with each individual having a unique pattern. Paper and pencil tests have become more precise in terms of the constructs that they measure, e.g., state/trait anxiety, cognitive/somatic anxiety, and more specific in terms of the sporting contexts in which they are used, but are still restricted in the manner in which they can be used during a competition. Some of the psychophysiological measures can be used during competition, utilising the technology of telemetry, provided that the activity is not too physical, because this

causes artifacts. The increased sophistication of the measures has allowed a more precise profile to be developed for each individual, dependent upon the circumstances in which they are competing or coaching.

<center>Arousal in Coaches</center>

The research summarised in the preceding section has indicated that some research has indicated that a relationship exists between arousal and performance for athletes. There is also some research that suggests that a relationship exists between the effects of competition and the physiological arousal of coaches and officials (Gait, Cook, Allen, & Duncan, 1979; Gazes, Sovec, & Dellastatious, 1969). The research undertaken to date on coach arousal has been directed mainly at physiological levels of arousal, with particular emphasis on the extent to which coaches and officials become stressed as a result of their involvement in competitive situations and whether this involvement could be considered injurious to their health (e.g., McCafferty et al., 1978). An important issue is whether there is a relationship between a coach's level of arousal and their behaviour. Little research has focused upon the relationship between coaches' anxiety, their levels of arousal, and their coaching behaviour, during matches.

With respect to the physiological levels of arousal of coaches and officials, studies have indicated that individuals vary in terms of their responses to game situations (Gait et al. 1979; Gazes et al., 1969; Kostelnik, Metz, Noviello, & Robertson, 1990). These particular studies investigated whether the involvement of the coach in competition caused a concomitant rise in their heart rate, utilising telemetric monitoring. In a study of 17 football officials, Kostelnik et al. found that, during matches, all participants produced a heart rate response above 80 per cent of

their maximum heart rate. The researchers indicated that the high percentage of maximum heart rate resulted both from the physical exertion and also from a psychological component. For example, one official's heart rate jumped from 141 beats per minute to 156 beats per minute upon hearing the crowd reaction to an unfavourable call. Kostelnik et al. observed that this was an indication of the psychological effect of officiating.

Delashmit (1991) studied eight coaches to determine the effects of game stress situations on the heart rates of American football coaches and to determine if the coaches could accurately recognise the stressful situations. The initial focus of the study was to establish maximum physiological heart rates and average resting heart rates for later comparison with experimentally gained heart rates. In Phase 2, the coaches wore a heart rate monitor, while coaching a home game and an away game. The heart rates for each coach were recorded by a camera that was simultaneously recording the game. At the completion of the game, the coaches completed a questionnaire choosing what they considered to be the greatest stress situation for each quarter of the game. At a later point, this was matched to the corresponding game incident. Delashmit obtained the following findings. First, significant differences (p<.05) were found in the mean resting heart rates and the mean game heart rates of the coaches. Significant differences (p<.05) were also found between the maximum game heart rate and the coaches' perceived peak stress situation heart rate. Second, no differences were found in the mean game heart rates of the head coaches and assistant coaches. Third, there was no significant difference between maximum physiological heart rates obtained during an exercise tolerance test, and the maximum game heart rates, taking into account the minimal movement

of the coaches during competition. Delashmit (1991) concluded that demands of the coaching positions in a football (gridiron) game were stressful to the people who assumed these roles. The study indicated that the pre-game resting heart rates of some of the coaches were higher than those recorded during laboratory tests. Football is stressful to coaches, with each of the eight coaches studied having an average heart rate increase of 42.5 beats per minute whilst coaching in competition. The study also concluded that head coaches did not become significantly more aroused than assistant coaches, and that experienced coaches and rookie coaches did not differ systematically in terms of competitive heart rates.

These studies indicate that there is a relationship between the physiological indicators of arousal and concurrent events in competitive situations. McCafferty et al. (1978) conducted a study involving coaches from minor sports, e.g., swimming, water polo, volleyball, and cross-country, to ascertain whether the stress of coaching in competition was similar to that experienced in major American sports, e.g., football and basketball. The coaches displayed elevated heart rates similar to previous studies, despite the fact that the coaches were not involved in physical activity. McCafferty et al. found that the cardiac response of the coach was affected by the perceived importance of the game, in terms of the overall competition, or the state of the particular game. Further the "magnitude of stress depends on many factors, including the characteristics of the coach, the type of contest, and the importance of the contest". (p. 67)

The studies cited here were directed at understanding what arousal, if any, coaches experienced as a result of being involved in competitive situations. The focus of the studies was the effect the competitive situations had on the heart rate of

the coaches and whether they were being placed at risk of serious injury as a result of elevated heart rates. The studies were not designed to ascertain how the behaviour or performance of the respective coaches was affected as a result of the stress generated by involvement in competitive situations. Rather, the aim was to determine whether the coaches were at risk of physical injury as a result of being physically under-prepared for the stresses involved with competition.

Competition-related Stress in Coaching

The focus of the research to date has been the physiological levels of arousal of coaches and officials, with particular emphasis on the extent to which coaches and officials become stressed as a result of their involvement in competitive situations, and whether this involvement could be injurious to their health (e.g., McCafferty et al., 1978). Gazes et al. (1969) stated that, "there has been no report on the effects of stress of athletic events upon the heart action of coaches whose teams were in competition" (p. 509). In the 35 years since this statement little research has been undertaken solely upon the effects of stress of athletic events on coaches.

Studies of coaches and officials to date have primarily used one methodology. Participants have been pre-tested in the laboratory to establish their resting heart rates and to measure their response to a standardised, graded exercise test. This methodology allowed the researchers to establish a profile for each participant and to establish whether any of the individual participants were physically at risk of injury. The studies varied as to whether they were directed to establishing only the absolute physical effect upon the participants or whether they measured the effect upon physiological arousal of the official, due to their psychological reaction to the prevailing circumstances.

The main method of measuring in vivo heart rates during competition has utilised heart rate telemetry, whereby the participant's heart rate was measured by electrodes placed on the participant, with the heart rate subsequently relayed either to a recording device, also located on the participant, or to a receiving device located nearby. The simplest devices allow the recorded readings to be downloaded from the receiving device at a later time. The more sophisticated devices allow continuous ECG traces to be recorded concurrently with the involvement of the individual in the game. To establish the context in which the heart rates were recorded, participants in most studies were either video recorded and the play by play analysis later paired with the heart rate at the same time, or a note of the specific involvement of the participant at particular points was made in real time and later matched to the concurrent heart rate.

The major difficulty in determining whether psychological stress has a bearing on the physiological response of a particular individual is separating the physiological response that occurs as a result of any movement by the person and the physiological response that occurs as a result of an emotional reaction to a specific event in a game. Typically, the more sedentary is the role of the person, the more accurate is the prediction that the elevated physiological response is due to psychological reaction. Gait, et al., in writing of studies utilising football and basketball officials, noted that "as these officials are constantly on the move, cardio-vascular fitness become (sic) an added variable and determining the degree of psychological stress becomes increasingly complex" (p. 71). In their study, Gait et al. utilised volleyball officials, who were not required to move as part of their officiating

duties. This meant that, any rise in heart rate could not be attributed to an artifact of movement by the official.

Research on Stress in Coaches

Early studies into the effect of stress upon coaches (e.g., Gazes, et al., 1969; Porter & Allsen, 1978) focused upon the possibility of coaches suffering some form of cardiac impairment as a result of their physiological reaction to the pressure of the competitive situation. An early study by Gazes et al. involved the continuous electrocardiographic monitoring of 30 football and basketball coaches, aged between 24 and 56. The participants were monitored for a period beginning 5 minutes prior to the start of the game, throughout the entire game and for 5 minutes after the game. Prior to being monitored in a game situation, each participant was subjected to a physical examination, including a chest X-ray, a resting 12 lead ECG, and an exercise test. This examination revealed two coaches with cardiac-related conditions, but who were passed to participate in the study. The remainder of the group had normal physical findings. During competition, each participant was monitored utilising a radio-ECG transmitting signals to a receiver placed near the participant, which in turn was connected to a standard ECG recording the signal on paper at 25mm per second. The study had three foci: first, to determine the average heart rate at rest and its change during the period of stress; second, to identify the occurrence of ectopic beats or abnormal rhythms, and, third, to examine changes in the electrocardiograph tracing. During games, major events, such as touchdowns and missed baskets, were noted on the ECG paper.

The researchers observed that all coaches exhibited sinus arrhythmia during the monitoring period, which became less evident as the heart rate increased. Of the

coaches, three had pre-game heart rates of less than 100 beats per minute, the others ranging upward to 150 beats per minute. Gazes et al. (1969) also observed that as the game began each coach rapidly reached a higher rate that was sustained with minor changes throughout the game. No noticeable changes to heart rate appeared to be associated with major events occurring throughout the game. Ectopic beats or other arrhythmias were not precipitated. Gazes et al. concluded that healthy football and basketball coaches "develop and sustain a symptomless tachycardia during the stress of the game" (Gazes et al., 1969, p. 511), but that the heart rate did not appear to be affected by game events. The average increase in heart rates during the pre-game period was 42 beats per minute over resting heart rates, with an additional increase of 21 beats during the game. None of the coaches developed cardiac symptoms or significant S-T, or QRS changes. The most interesting finding of this study is that the researchers did not find a relationship between game events and increases in heart rate. Unfortunately, the study did not state the importance of the games monitored, nor if the coaches studied were competing against each other in a comparable match.

In another early research project, McCafferty et al. (1978) conducted a series of studies to test whether coaches of "minor" sports, such as swimming, water polo, volleyball, and cross-country experienced similar stress to coaches of basketball and football. The sample size for the study was small, consisting of four coaches of unspecified gender, that is, one coach from each of the sports. Prior to monitoring in competition, some of the participants' resting heart rates were obtained and some of the participants undertook a maximal aerobic capacity test. The participants were monitored using telemetric equipment, with measurements being recorded for the last 15 seconds of each minute. McCafferty et al. stated that heart rate changes indicated

that there was considerable stress in these coaches of minor sports; the magnitude of stress was dependent on many factors, including the characteristics of the coach, the type of contest, and its importance. For example, the coach of a cross-country runner recorded a mean HR of 79 beats per minute when the runners were out of sight, increasing to a mean of 100 beats per minute when the runners were in view. For a water polo coach participating in the study, the mean HR increased dependent upon the importance of the contest. During a pre-season game, the mean HR was not above 90 beats per minute, but during an in-season game the mean HR was above 108 beats per minute, and the researchers recorded a standing HR of 144 beats per minute, at one point in the match. McCafferty et al. concluded that there is considerable stress on coaches of "minor", as well as "major", sports, either team or individual. "The source of stress is the coach's perception of the events of the game, and the meaning of the outcome, not the competitive requirements of the game itself" (McCafferty et al., 1978, p. 71). This finding appears to be justified given the data generated from intra-individual comparisons between, for example, a pre-season game and an in-season game for a water polo coach, where there were considerable differences in the heart rate patterns for each of the games.

Porter and Allsen (1978) studied the increase in coaches' HR, and additionally the differences in the HR of head coaches and assistant coaches, in basketball competitions ranging in level from National Collegiate Athletic Association University Division 1 to class 4-A junior high school. A total of 216 coaches were studied. Each coach was pre-tested for resting and maximal HR. The maximal HR was established by the participant undergoing a standard treadmill test until exhaustion. In the event of the participant's health being compromised by this

test, the maximum HR was established by deducting their age from 220. The resting HR was established by having the participant lie in a supine position for 30 minutes, while an ECG recording was taken. Each coach was monitored for two games utilising a biotelemetry system that recorded the participants' HR on cassette recorder. The monitoring commenced 10 minutes prior to the game and continued until 10 minutes after the completion of the game. To assist analysis, the results were broken into 12 time periods, with the means being taken for each. The periods were 10 minutes prior to the game, 5 minutes prior to the game, start of the game, halfway through the first half, three quarters through the first half, end of the first half, beginning of the second half, half way through the second half, three quarters through the second half, the end of the game, five minutes after the game, and ten minutes after the game. No readings were taken during half time.

Analysis indicated that the highest average HR for a head coach was 135 beats per minute, whereas for an assistant coach it was 116 beats per minute. The highest mean for a coach, for a whole game (95 minutes), was 76% of maximum HR; the highest rate for an assistant coach was 65% of maximum HR. Over an extended period of time, defined as more than 10 consecutive minutes, one coach recorded a HR of 91% of maximum HR. The highest individual HR was recorded at 162 bpm, which was 93% of maximum HR for that individual, compared to 139 bpm for the highest HR of an assistant coach, which was 78% of maximum HR.

Porter and Allsen noted that there was considerable difference between the HR patterns of the head coaches and the assistant coaches. Further, they observed that it is not clear whether the difference was due to the stress placed upon the coach

due to the responsibilities they undertake or to their individual anxiety levels, which were not measured in the study. Porter and Allsen also reported that, for one coach, pre-game HR was higher than it was for all but one of the subsequent periods analysed. They suggested that this was due to the fact that the coach's team was playing their greatest local rival. The coach's pre-game HR was 120 bpm, (65% of his maximum) falling to 112 bpm late in the third quarter, when his team had a commanding lead. In the second game in which this coach was monitored, the coach had a pre-game HR of 96 bpm, ostensibly due to the confidence of the coach about his team's likely performance, given that they were undefeated at this stage of the season. The game was hard fought, with the coach's HR during the fourth quarter reaching 142 bpm for an extended period of time. This was 14 bpm higher than his HR for any period during the first game. The assistant coach in comparison was monitored to have heart rates, on average, 56.5 bpm less than the head coach.

Porter and Allsen concluded that the HR response of coaches was exaggerated "until the games were over or until they were over in the judgement of the monitored subjects" (Porter & Allsen, 1978, p. 89). The major findings of the study were that there existed a significant difference between the HR's of head and assistant coaches, that there was no significant difference in a head coach's HR between his first and second monitored game, that there was no significant difference between an assistant coach's first and second game, and that there was a significant difference between the head and assistant coaches' HR during the pre-determined time periods of the game, but the HR patterns were consistent within each pair (coach and assistant coach). Thus, as the head coach's HR increased, so did that of the assistant. Likewise, as the head coach's HR decreased so did the assistant's HR.

According to Porter and Allsen, the results also indicated that annual checkups should be undertaken by all coaches to determine any pathological problems.

A later study by Delashmit (1991) was designed to "determine the effects of game stress situations on the HR of high school football coaches and to determine if those coaches were accurate in recognising those stress situations" (p. 2). Delashmit studied eight male football coaches in a two phase study. The first phase entailed a one-day testing session to establish maximum HR and average resting HR to be used in conjunction with Phase 2. In the second phase, the coaches wore a 24-hour holter HR monitor device, while coaching a game. These recordings were later analysed, utilising specialised software. Concurrent to the HR recordings, the games were video-taped, using a camcorder, which had "on screen" time display, allowing play-by-play analysis and pairing with HR recorded during the game. Following the game, the coaches completed a questionnaire indicating the situation of greatest stress during the game. This situation was also matched to the HR obtained at the time. Delashmit concluded that football coaching is stressful, given that all the coaches studied had an increase in mean HR, on average of 42.5 bpm, while they were coaching. Delashmit noted that this was similar to the findings of Gazes et al. (1969) and Porter and Allsen (1978). There was no significant difference between the mean game HR of experienced and first year coaches, nor was there a significant difference between the mean game HR of head and assistant coaches. Delashmit further concluded that coaches are under stress when coaching, but are not skilled in determining what is stressful to their cardio-vascular system. Delashmit's recommendations included that coaches should have an annual physical, that coaches should exercise regularly, that coaches should consume a low fat diet, and that those

entering the field of coaching should be aware of the effect that coaching may have on their heart rate.

Nitsch (1981, cited in Teipel, 1993), observed that "various stressors from a specific environment and particular task may result in a destabilisation of a person" (p. 445). This is an acknowledgement that the effects of stress may have some impact on the behaviour of an individual coach. Biener (1986, cited in Teipel, 1993), studied the completed questionnaires of 227 soccer coaches, relating to specific stress factors and coping strategies. He found that "83% (of coaches) defined stress as psychological load, 7% as physiological load and 10% feeling pressure from all sides, continuous criticism, fear of losses and necessity of success." (p. 445). Of the coaches studied, 79% experienced game stress as medium to high. Teipel (1993) studied two aspects of stress: psychophysiological and psychological stress. To analyse psychophysiological stress, two opposing professional coaches were concurrently video taped and had their heart rates monitored. Two observers simultaneously studied the game and made notations of game events to allow later comparison with the coaches' specific behaviour. To analyse psychological stress, 28 soccer coaches, both professional and amateur, completed a questionnaire, containing 45 items, requiring them to evaluate stress factors, utilising a 7-point scale. Teipel found that "psychophysiological stress measured by heart rates approaches almost maximal level with comparatively little motor activity" (p. 448), indicating " a close correlation between important game situations, more or less motion and emotion-related actions of the coaches and their individual heart rates"(p. 448). The analysis of the questionnaire indicated that coaches found relations with reserve players and referees in home and away games moderately stressful, whilst,

games which had a bearing on relegation or where the team suffered a big loss were considered most stressful. Teipel (1993) concluded that "coaches must learn to perceive, evaluate, appraise, attribute stressors adequately and act in specific game situations effectively" (p. 449) to prevent long-lasting overload or destabilisation of their behaviour.

Gait, et al., (1979) studied how game conditions affect stress level of volleyball officials, specifically because volleyball officiating calls for limited movement when compared to that of basketball or football officials. They assumed "that any resulting stress can be attributed to psychological stress" (p. 71). The study utilised telemetric measurement of HR, allowing continuous monitoring during games. The study examined a number of issues: the percentage of maximum HR at which an official continuously works; the situations that are likely to cause a HR increase; the highest maximum HR that an official experiences; the effect of the score or closeness of the score on the HR; any difference between officiating at girls' compared to boys' games; the effect of the importance of the game on HR; and, finally, differences between the first and last game of a match.

Gait et al. (1979) studied 10 male, volleyball officials aged between 26 and 39 years, with two of the participants being studied twice. The officials were monitored for varying lengths of time, depending upon the number of games played in the respective matches. Two methods of measurement were used. First, HR was monitored minute by minute, but recorded only at two minute intervals throughout the match, with the score being recorded at each two minute reading. Second, a continuous watch was kept on HR to note any significant change and the game

situations corresponding to such changes were noted. The HR was transmitted from the participant utilising radio telemetry without any interference to the participant. The recording period was from 5 minutes prior to the match until 5 minutes post match. After a period of 10 minutes following the removal of the electrodes, the participant had the HR measured, using the radial pulse. Gait et al. noted that, as the telemetric unit was powered by batteries, the batteries needed to be checked to ensure they were at full charge, otherwise they had a tendency to fade very quickly and thus affect the results obtained.

The results indicated that the HR of volleyball officials increased from the established resting HR, but not at a steady rate, instead fluctuating up and down. Gait et al. assumed that, because the participants were not involved in any substantial physical movement, the fluctuation occurred as a result of anxiety and expectation related to the game. For example, upon blowing his whistle, one official's HR increased suggesting that he was preparing for the commencement of play. Likewise, another official's HR increased rapidly when he had to make a ball handling call, which rarely occurs in high level volleyball. According to the researchers, the "amount of stress was not very high because many of the games were not close or were not very important" (Gait et al., 1979, p. 81). Despite this, changes to HR occurred to varying degrees for all participants. Taken as a whole, the group of participants worked at 50.81% of maximum HR during games. The highest individual average was 72.13%, with the lowest being 38.5% of maximum HR. The researchers concluded that this large difference is related to the attitude of the participant. It should be noted, however, that the researchers did not measure attitudinal change. The particular game situation that caused the greatest average

increase across the entire group was being questioned by either the players or coaches, with the average increase being 7% of maximum HR. Equally, Gait et al. found that a good play caused an average increase of 6.5%, HR prior to a serve increased an average of 5.5%, compared to an average drop of 3% of maximum HR between serves. Participants also showed a significant increase in HR (6.2% of maximum HR) related to the effect of the changing score line or the scoring of an important point. The importance of the match also affected HR, with one participant, who was umpiring a girls' final, only experiencing an average increase of 1% of maximum HR, compared with a 22% increase for another participant who umpired a mens' final in the presence of approxiamately 1,000 people. Across individual matches, participants showed an average decrease of 4% from the first game to the last. Gait et al. concluded that, although the increase in HR was not as high as that experienced by football officials, volleyball officials nevertheless experienced moderate levels of stress.

Conti and McClintock (1983) studied a single participant, "to determine the heart rate responses of a football official to both physical and psychological stress during actual game conditions, and to determine if sinus tachycardia was greater during physical or psychological stress" (p. 110). The participant was a 40 year-old male with no apparent health problems. Prior to the study, the participant undertook a full medical examination, including a treadmill stress test (Bruce protocol). The results of the medical examination placed him in the average condition classification for 40-49 year-old men. For the actual game, the participant wore telemetric equipment transmitting to a receiver on the sidelines. The receiver was attached to a cardiotachometer and an oscilloscope to permit continuous monitoring. This allowed

ECG readings to be made at two minute intervals and during any unusual game situations. The distance covered was also charted and timed with a stopwatch, as was the duration of each play. Referee decisions were noted, as were game situations.

Conti and McLintock (1983) reported that the participant's resting HR was 59 bpm. Upon meeting the team captains on the sideline half an hour prior to the game, the participant's HR had risen to 100 bpm. As the participant blew his whistle to signify the commencement of the game, his HR had risen to 150 bpm (79% of maximum). His HR remained around this reading for the remainder of the game with the highest HR reading during normal game conditions being 161 bpm (85% of maximum). The highest HR was recorded during (99% of maximum a player confrontation on the sideline, where the participant's HR rose to 188 bpm). The lowest average HR experienced by the participant was 140 bpm, which occurred during the fourth quarter. The participant covered an average of 10 yards per play at a pace of 15 minutes per mile, and each play lasted an average of 35 seconds, of which 25 seconds was spent with the teams in a huddle. The researchers observed that "the effects of psychological stress are apparent from our data" (Conti & McClintock, 1983, p. 112), with the participant's HR increasing to 150 bpm without any physical activity prior to the game commencing. The researchers concluded that the highest levels of sinus tachycardia evident on the ECG coincided with periods of psychological stress.

Kostelnik, et al., (1990) designed a study to "(a) evaluate the pre- and post-season health status and fitness level of 17 male high school football officials and to determine if any had indications of latent coronary artery disease and (b) determine

the heart rate responses elicited for the various officiating positions in a football game" (p. 18). All participants underwent a thorough medical screening 60 days prior to the football season, including a graded exercise test (Bruce protocol). Six participants were found to have elevated cholesterol, all but three officials were considered moderately to slightly obese, four officials were identified as hypertensive, and five as borderline hypertensive. The physical activity profile indicated that the majority of officials did not undertake any form of regular conditioning as part of their pre-season preparation. From the results obtained from the exercise test, 29% of the participants had responses that lead to the early termination of the test. The peak HR reached by each individual was used to determine relative HR during games. In the competitive season, seven games were studied, with two officials being observed in each game. A minimum of four quarters and a maximum of 14 quarters were monitored for each of the five officiating positions. The results indicated that the Head Referee's position, which was the least active, recorded, on average, 64.2% of maximum HR, whereas the most physically demanding positions of field judge and head linesman, recorded 76.5% to 81% of maximum HR respectively. The post-season medical screening indicated that the health fitness status of the officials had not improved. The researchers noted "that the psychological stress of officiating... was also evident in individual observations" (p. 20). For example, one official upon making an unfavourable decision, which drew spectator reaction, had an increase in HR from 141 to 156 bpm.

The focus of the studies cited, has been upon determining whether involvement in coaching or officiating activities places undue stress upon the cardio-vascular system of the individual and whether individual coaches were sufficiently fit

to be able to cope with those demands. In the process of analysing the research, it became obvious that many of the significant increases in HR were due to the psychological reactions of the coaches to up-coming competition and to specific situations arising during games. In determining whether cardio-vascular stress existed, studies, such as that by Porter and Allsen (1978), averaged the heart rates of the participants, whereas the study by Gait et al., (1979) measured and reported the individual heart rates of the participants, giving a more precise indication of individual responses. Given that great differences in individual response do arise, this would appear to be the most accurate means of reporting. Delashmit (1991) also observed that an individual's response to a specific situation could have a marked effect on the level of their heart rate, as opposed to a general increase as a result of being involved in the game. The general observation that heart rates of coaches can be elevated as a result of psychological responses, as opposed to heart rate elevations as a result of coaches' physical activity during a game, is an important finding for future research. Equally, that coaches may respond to specific game situations with elevated heart rates is also of particular interest. Both observations serve to indicate that coaches are not immune to the pressure of the game, but may be affected by what is transpiring at any time during a game.

The number of studies found on coaches was surprisingly small, given the increased importance of sport, economically, financially, politically, and in terms of media interest. The studies undertaken are somewhat equivocal in their findings. One study found differences between head coaches and assistant coaches, another did not. Two studies found differences related to game situations, whereas another did not. It could be concluded that the literature to date does not give a clear view of coaches'

reactions to competition. Similar findings, in terms of physiological responses, were found with officials in the small number of published studies on individual's undertaking these sport roles.

The research cited above clearly indicates that coaches show physiological changes as a result of being involved in competitive coaching environments, beyond that which could be expected as a result of movement by them during games. In addition to simply being in a competitive situation, coaches also displayed changes in physiological measures, e.g., heart rate, as a result of specific happenings during games (Delashmit, 1991).

Research into Coaching Behaviour

As this thesis is focused on the relationship between anxiety, arousal and coaching behaviour it is worth examining whether research indicates that coaches experience changes in patterns of behaviour during competition. The following section explores the literature on that issue.

Tharp and Gallimore (1976), in a seminal study, examined a basketball coach, who was widely regarded as being one of the best of his era, to determine how he behaved while coaching. They were seeking to identify characteristics that could be followed by other coaches seeking to achieve like success. As research has progressed the focus has broadened to include issues, such as gender, type of setting, score differentials, frequency of behaviours, and rates per minute of behaviour. Since that time, studies have focused upon an increasing array of facets related to coaches and coaching.

Initially, the emphasis was on studying coaches who had maintained a winning ratio, assuming that those coaches possess characteristics worth emulating. Douge and Hastie (1993), however, warned of applying the findings of coach behaviour research in a prescriptive fashion, as this ignored the specific context of the research. According to Anshel, Housner, and Cyrs (1987),

"in the sport domain .... the quality of coaching is held primarily responsible for athletic success. Consequently, over the years sport psychologists, sport journalists, physical educators, coaches and athletes have attempted to ascertain the characteristics of successful coaching practices and personalities" (p. 81).

Researchers (e.g., Rushall, 1982; Smith et al., 1977) have attempted to identify how the specific behaviour of coaches is associated with such factors as the outcomes of competition for athletes, and the relationship between coach and athlete. Coaching behaviour can be viewed from the perspective of the coach's personality characteristics, the interaction between athletes and coach, and the various behaviours exhibited by the coach in training or competition. In a study of 51 male Little League baseball coaches and their players, Smith, Smoll, and Curtis (1978), found that coaches had little awareness of how they behaved and that this, in the researchers' opinion, would limit their ability to coach effectively. Smith et al. placed particular emphasis on the positive experiences of the young players. They noted that coaches whose players were positive in terms of enjoyment and in feeling positive about themselves, had win/loss records similar to coaches who were less liked and whose players did not feel as positive about themselves. Smith et al. did not indicate whether the performance of the particular teams who experienced positive coaching

was improved from previous performances. As research has progressed, the focus has broadened to include issues, such as gender, type of setting, score differentials, frequency of behaviours, and rates per minute of behaviour. These have included, a focus upon the process or outcome of games (Chaumeton & Duda, 1988), coaching and gender issues (Lacy & Goldstein), the instructional content of coaching (Seaborn, Trudel, & Gilbert, 1988), coaching behaviour and the score differential during matches (Cote, Trudel, Bernard, Boileau, & Marcotte, 1993), the similarities of coaching behaviours in different sports (Claxton & Lacy, 1986), and the behaviour of coaches during practice sessions (Curtner-Smith, 1998). To date, there is yet to emerge a blueprint that provides the prescriptive model indicating the most effective or successful way to coach.

Cote, Salmela, Trudel, Baria, & Russell, 1995 noted "no theoretical framework, however, exists for explaining which factors are most important in the coaching process and which relationships among these factors are most significant". (p. 1) They further note that because there is a lack of structure to the content of coaching making it difficult to measure the performance of coaches. At various times teaching models have bee used to assist understanding of the coaching process. A shortcoming of this is that coaching has competition as a variable which does not exist in teaching practice. Cote et al., observe that without a comprehensive coaching model, the outcomes of research remain "disconnected information related to how and why coaches work as they do". (p. 2)

Cote et al., studied 17 expert high performance Canadian gymnastic coaches who worked with either male or female gymnasts. The research design utilized an in-depth unstructured interview process, using three kinds of open-ended questions, a.

descriptive questions, b. structural questions, and c. contrast questions. The schedule of interviews was designed to elicit the issues most relevant to the coach, and to pursue these in detail. The analysis followed the process outlined by Tesch, (1990), and by Cote, Salmela, Baria, & Russell, (1993) for use in qualitative research. Cote et al., (1995) state that central to the coaching model (CM), are competition, training and organization, and that these variables are affected by three other variables, the personal characteristics of the coach, the personal characteristics of the athlete and their level of development, and other conceptual factors. The researchers label these last three variables as peripheral components. Two additional factors that complete the model are the goal, and the coach's mental model of the athlete's potential.

The approach to the analysis used a constant comparative method whereby the data is continually compared and contrasted until saturation occurs, that is, where new categories emerge, nor no new concepts. An important part of this method is its focus on conceptualization rather than only on description. The first task of the researchers was to identify the core categories and relate them to the central phenomenon of the study which was the knowledge used by the coaches to develop elite gymnasts. The second task was to write a general descriptive story integrating the categories and determining those used to achieve the goal.

Cote et al., report that the central components of the CM, that is, competition, training, and organization, distinguished this model from more specific models of coaching. They indicate that the peripheral components were actually similar to those of existing models. Cote et al., believed that "the components of the CM and their specific relationships were described to explain how expert coaches worked towards their objectives of developing elite gymnasts by building mental models of different

situations". (p. 12) They also reported that they considered that the major components could be generalized to coaching in general. The researchers believe that other more specific coaching research could be given a new perspective if viewed in the light of the CM, and would offer a more comprehensive understanding of coaching, and how the various components interact.

Research Utilising Direct Observation of the Coach

Lacy and Darst (1985) used a modified form of Tharp and Gallimore's (1976) instrument to observe coaches during three phases of training. The instrument consisted of 11 coaching categories. In addition to recording frequency of coaching behaviours, Lacy and Darst also recorded the rate per minute of discrete behaviours. They believed that the use of systematic observation instruments enabled researchers to report objective findings on coaching behaviour. Claxton and Lacy (1986) used the Arizona State University Observation Instrument (1984), which had been developed from the work of Langsdorf (1979). It consists of nine coaching behaviour categories, utilising event recording.

Smith et al. (1977) indicated that the effects of sport participation can "vary as a function of the way in which programs are structured, the kind of supervision that exists, and the personal characteristics of the child" (p. 401). In order to understand how these factors interact, Smith et al. (1977) devised the Coaching Behaviour Assessment System (CBAS), to measure coaching behaviour. The CBAS was designed to measure behavioural dimensions shown to affect people in a variety of settings. Initially, the CBAS was developed by studying soccer coaches, to determine what classes of behaviour occurred, in order to develop a set of scoring categories from which the formalised version of the CBAS emerged. The system was

subsequently used in a number of sport settings. Smith et al. concluded that the "system was sufficiently comprehensive to incorporate the vast majority of coaching behaviours, that individual differences in behavioural patterns can be discerned, and that the coding system can be used easily in field settings" (p. 402). The CBAS has been used extensively in research into coaching behaviour, with an exhaustive SPORT-Discus CD-ROM search by Kahan (1999) for the period 1975 to September 1997 revealing that CBAS was used in 20% of studies on coach behaviour (N=60) during that period.

Wandzilak, Ansorge, and Potter (1986) used the Coaching Assessment Behaviour Inventory, a 14-category instrument, to study the behaviours of 17 soccer coaches in practice and game situations. They combined the 14-category CBAI with questionaires completed by players and coaches. In responding to the questionnaire, the coaches, concentrated on knowledge of the sport, rating their ability and perceptions of behaviours they used in practice and games. The players completed an evaluation of the coach, and responded to a 6-item survey concerned with the level of satisfaction with their participation and team solidarity.

A difficulty in making accurate judgements, regarding effective coaching, is related to the absence of a template by which to assess coaching behaviour. Anshel, et al., (1987) stated that attempts to ascertain what constitutes the characteristics of successful coaching have usually been based on the assumption that a coach with a positive win/loss record must possess the necessary attributes. Anshel et al. (1987) further indicated that there has been a sparsity of research focusing on the characteristics that a coach, either "must have" or "should have". They adopted a different approach to the measurement of coach behaviour. One "immediate

objective, was, to determine objective criteria for the assessment of effective coaching behaviours, and to develop a behaviourally anchored rating scale based on the objective criteria" (p. 81). The resultant instrument, the Behaviourally-Anchored Rating Scale (BARS), was to be utilised in determining job performance, based upon the measurement of effective coaching behaviour.

Chaumeton and Duda (1988) examined variations in coaches' behaviour as a function of setting, either practice or competition, and the level of competition. They studied 12 basketball coaches, four coaching at elementary school level, four coaching at junior high school level, and four coaching at high school varsity level. Chaumenton and Duda found a significant difference between junior high school coaches' and high school coaches' use of desirable and undesirable behaviour. High school varsity coaches engaged in more undesirable behaviour in competition than junior high school coaches, but more desirable behaviour in practice. With respect to whether the coach was outcome-oriented or process oriented, coaches of junior high and high school varsity teams reinforced performance outcome more frequently during competition than during practice. Coaches of elementary school teams reinforced process orientation more frequently than both junior high school and high school varsity coaches. It appeared, that as the level of competition increased, the behaviour of the coaches reinforced performance outcomes to a greater extent. Teipel's (1993) study, in contrast, considered the context in which the coach was studied, but did not indicate whether the coaches altered their behaviour as a result of the changing nature of the competitive situation.

Trudel, Cote, and Bernard, (1996) developed a coding system, the Coaches Observation for Games (COSG), after analysing several video-taped ice-hockey

games. They undertook 40 hours of coding and created seven versions before 'theoretical saturation" occurred. The COSG has 16 categories for coding coach behaviour and 8 categories describing the target of the behaviour. The COSG also differs from other instruments in that it utilises an interval coding format, whereby coaches ae studied for 6 seconds followed by a 6 second break.

Cote, et al., (1993) used a coding system that measured seven coaching behaviours, agrees with referee, disagrees with referee, deals with body-checking technique, encourages more intensity, encourages less intensity, encourages self-control-respect for the rules, and encourages aggressive behaviour-violation of rules. The coding took place post game when two observers viewed a video-tape that showed both the game and the behaviour of the coach concurrently. A third coder was utilized in the advent of a disagreement between the original coders. In addition to recording frequencies of the seven behaviours, the coaches' verbal behaviour, together with a description of the context in which it occurred was also recorded.

Seaborn, et al., (1998) studied four female ice hockey coaches, in either three or four games, for an overall total of 14 games. According to Seaborn et al., existing observation systems did not fulfil the needs of their study, so they developed a new event recording procedure, which had three main components: a. "what" was the content of the instruction, b. "when" was the instruction given, and c. "how" was the instruction communicated. In addition to the coding system, the researchers utilised interviews with the coaches. These included background, pre-game, and post-game interviews. The researchers also used a purposive sampling strategy. For Merriam (1988, cited in Seaborn et al., 1998), purposive sampling is based on the assumption

that one wants to discover, understand, gain insight: therefore one needs to select a sample from which one can learn the most.

Limitations of Systematic Observation

Van der Mars (1989) notes "there are many sources that influence the observer's ability to observe reliably even with systematic observation tools"(p. 8) He states that there are four limitations of systematic observation. First, it concentrates only on events that are visible or audible. To make inferences about the behavours recorded care must be taken when developing definitions of the behaviours to be studied. Van der Mars does however believe that it is possible to make assertions about a persons attitude given their observed behavour, assuming that their attitudes are displayed via their behaviour. The second limitation is that descriptive information is derived from the observations, that are relatively objective. What can be derived from the information is largely dependent on how the material is interpreted. The risk is that the observer adds there own biases to the material observed. The third limitation is that the descriptive data does not give an indication of what the person observed might change in their behaviour. The final limitation is that the material observed is always contextual. Any findings mad need to be interpreted in response to the context in which they were observed.

Research Utilising Players' Perception of Coaches' Behaviour

Another approach used to study coach behavior has utilized the reported subjective experiences of players to describe coaches' behaviour. The following section explores studies that have used this methodology.

Kenow and Williams (1992) observed that, for the majority of coaches, winning is their primary objective and that coaches would like to behave in ways that

will enhance that outcome. From this, one might assume that coaches are aware of what behaviours are likely to enhance the prospects of winning and that coaches are equally aware of how they are behaving, and what effect their behaviour is having upon the athletes that they coach. An area where this is less likely to be true might be in junior coaching, where teams are often coached by well meaning, but untrained adults, due to the unavailability of trained coaches.

Kenow and Williams (1992) reported that in two studies of a coach and his basketball team that they conducted, there were marked differences between the coach's perception of his behaviour and its effect upon the players, and the players' perception of the coach's behaviour and its effect upon them. This is similar to the findings of Smith et al., who found that correlations of coaches' self-perception of their behaviour and their actual behaviour were generally low and non-significant. Athletes' ratings of coaches' behaviours correlated more highly with the coaches' actual behaviour than the coaches' ratings of their own behaviour.

Kenow and Williams (1992) developed the Coaching Behaviour Questionnaire (CBQ), a 28-item questionnaire, evaluating coaching behaviours that might occur when competing against the top teams in a competition. Developed the for use in a study to examine the relationship between anxiety, self-confidence, and evaluation of coaching behaviours. Individual items were ranked using a 4 point Likert scale ranging from (1)"strongly disagree" to (4) "strongly agree". Kenow and Williams relied on their own experience and the findings of Percival (1971) to establish the individual items and the conceptual categories of the CBQ. The instrument was modified, based upon the critiques of six coaches. The coaching-behaviour questions examined the following, (a). the athlete's opinion of the coach's

communicating ability, (b). the confidence displayed by the coach towards the players, (c). the coach's emotional control, and (d). the effect of the coach's arousal level and behaviour upon the player. In scoring the responses of the participants, Kenow and Williams took into account the total questionnaire score, in addition to the scores on individual items, to assess the relationship between the variables being studied.

Black and Weiss (1992) used the Perceived Coaching Behaviour Scale, an eight-category scale developed by Horn and Glenn (1988), based on CBAS. The scale included one question in each category. Black and Weiss further modified Horn and Glenn's (1988) scale by adding two extra categories. The 10 categories of coaching behaviours included four categories representing behavioural responses to swimmers' success (praise only, no response, praise combined with information about the performance, and information only), and six categories representing behavioural responses to swimmers' performance errors (encouragement only, no response, criticism, corrective information about the performance, encouragement combined with corrective information, and criticism combined with corrective information). In order to increase the measurement reliability, each of the 10 categories was represented by three items, giving 30 items in total. For each category, the participants were asked to rate, using a 5 point Likert scale from (1) "never" to (5) "always", the frequency with which their coaches displayed certain behaviours.

Moser (1992), in a study undertaken with the co-operation of the Norwegian orienteering team, developed an evaluation scale, containing 18 items that related to some important aspects of the personality and behaviour of a good coach. Initially,

45 members of the Norwegian orienteering team and 11 coaches were asked to rank the items, according to the importance they believed they had for being a good coach. The evaluation scale had been developed by Moser with the assistance of his former colleagues at the German College for Sports in Cologne, during the period 1985-1989. Three groups were involved in the study, the coaches, the senior athletes, and the junior athletes. After the groups responded to how important they perceived each of the items to be, the athletes were asked to evaluate their coach on the National team, utilising the same 18-item coach evaluation questionaire. The athletes made responses to each item on a 6-point scale from, ("*very content*") to ("*very discontented*"). The responses enabled Moser to establish how the different items were ranked by the different groups, whether there were any differences between the different groups of athletes and between athletes and coaches, and whether there was satisfaction with the coaches.

Moser (1992) examined the initial responses to ranking the 18 evaluation items for five sub-groups, senior female orienteers, senior male orienteers, junior female orienteers, junior male orienteers, and coaches. The 45 athletes considered, "have a knowledge of his/her sport" and "good abilities to plan and arrange the training" to be the most important attributes. The coaches believed "be psychologically stable and self-confident" to be most important, with "being aware of one's strong sides and weak sides", and "be able to obtain a good atmosphere and well-being within the team" being the second most important items. The younger athletes placed much higher emphasis on the coach having a friendly relationship with the athlete than did the seniors. Senior females gave their priority to the coach being able to organise, whereas the other groups placed more importance on the

coach's technical knowledge. Moser noted, according to his view of the matter, that

the women's sub-culture was strongly focused upon the qualities of relationships and

well-being within the team.

Moser (1992) reported that the evaluation of their individual coaches by the

athletes was positive. The only item with a negative response related to the coach

being a model to his/her athletes. The statements that the athletes answered

categorically, as more content than discontented, were "have a high capability to

organise", "be aware of one's strong and weak sides", "be able to stand up to great

psychological strain" and "be a good psychologist". The remainder of the responses,

were, on average, in the contented category. When comparing the particular

responses by the individual athletes, Moser observed that there were different

evaluations between coaches. He concluded that this approach seemed to be "an

efficient way to develop simple methods which fit the specific environmental

demands of the team" (p. 23). One draw-back of the technique, despite its being

individually focused, is that the responses by the athletes toward their coach depend

upon impressions, rather than actual, measured behaviour. Thus, current

circumstances may affect the perception of the athletes. A more precise approach

might be to use actual behaviour across enough different samples of behaviour (i.e.,

games), and seek the impressions of the players, to be confident that an

unrepresentative result is not found.

Summary of Coaching Measurement Techniques

The scales described in the previous section differ with regard to what they

are designed to measure. Some are concerned with categorizing the behaviour of the

coach, others are concerned with the perceived effect that the coach has upon

players. Smith et al. (1978) focused upon the effect that trained coaches had upon the self-esteem of children, especially those low in self-esteem. They established that "the greatest differences in attitude towards trained coaches.....were found among children low in self-esteem, appearing most sensitive to variations in coaches use of encouragement, punishment, and technical instruction" (p. 59). Kenow and Williams (1992) concluded that "the cognitive sub-component of state anxiety appears to be a major variable affecting how a player will evaluate and perceive a coach's game behaviour" (p. 355), with those players with higher competitive cognitive anxiety producing more negative evaluations of the coach. Black and Weiss' (1992) study indicated a significant relationship between the quality and quantity of a coach's feedback and a young athlete's self-perceptions and motivation. Wandzilak et al. (1988) suggested that the inconsistencies in the literature might be due to the diversity of the investigations undertaken and the variety of sample sizes, the age ranges of samples, the type of sport, the type of setting, whether behaviour was examined during practice or competition; the range of instruments used, and what they are designed to measure. This wide range of variables does seem to make direct comparison of a large group of studies difficult, limiting the general conclusions that can be drawn from this line of research.

Ahlgren, Housner, and Jones (1998) observed that coaching research has been limited largely to descriptions of coach behaviour. They noted that "while behavioural analyses provide valuable information regarding frequencies or types of thoughts and behaviours of coaches, the intentions and appropriateness of the behaviours cannot be assessed using these types of methodologies" (p 143). Ahlgren et al. (1998) noted the need to use both qualitative and quantitative research methods

to provide triangulated convergent data. Bloom, Durand-Bush, and Salmela (1997) also utilised a qualitative approach to better understand the coaching process. Another coaching scale, developed by Anshell et al. (1987), utilised a different development technique, whereby two expert panels specified the important behavioural traits that competent coaches must have to be successful. One limitation of the studies cited is that they do not make a comparison between the observed behaviour of the coach and the intent of that behaviour. It is therefore difficult to understand whether the coach was being proactive in their behaviour and acting in respect of their intent, or reacting to the events occurring in context.

Instruments Originating from other Disciplines Used to Measure Coaching Behaviour

In addition to instruments designed specifically to measure coaching behaviours or traits, researchers have used instruments drawn from other fields to investigate various aspects of coaching behaviour. Docheff and Phillips (1989) indicated that the transmission of knowledge is one important aspect of coaching. Thus, one determinant of the effectiveness of a coach is their ability to teach. Docheff and Phillips, cited Bloom (1980), who had suggested that focusing on the process used to teach, rather than the teacher, would improve the effectiveness of the teacher in the classroom. They suggested that the same proposition seems true for coaching. According to Docheff and Phillips, a variety of criteria, including personality, appearance, public relations, and win/loss records, have been used to evaluate the effectiveness of a coach's performance. Evaluation utilising such criteria has rarely relied on measuring the specific behaviours exhibited by the coach. Docheff and Phillips also indicated that research has supported the fact that teaching

behaviours influence the achievement of learners. These behaviours include the importance of the teacher's knowledge, and the amount of time spent on task by the learner. The researchers proposed that the same factors would mediate the coaching effectiveness of a coach and, therefore, the development of athletes. In this particular study, Docheff and Phillips utilised three instruments, the Physical Education Teacher Assessment Instrument (PETAI), and the Coach Evaluation Instrument (CEI), which were used to assess coach behaviour, and a basketball knowledge inventory, which was used to establish the extent of coachs' basketball knowledge. The PETAI (Phillips & Carlisle, 1983) is a teacher evaluation instrument. Docheff and Phillips utilised five variables from the original PETAI, knowledge of content, coach's teaching time, coach's management time, athletes' skill learning, and athletes' management time. The CEI (Phillips, Docheff, Dolch, & Lewis, 1985) consists of six categories of five items each, relating to coaching performance, and one item which relates to coaches' overall effectiveness.

Westre and Weiss (1991) utilised existing instruments to examine the relationship between perceived coaching behaviours and group cohesion in high school football teams. The leadership style and behaviour of the coach was measured using the Leadership Scale for Sports (LSS; Chelladurai & Saleh, 1980), and team cohesion was measured using the Group Environment Questionnaire (GEQ; Widmeyer, Brawley, & Carron, 1985). The LSS is not an observational instrument, rather it asks either coaches or athletes to rate types of coach behaviour using a general paper and pencil test. In the study cited, the players completed the instruments following a practice session, with no games for four days before or after the session. The coach completed the instruments at the same time, but at a separate

location to the players. Westre and Weiss (1991) acknowledged that the performance of a team may be influenced by the degree of cohesion existing between the members and that the degree of cohesion can be influenced by the particular approach and behaviour of the coach. The greater the commonality of purpose of players and coach, and the greater the congruence of coaching style with athlete expectation then the greater the group satisfaction.

I have indicated that the measures used for assessing coaching behaviour usually fall into one of two categories, those that are designed to classify the actual behaviour, e.g., CBAS, and those that measure the perception of coaching behaviour, e.g., LSS. The former type of assessment is normally undertaken in vivo, that is, as the behaviour occurs, but can be done later, if the behaviour is recorded on video, whereas the latter usually relies upon the perception and recall of the athlete or the coach and often refers to typical behaviour, rather than behaviour on one specific occasion. The advantage of measuring coaching behaviour as it occurs is that the actual behaviour of the coach can be related to what is transpiring at the time of the behaviour. It gives a clear picture of what the coach actually does, as compared to what, either the coach or players, perceived to have happened upon later recall. As well as suffering from the problems of lack of specificity and dependence on memory, many motivational and personal variables might affect those perceptual responses, whether they are made by athletes or reported by the coaches themselves.

Abrahams and Collins (1998) observed that the majority of research into coaching behaviour has utilized an "assay" approach, where behaviour observed is ticked against a specific coding box for later tallying. This focus has followed a behaviourist line, where coaching expertise is determined by the observation of

particular behaviours, rather than knowing the coach's intent for the particular behaviour. Kahan (1999) agreed, noting that "The systematic study of coaching and teaching behaviour using descriptive-analytic systems and direct observation has been a prominent research methodology in the field of sport pedagogy for over 20 years" (p.18).

Use of Video-Tape to Investigate the Intent of Coaches' Behaviour

As indicated By Abrahams and Collins (1998), one of the issues of using behaviour coding, is that the researcher still has to make inferences as to what the intent of the coach might have been in the particular game context. Jones, Housner, and Kornspan, (1997), noted, "it is imperative that direct observation techniques be supplemented by methods for exploring the thought processes of coaches" (p. 445) One way in which researchers have started to explore coach behaviour and intentions is by the use of video-tape of coach behaviour to stimulate coaches' discussion of their intent. Trudel and his fellow researchers have utilized this medium since the early 1990's as a means of better understanding the coaching process. In their early studies they conducted descriptive studies to record the behaviours of both coaches and officials, often using two video-cameras, one focused on the participant and the other on the game. These studies examined violence in ice hockey, particularly the seeming contradiction of coaches encouraging their players to be physical yet urging control. Subsequent to their early studies, they decided to use video-recording to examine the cognitive aspects underlying coaching behaviours in order to understand the process.

Wilcox and Trudel (1998) studied five male, youth, ice hockey coaches with two objectives. They reported that the usual procedure for utilising video-tape, as a

toll to understanding the intent of coaches, is a stimulated recall interview (SRI). With this method, the participant is shown excerpts, elected by the researcher, and asked to comment or interpret the decision-making or intent underlying the behaviour displayed in the excerpt. According to Wilcox and Trudel, there could be some doubt as to the validity of the explanation by the participant. There have been concerns raised regarding the validity of the data gained through the use of this method. Yinger (1986), Keith (1986) suggested that presentation of the video-tape prior to seeking the interpretation from the coach could allow the coach to recount thoughts as a result of viewing the video-tape rather than being able to recall their thoughts that occurred at the point of the behaviour occurring. When talking of issues that have sensitivity to either the coach or the particular sport, "it not only enables researchers to unveil a wide range of beliefs and principles by which coaches claim to abide, it also provides an effective way to ensure that people talk about what they really think and what they really do". (Trudel et al., 2001)

To overcome this supposed limitation, Wilcox and Trudel focused on the following objectives for their study. The first objective was to utilise a modified stimulated recall interview technique. The second was to use the modified technique to construct, in a game situation, the principles and beliefs of the coaches they studied. In their study, Wilcox and Trudel used an interview strategy named verbal cueing stimulated recall interviews (VCSRI). At the completion of each game, the participants took part in a short interview regarding the decisions they made during the game based on the coach's game plan. A couple of days following the game, a VCSRI session was conducted where two types of game events were investigated, Type 1 and Type 2. Type 1 events were significant events selected by the coaches,

which reflected decisions carried out by the coaches that they had identified in the post-match, short interview. Type 2 events were events chosen from the game by the researchers that reflected decisions by the coaches during the game, but not reported at the short interview by the coaches. The process of the VCSRI was the same for Type 1 and Type 2 events. The interviewer would give a brief description of the event to prompt the recall of the coach and then ask the coach to expand on the event and to explain the underlying basis of the decision they made. After confirming that the coach had indeed remembered the event and following the coach's description of the decision making involved in the event, the coach was shown the excerpt and given the opportunity to discuss the event. The intent of the method was to validate the coaches' responses by verbal cueing, rather than stimulate the participants' recall. The VCSRI method was also used by Gilbert, Trudel, and Haughian (1999) in a study investigating interactive decision-making factors considered by coaches during matches involving youth ice hockey players. Gilbert et al. believed that, by using both Type 1 and 2 events they alleviated the chance of bias occurring had they relied only on events selected by either the coach or the researcher. The historical development and use of video-tape techniques is more fully explained by Trudel, Gilbert, and Tochon (2001), in a paper describing the use of video-tape in sport pedagogy research.

Relevant Research on Coach Behaviour Utilizing the CBAS

The CBAS was originally developed by Smith et al. (1977) as a response to a growing concern about how the psychological development of children was being affected by participation in organised sport. Smith et al. observed that the experience

of children in sport was unlikely to be either wholly positive or negative, but determined by a number of factors, for example, the type of supervision existing, the structure of the programs, and the individual characteristics of the child. An additional factor deemed to be important was coach behaviour. In the original development of the CBAS, soccer coaches were observed with the observer making verbal notes onto a tape recorder. The behaviours were then categorised to establish a set of categories from which the present CBAS was created. The CBAS permits the direct observation and coding of coaches' behaviours during practices and games (Smith et al. 1977).

The CBAS examines two major classes of behaviour, reactive behaviours and spontaneous behaviours. Reactive behaviours are coach behaviours that relate to preceding player or team behaviours, whereas spontaneous behaviours are coach-initiated behaviours that are not responses to preceding events. Reactive behaviours are further divided into responses that are judged to be reactions to desirable performances, reactions to mistakes, or responses to misbehaviours by players. Spontaneous behaviours by the coach are divided into game relevant, and game irrelevant behaviours. Smith et al. (1977) stated that "the reliability of the CBAS is undoubtedly enhanced by the fact that the categories are functionally related to the presence of specific situational occurrences. The nature of the situation thus eliminates all but a subset of categories" (p. 406).

The CBAS was designed for use during competition, having originally been developed through the study of coaches, while they were engaged in coaching during matches. As a means of studying coach behaviour, it is a very useful tool,

particularly because it is directly applicable to the competitive situation, rather than being a tool developed primarily for use in training situations, then adapted to competitive situations. The CBAS particularly distinguishes coach behaviour that is spontaneous, as opposed to coach behaviour that is reactive to the game or training situation. The CBAS also allows the observer to code behaviours as either positive or negative.

Some sports easily lend themselves to the coding of coaching behaviours, due to the discrete nature of the situations arising during competition, e.g., baseball and volleyball, whereas others, such as basketball and soccer, where the action is continuous, create the situation where the focus of the coach's attention is not always clear. As the CBAS is a tool for measuring coaching behaviour, it is possible to use the results obtained to compare the varying behaviour of the coach in different games against different opponents, or to compare two halves, or other portions, of the same game. It is also possible to compare any changes that may have occurred as a result of coaches changing their approach by the use of a pre-test, intervention, post-test methodology. Chaumeton and Duda (1988) used the CBAS with a modification to allow them to test whether the reinforcement given by coaches was positive or negative and whether it focussed upon performance process or performance outcome. They also compared the difference in coach behaviour between practice and competition settings.

Smith et al. (1978) studied 51 male Little League coaches during a total of 202 competitive games. Each coach averaged 1,112 behaviours over the course of the season, allowing Smith et al. to establish a profile for each coach. Additionally,

the coaches completed a number of self-report measures assessing their beliefs, attitudes, and perceptions. These were combined into a single questionnaire that the coaches completed at the conclusion of the season. Of critical importance, was the coaches' perception of how they behaved. Assessment of this occurred by giving the coaches examples of the 12 CBAS scales and asking them to rank their behaviours for each category on a 7-point scale, as to how often they engaged in the situational behaviours described. At the conclusion of the season, a total of 542 players between the ages of 8 and 15 years, were interviewed in their homes and concurrently completed a questionnaire. For Smith et al. the most important feedback was the children's recall and perception of how the coach behaved and their attitude to that behaviour. To determine the role of personality variables in the process, each child completed several personality measures, including self-esteem scales. Utilising this procedure allowed judgements to be made as to the role of these variables in the reaction of the children to particular types of coaching behaviour, and the reaction of those children exposed to a number of coaches. "To summarise, we determined what coaches were doing, what they thought they had done, what the children thought the coaches had done, and how the children felt about the coach, their experience, and about themselves" (Smoll and Smith, 1989, p. 1526). Three independent behavioural dimensions were identified, supportiveness (which consists of reinforcement and mistake contingent encouragement), instructiveness (general technical instruction and mistake contingent technical instruction versus general communication and general encouragement), and punitiveness (punishment and punitive technical instruction versus organisational behaviours). The researchers found that the dimensions of supportiveness and instructiveness were significantly and positively

related to players' attitudes toward the coach, the sport, and team-mates. Coaches who engaged in higher percentages of these behaviours had the most favourable responses from players. The same behaviours were also related to children's post season self-esteem scores, with supportiveness being associated with higher levels of general self-esteem, and instructional behaviours with lower levels of self-esteem (p. 1530). With regard to player-perceived coach behaviours, supportive behaviours were related to positive attitudes towards the coach, while punitive behaviours were related to negative behaviours towards the coach.

The study indicated that coaches' awareness of their behaviour was generally inaccurate, with correlations between CBAS observed behaviours and coaches' ratings being generally low and non-significant, with the exception of punishment. The ratings of the coaches' behaviour by the children showed a much higher correlation with the CBAS measures. Smoll and Smith (1989) observed that it "appears that coaches have limited awareness of how frequently they engage in other forms of behaviour than punishment, and that the athletes are more accurate perceivers of actual coach behaviour" (p. 1530). A further significant moderator of attitude responses to coaches was general self-esteem, with children low in self-esteem differing the most towards coaches, who were at extremes of the supportiveness and instructiveness dimensions (p. 1530), that is, low self-esteem children responded most negatively to coaches who were not supportive or instructive.

Smith et al. (1983) observed that the nature of the sport may influence the behaviour patterns of the coach. They found that the distribution patterns of the

CBAS categories was generally similar for basketball and baseball, with the rate of punitive responses occurring infrequently, when compared with the rates of reinforcement, encouragement, and technical instruction. The major difference in the factor structure, was the loading of the technical instruction categories opposite the supportive behaviours of reinforcement and encouragement, for the basketball coaches. Smoll and Smith (1989) noted that this finding of Smith et al. (1983) "suggests a dimensional structure involving relationship versus task orientation" (p. 1541). Other situational factors that may affect coaches' behaviour include whether they are engaged in training, as compared to being engaged in competition, the level of the competition, previous results against a particular opponent, and the current state of the match, that is, whether a team is leading, losing substantially, or involved in a close contest.

The CBAS has been one of the most prominent measures used in research that has examined actual coach behaviour. One particularly relevant example is a study by Gross (1990) involving National Basketball League coaches and players in Australia. Gross aimed to answer the following questions.

"Does coaches' behaviour actually influence team behaviour? Do coaches believe their own behaviours are important towards influencing team performance and are these behaviours consistent with players views? Do coaches change their behaviour when they win compared to when they lose? Are winning coaches' behaviours any different to losing coaches' behaviours?" (p. 36).

Gross studied 11 head coaches and two assistant coaches for a total

of 39 games, video-recording in total, 30,243 verbal and non-verbal

behaviours by the coaches. Following the completion of each game the

coaches of both teams were required to complete questionnaires establishing

the attitudes of the coaches towards the importance of coaching behaviours

upon team performance. Gross, utilising the CBAS, analysed the verbal and

non-verbal behaviour of the coaches, linking the specific behaviours to

indices of team behaviour, including point scores for each team, fouls

called, and the times that each of these events occurred. The report of the

study does not indicate whether the classification of behaviours was cross

checked by an independent observer. The results indicated that, for these

elite level coaches, 85% of their behaviours fell into three categories,

general and specific technical instructions, general and specific

encouragement, and verbal and non-verbal reinforcement. Technical

instruction, both specific and general, accounted for 55% of the total

behaviours. According to Gross, the breakdown of behaviours is similar to

that of previous studies (e.g., Gross, 1985; Tharp & Gallimore, 1976).

Further, Gross found that, whereas youth basketball coaches provided more

encouragement and reinforcement type behaviours, NBL coaches elicited

far more technical instruction. As a percentage of all behaviours, in Gross'

study, 70% were spontaneous in nature, geared toward influencing what is

to happen in the game, rather than reacting to what has already transpired.

From the questionnaires completed by the coaches, winning coaches

believed that their behaviours were more influential in affecting

performance than losing coaches. Gross established that winning coaches

exhibited more behaviours overall than losing coaches and that these

behaviours were more spontaneous in nature than the behaviours of losing

coaches, which were less frequent and more reactive. Losing coaches

demonstrated more non-verbal reinforcement, punishment accompanying

technical instructions after a mistake, and comments to officials. Gross

proposed these behaviours were consistent with being out of control. With

regard to coaching style, the behaviour of coaches changed when they won

compared to when they lost, but in a manner unique to the individual coach.

According to Gross, not only did these coaches change their behaviour

between games, they also changed their behaviour within games, dependent

on the state of the game. That is, when winning, a particular coach exhibited

his winning coaching style and when losing he exhibited his losing style.

In a previous study, Gross (1985) had demonstrated that coaches respond to

the performance of the other team, in addition to the performance of their own team.

In the later study, Gross (1990) stated that "they probably react more to the

difference between their team and the opponent's team score at particular stages of

the game." (p. 39). According to Gross (1990), one could expect a coach to change

coaching strategies dependent upon the changes in the score gap between the teams.

The challenge for the coach is how to manipulate team behaviour in order to change

the score gap at any particular time. Gross also observed that the behaviours a coach

believed to be important in influencing the outcome of a game were indeed the

particular behaviours that they demonstrated during a game. Specifically, "winning

coaches produce more general technical instructions, specific encouragement, and

verbal reinforcement than do losing coaches." (p. 39). In contrast, "losing coaches display more: punishment accompanying a mistake; comments to officials, and non-verbal reinforcement." (p. 39). In Gross' view this reflects ineffectual attempts to change the course of the game. Gross proposed that the challenge for individual coaches is to become aware of their idiosyncratic patterns of behaviour under varying competitive conditions, in order to alter their behaviour when, for instance, their team is losing, so that their subsequent behaviour will enhance the ability of their team to take the lead. In particular, a coach needs to be aware, when responding to player behaviour in a losing situation, that their particular behaviour is positive and designed to encourage a specific playing response from the player, rather than negative and having the effect of inhibiting the player.

In another study that employed the CBAS, Black and Weiss (1992) utilised the version of the CBAS, as modified by Horn and Glenn (1988), "to determine which perceived coaching behaviours (praise, instruction, and/or criticism) are related to certain motivational indicators such as perceived competence, enjoyment, and effort in competitive swimmers" (p. 311). The sample consisted of 312 swimmers representing 11 registered teams, divided into three age groups, 10-11 years, 12-14 years, and 15-18 years. The participants responded to four demographic questions and completed the Perceived Coaching Behaviour Scale (Horn & Glen, 1988), which consisted of the CBAS modified. In addition, two extra categories were added by the researchers. Two measures were used to assess swimmers' self-perception of ability. These were a modified Self-Perception Profile for Children, the original of which was developed by Harter (1985), and two questions relating to how the swimmers perceived their success in the current season. Motivation was likewise

measured utilising two instruments, the challenge subscale of the Motivational

Orientation in Sport Scale (Weiss, Bredemeier, & Shewchuk, 1985) and Ryan's

(1982) Intrinsic Motivation Inventory, as modified for use in sport by McAuley,

Duncan, and Tammen (1989). The study utilised swimmers' perceptions of their

coachs' behaviour, rather than measuring actual behaviour. The findings of this study

supported those of previous studies (Smith et al., 1978, 1979; Smith et al., 1983),

"that is, coaches' (perceived) behaviours not only influenced sport enjoyment and

self-esteem (i.e., perceived swimming competence), but also influenced perceived

success, effort, and preference for optimally challenging activities." (p. 321).

<center>Arousal and Behaviour in Coaches</center>

Little research has focused upon the relationship between coaches' levels of

arousal, and their coaching behaviour during matches. Nitsch (1981, cited in Teipel,

1993), indicated that the aspects of stress that impinge on coaches are rarely

systematically investigated. These stresses can include, winning or losing, and

coping with the varying demands of players, officials, referees, and spectators. Teipel

observed that the psychophysiological stresses experienced by coaches have been

well documented, but these studies have not taken into account, "the specific actions

of the coaches, before, during and after games" (p. 446). Teipel studied the

psychophysiological stress on soccer coaches in terms of heart rate during and after

games, as it related to game events, and the psychological stress on these coaches, as

it related to the specific environment, including indicators of success and failure.

To assess psychophysiological stress, Teipel (1993) studied two male

professional soccer coaches, utilising heart rate telemetry. Specific coach behaviour

was monitored by videotaping the games. This enabled the researchers to pair the

heart rates of the respective coaches to their specific behaviour at a particular time during the game. The two coaches involved were coaching opposing teams, where the home team needed to win in order to participate in a promotion game to be elevated to first grade. The heart rate measurement of each coach lasted for 150 minutes with the monitoring commencing 30 minutes prior to the start of the game, and continuing for approximately 30 minutes after the game. The coaches were both videotaped for the whole period, with the exception of half time, when the respective coaches accompanied their players to the dressing rooms. The average heart rate of the home team coach was 126 beats per minute, with a range of 110-160 beats per minute. The opposing coach had an average heart rate of 124 beats per minute, with a similar range of 110-160 beats per minute. At the point of a goal being scored for his team, the home team coach's heart rate elevated from 130 beats per minute to 147 beats per minute. On the other hand, the opposing coach did not have any remarkable leaps in heart rate during the first half, but upon his team scoring in the second half, his heart rate leapt from 130 beats per minute, to 160 beats per minute. At the same point, the home coach put his hands over his eyes and shook his head, with his heart rate increasing from 135 bpm to 150 bpm. In summary, Teipel suggested that "the psychophysiological stress measured by heart rates approaches almost maximal level with comparatively little motor activity", (p. 448). Teipel also observed that "there seems to be a close relation between essential events on the field, emotional reactions (e.g., joy, anger, frustration) and/or motion reactions (e.g., sitting, standing, walking, jumping) and the coaches' heart rates" (p. 449).

Teipel (1993) examined psychological stress utilising a separate sample of 28 soccer coaches drawn from both professional and high amateur levels. These coaches completed a 45-item questionnaire, for which the coaches were required to rate each item on a 7-point scale, ranging from "not stressful" to "very stressful". The responses indicated that the most stressful situations were perceived to be where relegation was a distinct possibility, in the last game of the season, three games before the end of the season, mid-season, and as a result of a big loss. Less stressful were relations with assistant coaches, sponsors, and opposing players and coaches. Teipel concluded that coaches need to be aware of what prospective stressors might be, and to learn to act effectively in the face of these stressors. By being aware of the potential stressors, Teipel proposed that "stressors can be prevented from resulting in actual or long lasting overload or destabilisation of soccer coaches' behaviour " (p. 449).

Although Teipel's (1993) first study is one of the few to examine stress, behaviour, and game situations concurrently, the study does have shortcomings. It presented accurate heart rate readings as a psychophysiological indicator of stress, but did not present any assessment or coding of the coaches' behaviour. Although a full record of coach behaviour was made, using videotape recording, no formal classification system was applied to this data, rather coach behaviour was determined on the basis of general observations made by the researcher in relation to specific situations. Likewise, Teipel did not give precise indications of heart rate compared to behaviour and game situations on a systematic time basis. Nor did Teipel give any indication as to how a coach might act effectively in order to prevent long lasting stress or unstable coaching behaviour. Thus the question of how coaches' behaviour

relates to their arousal has not been addressed systematically, so there is little guidance for coaches and coach educators.

Summary of Review of Literature

It has been widely recognised that coach behaviour plays an influential role in individual and team performance. There is also clear evidence that stress levels of coaches vary during matches, depending on characteristics of the coach, the circumstances in which the game takes place, and specific match events. If stress level at any moment in time affects coach behaviour, this could impact on the performance of individual players or the team as a whole. The relationship between arousal level of the coach and the coach's behaviour is an important issue to investigate. To date there do not appear to have been any studies that have systematically examined this issue, although some relevant information has emerged from studies of psychophysiological arousal that have observed changes in coach behaviour incidentally, and unsystematically in the case of Teipel's research.

The Present Thesis

Given the acknowledged importance of coach behaviour for both the individual players and the team it is critical to understand what affects coach behaviour. It seems that stress created by coaches' circumstances and the game context could be key factors in assisting our understanding of these issues. This thesis aimed to examine the following, what stress is experienced by coaches during competition, measuring how coaches behaviour during competition, and the subsequent relationship between coach arousal and their behviour during competition. The Thesis consists of three studies, with Studies 1 and 2 measuring

arousal and behaviour, and Study 3 examining the intent of the coaches by way of a

video-taped focused interview.

CHAPTER 3: STUDY OF THE RELATIONSHIP BETWEEN COACH AROUSAL AND BEHAVIOUR DURING MATCHES

Introduction

Very little research has been undertaken into the relationship of the levels of anxiety and arousal of coaches and their behaviour. Previous research has measured the levels of physiological stress that coaches' experience during both competition and training. The focus of that research has been on what changes occur across physiological parameters, such as heart rate, and whether changes in these parameters might be injurious to the health of the coach. It has been observed that changes in physiological parameters can occur as a response to game events. Those studies have not examined whether the physiological changes that were observed, particularly changes in the level of arousal, influenced the behaviour of coaches. Equally, there have not been any studies undertaken to examine whether coaches' level of anxiety prior to coaching in competition has any influence on their subsequent coaching behaviour.

I designed this study to examine the relationship between arousal and anxiety and coaches' behaviour. Those specific parameters were measured as follows. The levels of state anxiety of the coaches studied were measured using the CSAI-2. Immediately prior to and during competition the coaches wore heart rate monitors that recorded their arousal, operationalised as HR at five second intervals. Subsequently these monitors were downloaded to a computer to allow later analysis and comparison. Each game coached by the individual coaches was video-taped, while the coach wore a remote microphone to allow voice recordings to be dubbed

onto the video-tape in situ. These video-tapes were viewed later to allow the coaches' behaviour to be coded using the CBAS.

Method

Participants

The participants were four male basketball coaches, three of whom coached junior female basketball teams, and one who coached a senior women's team. The coaches' ages were, 28 years, 30 years, 43 years, and 50 years. They coached in different competitions. Three participants coached at junior female Championship grade, which is the highest level available to junior players in Victoria, whereas one participant coached a women's team in the Continental Basketball Association (CBA) senior women's competition, which is the second highest level available to senior women in Australia. All coaches had, at one time or another, coached or been assistant coaches to Victorian representative under-age teams at National championships. Basketball was selected because rules in basketball competitions restrict the physical movement of coaches, a factor that can confound HR data.

Design

This study examined the relationship between coaches' arousal levels and their behaviour. Trait anxiety of the four coaches was measured at the commencement of the study, away from competition using the SCAT. State anxiety of the coaches was measured prior to each of the matches, using the CSAI-2 intensity sub-scales. Arousal levels of the coaches were measured, using HR as an indicator. HR was monitored using Polar heart rate monitors, recorded at five second intervals for the duration of three matches studied for each coach. At the same time, the behaviour of the coaches was videotaped during those matches. Principal analyses

examined patterns of arousal during matches, use of categories of coaching

behaviour, and arousal levels for categories of coaching behaviour.

Instrumentation

The research utilised two paper and pencil tests, the Sport Competition

Anxiety Test (SCAT), and the Competitive State Anxiety Inventory-2 (CSAI-2), one

behaviour analysis instrument, the Coaching Behaviour Assessment System (CBAS),

and one psychophysiological indicator, heart rate. Coaches' behaviour for the whole

of each game was recorded on video cassette and analysed later using the CBAS.

Sport Competition Anxiety Test (SCAT; Martens, 1977). The SCAT is a

situationally specific measure of trait anxiety, developed by Martens, that measures

an individual's general tendency to perceive competitive situations as threatening. It

is a self-report questionnaire consisting of 15 questions, with 10 questions being

anxiety-related, and five questions being distracters. The items are answered on a 3-

point Likert-type scale (*Hardly Ever, Sometimes, Often*). Scores range from 10 (*low*

competition anxiety), to 30 (*high competition anxiety*). Martens, Burton, Vealey,

Bump, and Smith (1990) indicated that the test-retest reliability of SCAT ranged

between .70 to .90, and that general A-trait scales yielded correlation coefficients of

.50 to .60, when correlated with the SCAT. Martens et al. stated that this clearly

supports the concurrent validity of the SCAT. The SCAT has been widely used in

research on anxiety in sport.

Competitive State Anxiety Inventory -2 (CSAI-2; Martens, Burton, Vealey,

Bump, & Smith, 1990). The CSAI-2 is a sport specific and multidimensional self-

report anxiety measure developed by Martens et al. (1990). It measures cognitive and

somatic components of state anxiety, in addition to a third related variable, self-

confidence, all specific to sport competition. It consists of 27 questions, with nine

questions scoring on each of the three sub-scales, cognitive anxiety, somatic anxiety,

and self-confidence. The items are answered on a 4-point Likert scale from 1 (*Not At*

All) to 4 (*Very Much So*). Each factor has a minimum score of nine (indicating a low

level) and a maximum of 36 (indicating a high level). Cronbach alpha coefficients,

measuring internal consistency, have ranged from .79 to .83 for the cognitive A-state

scale, from .82 to .83 for the somatic A-state scale, and from .87 to .90 for the state

self-confidence scale (Martens et al., 1990). The CSAI-2 subscales correlated in the

hypothesised directions with the Sport Competition Anxiety Test (Martens, 1977)

and general state and trait anxiety scales (Speilberger, et al., 1970). Studies have

offered further support for the reliability and validity of the CSAI-2 (e.g., Gould,

Petlichkoff, & Weinberg; 1984, Jones & Cale, 1989; Parfitt & Hardy, 1987). The

CSAI-2 has been used widely in research on state anxiety in sport.

Heart rate. The heart rates (HR) of the coaches were recorded using a Polar

4000E heart rate monitor. The monitor utilised telemetry to transmit impulses from

electrodes attached to a belt worn around the chest, to a receiver on the person's

wrist. Heart rate values were saved in the memory of the receiver, averaged for each

five second interval, starting five minutes before the game commenced and ending

five minutes after the game finished. The data stored in the receiver was

subsequently downloaded to a computer. Subsequent to the game, the HR's of the

participant were manually added to the data sheets on which the CBAS coding had

been noted. As the video-camera and the HR monitor had been activated

simultaneously, and both pieces of equipment had time codes displayed, the coded

behaviour and the HR at that time could be paired.

Video-recording. The behaviour of the coaches was recorded using a National M-10 portable VHS video camera, located directly opposite the coach on the other side of the basketball court. The camera was focused upon the coach for the entirety of the game. Because the video camera was located some distance from the coach, the dialogue of each coach was recorded onto the video-tape using a remote microphone, attached to the coach's clothing.

Coaching Behaviour Assessment System (CBAS; Smith & Smoll, 1977). The CBAS is a 12 category behavioural assessment system, encompassing two major classes of behaviour, reactive and spontaneous. The 12 categories were listed earlier in this thesis. Reactive behaviours are elicited in response to identifiable stimuli. Spontaneous behaviours are elicited without reference to clear-cut antecedents. The CBAS was developed to permit the direct observation and coding of coaches' behaviour, whilst they were engaged in coaching, but it can also be used to code behaviour recorded utilising video-tape. This study employed a modified CBAS with 14 behavioural categories developed specifically to classify the behaviour of basketball coaches (Gross, 1990).

Smith, et al.,(1977), report that several studies have been performed to assess the reliability of the CBAS. In the first of the studies 31 trainees viewed a video-tape of 48 randomly ordered coaching behaviours performed by an actor. In each instance the coach's behaviour was described and then the video-tape shown. Using this methodology, each of the 12 CBAS categories was presented on four occasions. Accuracy was arrived at by the number of times the trainees agreed with the scoring of the behaviours by the authors. Error scores ranged fro 0 – 5 with a mean of 1.06 errors per observer. The average agreement with expert scoring was 97.8%. The

authors reassessed the consistency of scoring over time by re-administering the video-tape of the 48 behaviours to 24 of the trainees one week later, without them having received any feedback regarding the initial codings. The index used to establish consistency was the percentage of behaviours that were identically scored on both administrations. They ranged from 87.5% to 100% with a mean consistency of 96.4%. The inter-rater reliability of the original CBAS was reported to be 98%, for the coding of video-tape sequences, with inter-rater reliability being .88 in field settings (Smith, Smoll, Hunt, Curtis, & Coppell, 1979). In Gross' research, the research assistant was required to achieve a 90% success rate on 15 simulated coach responses, prior to moving to a 40-item audio-tape, where a 90% success rate had to be achieved, before moving to viewing video-tape. The CBAS has been widely used to study coaching behaviour.

Procedure

The participants were all volunteers accessed through a basketball contact. They were informed about the general nature of the research and signed consent forms indicating their awareness of the demands of the study, confidentiality, and freedom to withdraw at any time. They were encouraged to ask questions at any time and all concerns that were expressed at this point were addressed. Prior to participants being involved in the video analysis of games, each coach completed the SCAT away from competition to establish competitive trait anxiety. Fifteen minutes before the start of each game, the participants completed a CSAI-2. Following the completion of the CSAI-2, the participants were fitted with a Polar HR monitor, set to record every five seconds from five minutes prior to the game until five minutes post game. The participants' verbal and non-verbal behaviour was recorded on

video-tape for the duration of the game. After the final game recorded for each coach, the coach was de-briefed and thanked for participating.

Preliminary Organisation of Data for Analysis

Heart rates were downloaded directly into an IBM computer. Mean HR was calculated for each coach for each quarter of each game. Age-adjusted maximum HR for each coach was established by deducting their age from 220. McArdle, Katch, and Katch (1991) suggested that it is advisable to utilise this formula, rather than expose older, untrained participants to a test of maximum heart rate, due to the risks associated with coronary heart disease. Average age-adjusted HR's were then summed for each behavioural category and means were derived. The video-tape of each game was analysed using the CBAS to code each coach's behaviour for the entire game. Frequency of use of each type of behaviour was recorded, and behaviours were further classified as spontaneous or reactive.

Results

I considered the results under a number of sub-headings, and they are reviewed in the following order, trait and state anxiety, arousal levels, coach behaviour, and finally the relationship between arousal and coaching behaviour.

Trait and State Anxiety

Trait anxiety scores on the SCAT are presented in Table 1, together with state anxiety scores measured by the CSAI-2. No norms exist for male coaches for either scale, so comparison has been made with male college athletes, as reported in Martens et al. (1990). The norms in that study were derived from a sample of 158 male college players. There were three norms derived, CSAI-cog, $M=17.68$, ($\underline{SD}=4.84$), CSAI-som, $M=17.68$, ($\underline{SD}=4.86$), and CSAI-sc, $M=25.37$, ($\underline{SD}=5.15$).

The trait anxiety scores of Coaches A and B were at the reported norm, whereas Coaches C and D had scores substantially lower than the norm. With regard to state anxiety scores, Coach A had cognitive and somatic anxiety scores slightly higher than the norm, before three of the four games studied. Interestingly, prior to the game that his team subsequently lost, his cognitive anxiety score was the highest of those measured for his games. Both Coaches B and C scored well below the norms for cognitive and somatic anxiety in all games. When compared to game outcome, Coach B lost all games that were taped, and Coach C won all games taped, including a close win in the grand final. State Anxiety varied around the norm for Coach D, the highest pre-game score arising for a game resulting in a one point win. Visual examination also indicates that there was little correspondence between trait and state anxiety. For example, Coach A had equal highest trait score and the highest state score, whereas Coach B had the equal highest trait score but the lowest state score. Coaches C and D had low trait scores and moderate state scores.

Table 3.1

Coaches' Trait Anxiety and Mean State Anxiety of Coaches across Games

| | | CSAI-2 | | |
Coach	SCAT	Cog	Som	Self-conf
A	20	23	21	23
B	20	15	9.67	30.33
C	12	16.67	9.67	30.33
D	14	22	17	22

Arousal Levels

Mean HR across games for Coach A was moderate, varying from a low of 99 bpm to a high of 126 bpm. Coach B showed the smallest variation from 86 bpm to 96 bpm. Coach C had the highest range from a low mean HR of 120 bpm to a high of 167 bpm. Coach D reported the lowest levels from a low mean HR of 71 bpm to a high of 91 bpm. The arousal levels of the four coaches, measured by raw mean heart rates (HR) for quarters, are presented in Table 2. Mean HR varied considerably between coaches and for the same coach in different games. These HR values represented widely varying percentages of the maximums estimated by the age adjusted method. The typical pattern of arousal within matches was a decline from the start to end of the game. The exceptions were Coach A, whose HR rose in the final quarter of one game compared to the starting HR, and Coach C, who had HR increases in two of the games. It should be noted that the games for Coach C, being in a younger age group, were played in halves, as opposed to quarters. For the purposes of comparison HR during games for Coach C was divided into quarters, based on time elapsed in each half. One-way repeated measures Analysis of Variance (ANOVA) was applied to the data. This is an inferential statistic that tests for significant differences between two or more sets of data generated by the same sample. It was employed to compare mean HR for the four quarters. The ANOVA indicated that there was no significant difference between the mean heart rates for each quarter, $\underline{F}(3,9) = 3.03$, $\underline{p} > .05$.

Table 3.2

Mean Heart Rate of Coaches for Each Quarter

Coach		Q1	Q2	Q3	Q4
A	M	118.11	112.78	114.78	117.92
	SD	3.98	7.78	9.51	16.85
B	M	93.44	91.50	90.69	88.60
	SD	3.94	4.15	4.97	7.59
C	M	141.37	137.30	140.1	131.59
	SD	24.27	26.11	22.09	24.05
D	M	85.02	81.71	75.68	75.40
	SD	15.98	12.67	9.50	8.15
Group	M	109.49	105.82	105.31	103.38
	SD	25.48	24.67	28.24	25.87

There appeared to be little correspondence between levels of HR and type of anxiety. For example, Coach C had low trait anxiety scores and the highest HR, whereas Coach D had low trait anxiety scores and the lowest HR. With reference to state anxiety, Coach C had low to moderate state anxiety (Cog.=16.67, Som.=11.67)and the highest HR, whereas Coach D had a state score (Cog. 22, Som.= 17) near the higher end of the sample, but the lowest HR.

Coach Behaviours

There were large differences between coaches in the number of coaching behaviours exhibited per game. Coaches C and D had the highest totals, with Coach

C exhibiting 430 behaviours in one game, and a mean of 380 behaviours across all games. The lowest number of behaviours exhibited was 109 by Coach A, who had a mean of 129 behaviours across all games. The CBAS, as modified by Gross (1985), specifies 14 categories of coaching behaviour. The results indicated that the majority of observed behaviours for each coach came from only seven CBAS categories. The most common categories were, verbal re-inforcement (VR), verbal punishment (VP), general technical instruction (TIG), specific technical instruction (TIS), mistake contingent technical instruction (TIM), mistake contingent technical instruction with punishment (TIMP), and general encouragement (EG). Coach D, displayed a higher frequency of mistake contingent technical instruction with punishment (TIMP) than the other coaches. The actual distribution of these main behaviours varied between coaches. Three coaches (Coach B, C, & D) showed TIS highest, whereas verbal punishment was the most frequent behaviour for Coach A. Patterns of coach behaviour based on CBAS analysis of video recordings are presented in Table 3. This table shows the mean frequency of coach behaviour for each coach across all games for the seven categories that were used to a noteworthy extent. The mean for each behavioural category and across coaches is also presented. One-way repeated measures ANOVA was applied to test for any difference in the use of each behavioural category. The ANOVA indicated that there was a significant difference between the frequencies of use of different categories of behaviour, $F(6,18) = 4.17$, $p < .05$. A student Newman Keuls post hoc test indicated that specific technical instruction (TIS) was used significantly more frequently than technical instruction and punishment following a mistake (TIMP), verbal punishment (VP), and technical instruction following a mistake (TIM).

Table 3.3

Mean Frequencies for Seven CBAS Categories Used Frequently

Category		Coach				M	SD
		A	B	C	D		
VR	M	13.0	17.33	91.33	24.66	36.58	36.81
	SD	5.29	5.03	12.34	8.08		
TIM	M	0.66	18.33	26.66	27.0	18.16	12.33
	SD	1.15	5.5	3.51	4.58		
VP	M	17.33	5.0	1.66	38.0	15.49	16.44
	SD	11.06	1.73	0.57	12.12		
TIMP	M	0.33	1.33	1.0	29.33	7.99	14.22
	SD	0.57	0.57	1.73	11.01		
TIG	M	12.66	47.0	60.33	49.0	42.24	20.57
	SD	6.02	19.05	25.0	9.16		
TIS	M	11.66	89.66	118.33	77.66	74.32	45.12
	SD	1.52	1.15	18.9	28.53		
EG	M	32.66	29.0	53.0	97.33	52.99	31.38
	SD	5.13	0	33.86	19.6		

Smith, et al.,(1977) divided the CBAS into two main classes, reactive behaviours and spontaneous behaviours. A comparison of the frequency of use of spontaneous and reactive behaviours revealed that spontaneous behaviours (M=174.49, SD=71.48) were used much more frequently than reactive behaviours (M=88.67, SD= 45.88), and each coach shared this pattern. A one-way repeated

measures ANOVA indicated that this difference was significant, $F(1, 3) = 11.26$, $p < .05$.

Relationship between Arousal and Coaching Behaviour

The results presented in the previous section indicated that the majority of coaching behaviour fell into a limited number of CBAS categories. Table 4 presents the mean HR's for the seven high frequency behaviour categories for each of the coaches, across all games. One-way repeated measures ANOVA did not show a significant difference between the mean HRs for different behavioural categories, $F(6,18) = 1.23$, $p > .05$.

Table 3.4

Mean Heart Rates for Seven Frequently Used CBAS Categories

Category		Coach				M	SD
		A	B	C	D		
VR	M	114.87	90.58	137.39	80.71	105.88	25.43
	SD	11.98	5.08	24.66	12.36		
TIM	M	114.00	92.92	136.36	79.22	105.52	25.05
	SD	0	4.35	25.92	13.42		
VP	M	117.36	100.61	127.75	81.01	106.68	20.44
	SD	9.36	17.22	32.66	12.26		
TIMP	M	124.00	92.33	146.83	82.00	111.29	29.67
	SD	0	4.61	25.69	11.30		
TIG	M	116.35	91.42	134.36	80.79	105.73	24.21
	SD	8.62	5.51	26.23	11.65		
TIS	M	115.88	90.94	137.26	79.52	105.90	25.83
	SD	9.65	5.26	23.92	10.69		
EG	M	118.59	90.89	136.98	79.89	106.58	25.99
	SD	15.58	5.28	24.53	10.95		

Table 5 compares the mean heart rates of coaches across all spontaneous categories with those for all reactive categories of behaviour. As Table 5 indicates, there was little difference in the mean heart rates for the respective coaches, when behaviours were divided into the spontaneous and reactive categories. Although

different coaches showed widely varying means, the overall means for spontaneous and reactive behaviours for the sample were very similar. A one-way repeated measures ANOVA revealed that HRs for the spontaneous and reactive categories did not differ significantly, $F(1, 3) = .50$, $p > .05$.

Table 3.5

Mean Heart Rates for Spontaneous and Reactive Behaviour

COACH		Spontaneous	Reactive
Coach A	M	115.93	115.98
	SD	10.42	10.18
Coach B	M	91.00	92.61
	SD	5.25	5.40
Coach C	M	135.42	134.96
	SD	24.65	27.59
Coach D	M	80.06	80.13
	SD	11.01	12.31
Group	M	105.60	105.92
	SD	24.91	24.40

Discussion

The discussion section will discuss the following sections, conclusions and relationships to research, methodological issues arising from the research, implications for future research, and implications for practice.

Conclusions and Relationships to Research

The discussion will examine the results in the following sequence, state and trait

anxiety, levels of coach arousal, coach behaviour, and the relationship between coach

arousal and behaviour.

State and Trait Anxiety

Neither trait nor state anxiety differed in a systematic way, so their

relationship with behaviour was not examined. With reference to state anxiety, the

use of scales completed 15 minutes prior to the commencement of the game is

problematic, as it is possible that level of state anxiety changes as the events of the

game unfold.

Levels of Coach Arousal

Coaches' heart rates differed considerably between individuals, even though

they were coaching in similar competitive situations. The same finding was observed

in previous research that was concerned with establishing whether the stress of

coaches' involvement in competitive situations was likely to be detrimental to their

health (e.g., Gait et al., 1979; McCafferty et al., 1978). The data appears to show a

general pattern where the heart rate of the coaches decreased as the game unfolded.

The results indicate that heart rates for the coaches fluctuated, sometimes

considerably, from their heart rate at the start of the game. At some stage in every

game, the HR of the coach rose above their HR at the start of the game, but in each

game the mean heart rate later in the game fell below the starting heart rate. This

pattern might seem counter-intuitive. On reflection, early in matches, the pattern of

the game is often unclear, thus, perceived uncertainty of outcome and of performance

of the team would be relatively high. Perceived uncertainty is proposed to be one of

the main antecedents of state anxiety (Martens et al., 1990). Thus, arousal is likely to

be high early in games, when the performance of both teams is uncertain. Late in

matches, it is often quite clear who is likely to win. In such cases, perceived

uncertainty would be relatively low, so state anxiety and arousal would be expected

to be lower. Only in very close matches, where perceived uncertainty of outcome is

still high late in the game, so state anxiety and arousal would be high, will the game

state late in a match be likely to substantially increase heart rate. For example,

contrary to the general pattern, Coach C had a HR of 186 bpm in the last minute of a

Grand Final that was won on the last shot of the game. This proposition needs to be

tested by systematically comparing coaches' HR patterns for close games with those

of games where one team wins easily in a substantial sample of coaches.

Coach Behaviour

The coding of coach behaviour indicated variation in the number of

behaviours exhibited between coaches. Coach A showed a substantially lower total

of behaviours compared with the other coaches. This may have occurred because

Coaches B, C, and D were coaching junior girls teams, where a large number of

behaviours relate to the provision of general and technical instruction on basic skills.

Coach A was coaching adult women playing in the second highest standard of

competition available in Australia. Coaching at the sub-elite, senior level relies much

less on direction concerning basic skills, but involves greater focus upon the tactical

elements of the game, requiring fewer verbal comments to the players. Although the

CBAS involves 14 categories of behaviour, as modified by Gross, the actual coding

of the coaches' behaviour showed that behaviour predominantly fell into seven

categories. Coaches B, C, and D displayed their largest frequency of behaviour in the

specific technical instruction (TIS) category, whereas Coach A displayed more

encouragement (EG). This is consistent with the suggestion that Coach A needed to

communicate less instruction, because he was coaching relatively elite, senior

players.

The responses of the coaches in the present study differed from those found

by Smith, Smoll, and Curtis, (1979) for coaches of junior basketball players. In that

study, general encouragement and reinforcement were the behaviours most

displayed. This may be because the players in that study were younger than those in

the present study. The overall distribution of behaviour of the coaches in the present

study is similar to that found by Smith et al. (1983), who reported that punitive

responses occurred infrequently, compared to rates of reinforcement, encouragement,

and technical instruction. Coach A had a higher percentage of verbal punishment

(19%), than the other coaches. This was also high compared with the findings of

Gross (1990) with Australian National Basketball League coaches, where verbal

punishment accounted for only 8% of coaches' behaviour. The use of verbal

punishment by the other coaches in the present study was similar to that found by

Gross. Interestingly, the finding that specific technical instruction (TIS) was the

predominant category for the coaches of the junior teams in this study, that is,

Coaches B, C, and D, differs from the results reported by Gross (1990). He stated

that the youth sport basketball coaches in his research provided more encouragement

and reinforcement than elite NBL coaches, who generated greater technical

instruction. That specific technical instruction (TIS) was the most frequently used

category for Coaches B, C, and D. This could be related to a perception that, as

coaches of elite junior players, the coaching focus of Coaches B, C, and D should be

upon the technical and tactical development of the players. This discrepancy between results indicates the need for further research comparing the behaviours of coaches of elite and junior teams.

The CBAS consists of two broad classes of behaviour, spontaneous and reactive behaviours. Of the 14 sub-categories in the modified version (Gross, 1990), eight fall into the spontaneous class, and six fall into the reactive category. In the present study, all coaches displayed greater frequency of spontaneous behaviours (66%) than reactive behaviours (34%). In terms of the two classes of behaviour, spontaneous and reactive, Gross found that 75% of all behaviours were spontaneous. This is similar to the behavioural responses of the coaches in this study.

The raw data collection timesheets did not indicate a pattern of specific categories of behaviour being used at certain times in the games. There was no pronounced bias towards a greater frequency of behaviours occurring later in the game, nor a high frequency of certain categories of behaviour at the start or end of matches. It may be that the greater frequency of certain types of behaviour arises in relation to specific game events, as suggested by Gross (1990). As the present study was not concerned with the relationship of behaviour to game events, it is difficult to draw any conclusions on this question from the data reported here.

Relationship between Arousal and Behaviour

The present results failed to identify any patterns of arousal levels, as measured by heart rate, for various categories of coach behaviour, as measured by the CBAS. One possible reason for this outcome is that the coaches were very experienced in coping with the demands of competition. In particular, Coaches B, C, and D, had substantial experience of coaching at a much higher level than the present

junior competition. The emphasis of their endeavours may have been primarily on the development of the players in the present context, rather than there being a pre-eminent focus upon winning. Another explanation could be that the competitive situation did not extend the abilities of the coaches to the point of losing control. This is to some extent supported by the CSAI-2 scores of the coaches. With the exception of two games, the coaches did not experience pre-game somatic or cognitive anxiety at higher levels than the norms for college athletes, but were very confident of their ability to handle the demands of the competitive situation. This might indicate that, although the intensity of arousal, as measured by heart rate, can be high, for example Coach C in the grand final, the direction of the intensity might be positive rather than negative, as proposed for athletes by Jones and colleagues (Jones, 1995; Jones & Swain, 1992, 1995). As indicated earlier in the section, only seven categories of coach behaviour gave sufficient responses to be meaningful. The only category that showed a trend of higher HRs was TIMP (technical information with punishment) with a mean of 111 bpm compared with the other categories that had a mean of 105/106 bpm. It is not clear whether punitive behaviour arose in response to the elevated HR, or whether HR increased when the coach perceived the need to be critical of players' actions. The increase in mean HR for TIMP did not generalise to other reactive behaviours. Further research should examine the difference between TIMP and the other reactive behaviours more closely. In the present study, I found that global game statistics, that is, comparing quarters, did not reval substantial differences in arousal level or coach behaviour. As suggested by Gross (1990), it is recommended that research examining the possible relationship between arousal level and TIMP should focus on arousing events in the game. Level of arousal,

reflected by HR, did not vary significantly between the broad classes of spontaneous and reactive behaviours.

Methodological Issues

The present study was exploratory and there are a number of methodological concerns that suggest that the results should be viewed with caution. First, the sample consisted of a small number of coaches, who were not randomly selected, nor were they all coaching in directly comparable competitions, for example, one coached a senior women's team. A small number of games were video-taped, making it difficult to generalise about the results, as it is possible that the games examined for each coach were not representative of their typical arousal levels or behaviour. Nevertheless, samples of these games would be expected to be more typical than the single game samples for each coach in most previous studies. It may have been that the video-taping of certain coaches only focussed upon either the difficult or the easy games for the season, not allowing a comparison of the particular coach's behaviour or arousal in hard and easy games.

In future studies, a more sophisticated method of collecting heart rate could be used. In this study the HR's were paired with the particular coaching behaviours after data collection was completed. Future research could use a system where the HR is superimposed on the video-tape at the time of recording. The coding of the coaching behaviour at a later date using the CBAS to categorise behaviour recorded on video-tape was satisfactory. Coding from the video-tape also permits checks to be made for the reliability of assignment of behavours, which is not possible when coding in real time during games. It would be difficult to undertake coding during

games as the coaches often displayed several different behaviours in quick succession. As a whole, the categories of the CBAS allowed clearcut coding of coaching behaviour. Perhaps one exception was the lack of distinction between genuine encouragement and encouragement that had a sarcastic ring to it. In this study, the latter was coded as encouragement, based on the verbal content, but may have been perceived otherwise by the players, depending on the coach's intonation. Conversely, classification of verbal behaviour on the basis of tone of voice would rely on a subtlety on behalf of the coder that might not have been perceived by the player to whom the comment was directed. This might be checked, by asking coaches to comment upon selected coaching excerpts, if it was believed that incongruency might exist.

Implications for Future Research

The present study has identified a number of issues that could usefully be researched. One question for further research is whether there are differences in arousal levels and behaviour, and the relationship between them, for the same coaches at their highest coaching level and at lower levels. Another issue is whether there are general differences in arousal level and behaviour of coaches at different levels of competition. For example, it might be that arousal levels of coaches of elite teams are higher than those of sub-elite teams, because more is riding on the outcome. A third issue is whether there are differences in the arousal level and behaviour of coaches, and the relationship between them, depending on the extent of experience of the coach. Another focus of future research might be to examine patterns of HR and behaviour as the game progresses, in games that are close,

compared with games where the result is clear-cut. It would also be useful to compare both of those game scenarios with the interaction of the level of coaching and the level of competition. It is possible that coaches whose focus is more competitive and who are coaching at a higher level may be more focused on winning. Future research might be more fruitful if extent of experience of the coaches is varied. Care is needed to avoid confounding extent of experience, levels of experience, and coaching level at which the coach is studied.

An important issue for future research to examine is game context in relation to arousal and coaching behaviour and particularly their relationship. The present research suggests that in more intense matches, or sections of matches, the relationship between arousal level and behaviour of coaches is heightened. There were not enough close and important matches to examine this, however. Nor were game events closely or systematically recorded, so possible patterns related to this variable are somewhat intuitive. It should be possible to consider, not only winning and losing, but also specific patterns of play. For example, it might be expected that coach arousal and behaviour would vary between situations where the opposition had produced most of the scores in the previous phase, for example, 5 minutes, those where the observed coach's team had dominated scoring for the period preceding the measures, and segments of play where scoring had more or less alternated. Equally, future study could examine the relationship between arousal, behaviour, and the score differential at varying times during a game. In fact, it is possible that coach arousal and behaviour are affected by patterns of scoring in phases, as they relate to overall game status and time in the game. For example, being outscored by 10 points during a five minute phase in mid-game is likely to have a different impact, if the

team was 15 points ahead at the start of that phase to that if it was only five points ahead. A score turn around like this would also be more detrimental, if it occurred only a few minutes from the end of the game.

Implications for Practice

For coaches to enhance their effectiveness in the competition context, it may be useful for them, and sport psychologists who advise them, to know under what conditions, both personal and contextual, their arousal and behaviour tend to fluctuate. Then the coaches or their advisors would be able to take steps to control both arousal and behaviour, assuming that, if the coach is in control, then they are likely to make more informed decisions regarding the game and have a more positive influence on the team.

This study has raised several issues that are important for coaches to address. Although it was found that the coaches in the present sample had substantial experience of coaching at higher levels of basketball, noteworthy increases in arousal level (HR) were observed during games in which the coaches undertook little physical activity. If only to reduce general health concerns, coaches should consider adopting behaviours that buffer the effects of repeated stress, like that induced by years of coaching. Useful buffers include practising a relaxation technique or participating in regular exercise, which reduces the body's reaction to stress. The absence of any relationship between the state anxiety and HR data in this study suggests that coaches typically are not aware of how aroused they do become during games. It is, thus, suggested that coaches should not assume that, because they do not

consciously experience high levels of arousal during matches, they can ignore the need to employ buffers.

The present study demonstrated that the coaches used predominantly spontaneous behaviours, such as instruction, reinforcement, and encouragement, that are considered to have a more positive effect on players than some reactive behaviours like punishment. This supports previous research, at least in the context of coaching at the junior level, that the focus of coaching at this level should be on developing the playing ability of the individual player. Continued positive experiences would most likely encourage players to remain involved in the sport.

Although the results of this exploratory study must be viewed with some caution, because of the small sample of coaches, the study showed a trend for arousal levels of the coaches studied to be highest early in games and to decline as games progressed. The coaches predominantly employed spontaneous behaviours, especially encouragement, reinforcement, and technical instruction. The study also revealed a trend for level of arousal of the coaches examined here to be higher in the periods when they produced their most frequent category of reactive behaviour, TIMP, than when other common behaviours were produced. The implication of this finding is that coaches should be trained to be sensitive to the potential for TIMP to increase when they are aroused and to know how to respond (a) to reduce arousal or (b) to encourage or reinforce players, rather than punish them. The present study examined arousal and behaviour across whole games. It might be that patterns in arousal levels, behaviour and their relationship emerge more strongly when circumstances in the game are demanding. It is, thus, important for future research to

examine the influence of game events and patterns on coach behaviour, levels of arousal, and their relationship. As elite sport becomes increasingly high profile and demanding, coaches are expected to perform consistently at the same levels of excellence as top players. Further research, on issues that affect coaches' performance during competition, such as arousal, would be extremely beneficial.

CHAPTER 4: THE RELATIONSHIP BETWEEN COACHES' LEVEL OF AROUSAL AND COACHING BEHAVIOUR IN STRESSFUL AND NON-STRESSFUL GAME SITUATIONS

Introduction

The results of Study 1 did not indicate differences in arousal or behaviour between phases of the game, possibly because the level of analysis was too coarse. Study 2 was designed to be more precise in the manner in which game situations were defined and measured. In Study 1, the period of measurement used was quarters of the game. In this study, the focus was on specific events in the game that might be deemed as stressful to the coach. This allowed observation of sudden reversals of fortune that influence the course of the game and would be expected to affect the level of arousal and behaviour of the coach. Examples of such events are poor decisions by the referee, mistakes by players leading to the opposition scoring, lost scoring opportunities, disputes between the coach and officials, and in-fighting between team-mates.

In order to focus on game events, the video camera recorded the game events, rather than being focused on the coach as in Study 1. The results from Study 1 indicated that non-verbal behaviour was recorded only a limited number of times. Thus, video-taping the game with the verbal comments of the coach recorded on the video-tape allowed the capture of all the relevant comments of the coach for later analysis. As the video-camera was located opposite the coach during the game, as in Study 1, the verbal behaviour of the coaches was recorded by a small microphone attached to the coaches' clothes.

Anxiety did not prove to be a sensitive measure in Study 1, as it was only possible to measure it 15 minutes prior to the actual game. In Study 2, the level of the coaches' arousal during the entire game was measured using heart rate monitoring, as this measure proved to be effective in Study 1. The coaches' behaviour was also classified using the CBAS, as that instrument was found to be useful for identifying and measuring coaches' behaviours, at specific points during the game, in Study 1. The two measures were then compared to establish whether the relationship between behaviour and arousal was heightened in those periods of the match in which events stressful to the coach occurred.

Coaches in Study 1 had all coached at substantially higher levels of competition than the level at which they were coaching when they participated in the study. Thus, they may not have been challenged by the demands of the games they coached in the study, so arousal levels were generally not high. In this study, a larger number of coaches, who were coaching at or near the highest level that they had coached, were observed to increase the power of the study, making the identification of real effects of the context on coaches' level of arousal and behaviour more likely.

The main aims of Study 2 were to: (a) to compare arousal levels of coaches in stressful game situations and non-stressful game situations, (b) to compare coach behaviours in stressful and non-stressful game situations, (c) to examine the relationship between coach arousal levels and behaviour.

Method

Participants

The participants were 13 male and 4 female basketball coaches aged 21 to 56 (M=36.61 years, SD = 10.17 years). Their experience ranged from 2 years to 20

years ($\underline{M}$=6.27 years, $\underline{SD}$=4.83 years). They coached in the Melbourne Metropolitan

Junior Basketball League, which is the League where juniors represent their local

associations. The participants coached teams representing the Southern Basketball

Association in different age group competitions, conducted either on Friday nights or

Saturday mornings. They were accessed with the assistance of the Southern

Basketball Association. Basketball was selected, because rules in basketball

competitions restrict the physical movement of coaches, a factor that can confound

HR data.

Design

This study examined the relationship between coaches' behaviour and their

arousal levels, particularly the differences during periods of high stress compared

with periods of low stress. I recorded the heart rates of the coaches at five second

intervals for the duration of the match studied. At the same time, I video-taped the

game, with a recording of the coach's voice being overlaid on the video-tape. In the

principal analyses, I examined patterns of arousal, use of categories of coaching

behaviour and arousal levels for categories of coaching behaviour, during periods of

the match categorised as either high stress or low stress. The data analysis from

Study 1 showed that breaking the match into distinct time segments was not sensitive

to stressful events. In this study, stressful events were re-classified to be segments

where the coach's team went from winning to losing or vice-versa over a short

period or where there was a substantial change in the game score. It was predicted

that arousal and behaviour would differ for high and low stress game contexts.

Specifically, I expected to find that when a coach's team moved from winning to

losing, the coach's arousal level would increase and that the nature of their behaviour

towards the players, as measured by the CBAS, would also change. There would possibly be a greater frequency of behaviour with an increased number of negative behaviours.

Measures

In this research, I utilised one behaviour analysis instrument, the Coaching Behaviour Assessment System (CBAS), and one psychophysiological indicator, heart rate (HR). Coaches' verbal behaviour for the whole of each game was recorded on a video cassette of the game and analysed later using the CBAS. I selected verbal behaviour, because this is what the players primarily respond to during active passages of play. Gross (1990) stated that players are largely unaware of how the coach is acting, because they are focussing on what is transpiring on the court. They can, however hear what the coach is saying. A further problem, when coding non-verbal behaviour, is that the coder has to make an inference as to what is the significance of the behaviour. In Study 1, non-verbal behaviour of coaches accounted for a very small part of the total behaviours.

Heart rate. I collected heart rate (HR) recordings of the coaches using a Polar 4000E heart rate monitor. The monitor uses telemetry to transmit impulses from electrodes attached to a belt, worn around the chest, to a receiver on the person's wrist. Heart rate values are saved in the memory of the receiver, and averaged for a specified interval. In this study, I recorded average HR values for every 5-second interval, starting five minutes before the game commenced and ending five minutes after the game finished. I subsequently down-loaded the data stored in the receiver to a computer via a customised interface device.

Video-recording. I video-taped the match using a Panasonic 3 CCD portable

digital video camera, located directly opposite the coach on the other side of the

basketball court. A remote microphone worn by the coach fed back the coach's

verbal behaviour for recording on the video-tape. Video-recording of the match

allowed stressful periods during the match to be easily identified and audio recording

ensured that the coach's verbal behaviour was monitored in synchrony with non-

verbal behaviour.

Coaching Behaviour Assessment System (CBAS; Smith & Smoll, 1977). The

CBAS is a 12-category behavioural assessment system, encompassing two major

classes of behaviour, reactive and spontaneous. Reactive behaviours are elicited in

response to identifiable stimuli. Spontaneous behaviours are elicited without

reference to clear-cut antecedents. The CBAS was developed to permit the direct

observation and coding of coaches' behaviour, whilst they are engaged in coaching,

but it can also be used to code behaviour recorded using video-tape. In this study, I

employed a modified CBAS (Gross, 1990) with 14 behavioural categories developed

specifically to classify the behaviour of basketball coaches. Smith et al. (1979)

reported the inter-rater reliability of the original CBAS to be 98%, for the coding of

video-tape sequences, with inter-rater reliability being 88% in field settings. Gross

required his research assistant to achieve a 90% success rate on 15 simulated coach

responses, prior to moving to a 40 item audio-tape where a 90% success rate had to

be achieved before moving to viewing video-tape. The CBAS has been widely used

to study coaching behaviour.

Procedure

The participants were all volunteers accessed through the Southern Basketball Association. I informed the participants about the general nature of the research and they signed consent forms indicating their awareness of the demands of the study, confidentiality, and freedom to withdraw at any time. I encouraged the participants to ask questions at any time and I addressed all concerns that were expressed at this point. I explained to each participant prior to the game what equipment I would be using and how it operated. I fitted each participant with a Polar HR monitor, set to record every five seconds from five minutes prior to the game until five minutes post game. I also fitted each participant with a remote microphone, to record their verbal behaviour. The game was video-taped using a digital video camera, filming from the opposite side of the basketball court to where the coach was coaching. After the game, I asked the coach several questions related to their basketball coaching experience, de-briefed them and thanked them for participating.

Preliminary Organisation of Data for Analysis

I downloaded heart rates directly into an IBM computer. I analysed the video-tape of each game using the CBAS to code each coach's behaviour for the entire game. I added heart rates at the time of each specific behaviour to the coding sheet, along with the score at the time of the verbal behaviour occurring. I monitored frequency of use of each type of behaviour.

Results

This section presents analyses of the data in the following order. First, the mean arousal levels of coaches and the relationship of that arousal to the coach's team being ahead or being behind are presented. Then, the frequency of various

categories of behaviour for individual coaches is reported, followed by the relationship of that behaviour to whether the coach's team was winning and losing. Patterns of spontaneous and reactive behaviour are also reported. The final section presents arousal levels in relation to the different categories of behaviour and the broad grouping of spontaneous and reactive behaviours.

To understand whether the coaches' experience of stress affected their behaviour, a definition of the score gap that would be likely to lead to differences in the coaches' behaviour was operationalised as follows. Discussion with coaches familiar with junior basketball indicated that once the gap in scores between teams exceeded five points, the coach was less likely to experience the game state as stressful. Where the score gap was less than five points, it was proposed that the game was still in a fluctuating state that might be experienced as stressful.

Arousal Levels of Coaches During Matches

Table 4.1 presents the mean HRs of 17 coaches across the whole game in which they were observed. The average HRs for the 17 coaches varied from a high of 125 bpm for Coach P to a low of 83.51 for Coach G (M=104.09, SD=12.09). As in Study 1, the HR values represented widely varying percentages of the maximums estimated by the age adjusted method.

Table 4.1

Mean Heart Rates of Coaches

Coach	HR	
	M	SD
A	124.98	13.51
B	94.94	5.63
C	92.57	7.10
D	102.05	10.79
E	89.27	9.21
F	109.63	9.35
G	83.51	7.00
H	108.91	10.87
I	107.98	9.01
J	103.94	4.35
K	114.03	5.78
L	93.02	5.05
M	98.22	5.08
N	106.45	7.42
O	118.76	6.00
P	125.00	8.93
Q	96.42	8.10
Mean	104.09	
SD	12.09	

Ten coaches were involved in games where the score fluctuated, at some point, from winning to losing or scores being even. Mean HR's for these coaches are presented in Table 4.2. In these games, three coaches' HRs were similar when their team was winning or losing, five coaches had HRs that were higher when their team was winning than when losing, and two coaches had higher HRs when their team was losing than when their team was winning. The HR data was analysed to establish whether there was a difference in mean HR when the coaches' teams were either winning or not winning.

A paired t-test , t (9) = −1.208, p> .05, confirmed that there was no significant difference between coach HRs when their team was winning and losing during the same game. In Study 1, the pattern of coach HR during games was for the HR to be higher at the beginning of the game and then decrease as the likely result of the game became clearer. In Study 2, the pattern of coach HR during games varied. Two coaches had increases in HR toward the end of the game despite the final result already being clear, as did four coaches, where the result was close. Three coaches had decreases in HR when their teams won easily, two coaches had decreases where their teams lost easily, whereas one coach had a HR decrease toward the end of a close match. One coach's HR showed minimal fluctuation during a game that was won easily, whereas another coach's HR was stable during an easy loss.

Table 4.2

Mean Heart Rates for Coaches when Winning and Not Winning

COACH	WINNING		NOT WINNING	
	M	SD	M	SD
A	134.10	8.78	118.39	11.34
C	93.30	7.77	95.87	5.51
H	118.66	8.51	110.12	10.34
I	105.23	7.90	105.83	7.13
K	111.62	5.49	116.78	5.44
M	103.22	7.54	99.73	5.77
N	109.35	8.66	103.74	4.87
0	117.09	4.57	118.61	4.01
P	129.84	11.76	125.42	7.52
Q	95.65	6.73	99.06	9.42
Mean	111.86		109.35	
SD	13.43		10.03	

Coach Behaviour

There was a large variation in the number of behaviours exhibited by the 17 coaches that were representative of the various categories of the CBAS (Table 4.3). The least frequently used behaviour was KC (M=0.17, SD=0.52), followed by TIMP (M = 0.47, SD = 1.23). The table does not include the frequency of these categories

as each had less than 10 behaviours in total and a mean of less than .5. Because the video-camera was focused on match play for the duration of active play, no non-verbal categories of coach behaviour were measured, so these categories of the CBAS do not appear. The non-verbal CBAS categories included few entries in Study 1.

For the whole game, the highest number of behaviours was 265 by Coach M, the lowest 56 by Coach K, ($\underline{M}$=154.35, $\underline{SD}$=58.92), with a cluster of seven coaches displaying between 114 and 126 behaviours. The majority of behaviours (86.07%) were assigned to four categories of the CBAS, specific technical instruction (TIS; 29.87%), verbal reinforcement (VR; 20.16%), general technical instruction (TIG; 19.51%), and encouragement (EG; 16.53%). The distribution of the specific categories varied across coaches. For example, Coach A exhibited 139 TIG behaviours of a total of 253 (54.94%), Coach J exhibited 105 VR behaviours of a total of 227 (46.25%), Coach G exhibited 108 TIS behaviours of a total of 195 (55.38%). For the whole sample, the most frequently used category was TIS, with 784 behaviours ($\underline{M}$=46.11, $\underline{SD}$=37.73), followed by VR, which had 529 behaviours ($\underline{M}$=31.11, $\underline{SD}$=23.87), and TIG with 512 behaviours ($\underline{M}$=30.11, $\underline{SD}$=13.95).

Table 4.3

Frequency of Most Used CBAS Categories

COACH	VR	EM	TIM	VP	OFF	TIG	TIS	EG	O	TOTAL
A	6	0	6	0	5	61	139	27	8	253
B	43	10	0	0	0	31	15	10	8	117
C	8	5	2	2	9	21	39	28	10	124
D	21	4	0	0	4	43	21	11	9	114
E	52	3	6	2	6	28	74	13	3	187
F	14	5	8	4	0	19	32	31	8	122
G	24	0	11	5	1	28	108	2	11	195
H	23	8	4	3	0	12	25	15	3	90
I	34	2	7	0	0	18	24	16	17	118
J	105	22	7	0	1	25	25	42	10	227
K	3	0	2	2	0	11	25	8	5	56
L	41	5	2	0	0	40	64	50	7	210
M	36	0	8	1	2	45	103	63	6	265
N	18	3	8	4	2	49	17	20	3	126
O	47	14	5	1	0	18	27	28	12	152
P	31	5	0	0	3	25	19	28	4	115
Q	23	7	5	0	5	38	27	42	6	153
TOTAL	529	93	81	24	38	512	784	434	130	2624
MEAN	31.11	5.47	4.76	1.41	2.23	30.11	46.11	25.52	7.64	154.35
SD	23.87	5.71	3.30	1.69	2.70	13.95	37.73	16.39	3.72	58.92

Spontaneous and Reactive Coach Behaviour

The CBAS categories can be divided into two classes of behaviour,

spontaneous and reactive. Of the total of 2,636 behaviours, 1,860 were spontaneous

(70.56%), and 776 were reactive (29.43%), as displayed in Table 4.4.

Table 4.4

Frequencies of Spontaneous and Reactive Coach Behaviour

SPONTANEOUS CBAS CATEGORY		%	REACTIVE CBAS CATEGORY		%
TIS	784	42.15	VR	529	68.17
TIG	512	27.52	EM	93	11.98
EG	434	23.33	TIM	81	10.43
O	130	6.98	VP	24	3.09
			TIMP	8	1.03
			OFF	38	4.89
			KC	3	0.38
TOTAL	1860	100.00	TOTAL	776	100.00

In seven games, where the score-line varied between −5 and +5, that is, where the gap between the teams was either less than five points or greater than five points, 1,080 CBAS behaviours were recorded. The results of this analysis are presented in Table 4.5. Of the 1,050 behaviours, 867 were spontaneous (80.27 %) and 213 were reactive (19.27%). ANOVAs were performed on game state, behaviour categories, and on the interaction between the frequency of spontaneous and reactive behaviours and the two categories of game state.

A significant difference was found for frequency for CBAS categories, $F(1,27) = 8.185$, $p < .01$, for the stressful and non-stressful game states. The results indicate that the frequency of behaviours, for all bar one coach, was higher when the score difference was less than five points, when compared to the score difference being greater that five points. A significant difference was found for total behaviours that were either spontaneous or reactive, $F(1,27) = 15.568$, $p = .001$. No significant difference was found for the interaction between the frequency of spontaneous or reactive behaviour and game state, $F(1,27) = 3.071$; $p < .05$.

Table 4.5

Frequency of Spontaneous and Reactive Coach Behaviour when the Score Margin is

Either Less than Five Points or Greater than Five Points

COACH	LESS THAN FIVE POINTS				GREATER THAN FIVE POINTS			
	SPONTANEOUS		REACTIVE		SPONTANEOUS		REACTIVE	
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%
A	114	96.61	4	3.38.	92	97.87	2	2.12
L	135	78.48	37	21.51	27	75	9	25
M	172	81.13	40	18.86	30	78.94	8	21.05
N	17	100	0	0	28	84.84	5	15.15
O	91	70	39	30	16	50	16	50
P	39	76.47	12	23.52	27	75	9	25
Q	59	77.63	17	22.36	20	74.07	7	25.92

A further analysis was undertaken comparing the mean HR's of coaches in relation to CBAS categories when the coaches' teams were either winning or not winning. The results of this analysis are presented in Table 4.6. The table indicates that the analysis was not relevant for all coaches, because in some games, the coach's team was either winning for the whole game or losing for the whole game. The results do not indicate a distinct pattern of behaviour for all coaches, but rather individual variability as to mean HR's for the CBAS categories when either the winning or not winning game state.

Independent Raters

The analysis undertaken into coaches' HR and behaviour failed to indicate any distinct patterns. This may have been because none existed. It is also possible that the strategy for determining stressful situations, based on score changes during a specific time period failed to identify HR or behaviour patterns, because it was not really measuring stress. To test this, I decided that an alternative method for identifying stressful game situations was needed. In order to investigate whether any observable pattern might exist, two independent raters with experience of coaching junior basketball teams were asked to view all video-tapes of games from Study 2. They were instructed to identify those events in each game that might be considered stressful to the coach, e.g., a turnover that results in the opposition scoring or a poor refereeing decision, and to note the time it occurred on the game tape, so that later comparison could be made between the observations of the raters. The frequencies with which each rater identified stressful events in each game are shown in Table 4.7. The raters varied greatly in both the total frequency of events they considered to be stressful to the coaches overall and in the frequency of events considered stressful

Table 4.6

Coaches' Mean Heart Rates for CBAS Categories when Winning or Not winning.

COACH	WINNING									NOT WINNING								
	VR	TIM	EM	VP	OFF	TIS	TIG	EG	O	VR	TIM	EM	VP	OFF	TIS	TIG	EG	O
A	130	146	0	0	0	132.62	131.25	124.47	0	116.5	125	0	0	145	121.28	140	123	
B	95.55	0	99.6	0	0	92.67	94.11	93	97.75	99.75	0	0	0	0	101.3	0	0	0
C	94.57	100	0	90.66	89.11	93.25	93.25	94.13	94.5	97	0	85.25	0	0	0	0	0	0
D	0	0	0	0	0	0		0	0	109.1	119	107.9	99.67	0	102.7	105.7	109.1	102.1
F	0	0	0	0	0	0	0	0	0	121.1	111.8	113.2	107.8	0	113.7	116.8	116.3	0
G	0	0	0	0	0	0	0	0	0	82.75	85.08	0	78.8	0	85.15	85.61	84.33	80.55
H	0	0	0	0	0	0	0	0	0	114.2	119	107.9	99.67	0	114.4	106.4	114.6	120.3
I	0	0	0	90.66	89.11	0	0	0	0	105.62	110.8	85.25	0	0	105.5	104.53	109.88	103.35
J	104.9	103.2	103.5	0	0	103.7	103	0	103.2	106.2	0	0	0	0	106.7	103	0	0
K	0	0	0	113	0	112.1	110.2	115.7	104.5	113.3	112	0	111	0	116.4	119.8	0	118
L	92.39	0	91.5	0	0	0	92.64	93.04	92.75	93.22	0	0	0	0	93.9	92.25	94.07	0
M	101.8	101.7	0	0	0	104	104.6	103	102	104.4	91	0	0	0	98.77	98.29	107.6	0
N	117.3	107.5	0	0	0	110.7	101.8	109.9	108.5	100.3	101	100.4	97.67	0	106.8	104.4	105.3	101.8
O	116.8	117.3	117.4	0	92.75	118.8	118.8	115.2	118.2	118	0	119.5	0	0	117	120	121	0
P	127.8	0	0	0	0	130.3	129.9	125	130	127.3	0	124.8	0	123.3	126.1	128.6	128.5	0
Q	95.08	90	93	0	92.75	89.2	95.74	93.24	93	96.9	94.5	93	0	0	98.18	100.7	98.48	0

to the each coach within a specific game. Equally, there was little agreement between the raters as to what was a stressful event within a game, with Rater 2 observing nearly three times as many stressful events in each game as Rater 1. Nonetheless, a Pearson Product-Moment Coefficient indicated that there was a positive linear relationship between the ratings of stressful events by the two raters, ($r = .6576$; $p = 0.025$).

Discussion

The focus of the study was to identify the effect of stressful events on the arousal and behaviour of junior basketball coaches. In particular, the aim was to determine whether there was a relationship between arousal and behaviour that depended on the level of stress of the game. In the discussion, I first consider coach arousal, then coach behaviour, and then the relationship between coach arousal and behaviour. I then discuss the findings of the independent rater analysis. Then I examine the methods used, implications for further research, and considerations for practice.

The majority of coaches in the study were coaching at the highest level that they had coached, in comparison to the coaches in Study 1, who were, by and large, experienced coaches and who were not coaching at the highest level they had coached, at the time they participated in Study 1. The decision to select coaches who were coaching at the highest level that they had coached was that the coaches in Study 2 were expected to experience stress during games that were close. One reason for this is that they did not have previous experience at a higher level to draw upon to assist them during periods where the game was close. Clearly, an exception to this might be a coach who had had extensive experience at the same level. This was not

the case for the majority of coaches in this study. Another reason why these coaches were expected to show higher levels of arousal than those in Study 1 could be that their focus may be only on the game result, whereas coaches, who had been successful at higher levels

Table 4.7

Frequency of Stressful Events by Independent Raters

Coach	Rater 1	Rater 2
A	6	10
B	3	17
C	3	13
D	4	10
E	5	10
F	5	18
G	5	4
H	6	20
I	4	15
J	6	12
K	4	8
L	4	3
M	8	34
N	4	8
O	3	9
Total	70	191

Coach Arousal

There was great variability between coaches both in average HRs and also with regard to average HRs for winning and losing. Some coaches had higher average HRs when their team was losing, whereas others had higher average HRs when their team was winning. Others showed little disparity in HRs when their team was either winning or losing. In games that were predominantly one-sided, with the coaches' team either mostly winning or losing, the losing HRs included those parts of the game when the scores were level. A clear cut pattern did not emerge, perhaps indicating that arousal levels for individual coaches may not be related specifically to game status, but to other events that occur during games. The lack of HR pattern makes it difficult to generalise about the apparent stress of coaches, using arousal as an indicator of negative stress. The HR patterns may depend on a range of trait and state factors acting singly and in complex interactions, but leading to a situation where each coach enters a game with a very different HR and is affected differently by game events.

Coach Behaviour

The coaches in this study displayed great variation in the number of behaviours exhibited. For example, Coach K displayed 56 behaviours in total, compared with Coach M, who displayed 265 behaviours in total. Nonetheless, the majority of behaviours (86.07%) consistently came from only four CBAS categories, VR, TIS, TIG, and EG. In this study, non-verbal behaviours were not recorded as the camera was focussed on the play, rather than the coach. This approach was adopted, because in Study 1, it was found that non-verbal behaviours were minimal. There was also variation in which of the four frequently employed behavioural categories

different coaches demonstrated most. Coaches A, G, J, and M had a predominance of behaviours in one CBAS category. Coaches A, G, and M displayed large instances of encouragement (EG), whereas Coach J displayed a large number of verbal reinforcement (VR) behaviours. Other coaches had a more even spread of behaviours across the four predominant categories of behaviour. In Study 1, the coaches' behaviour fell predominantly into seven categories, with three of the coaches displaying behaviour, categorised as TIS most frequently. These coaches were coaching teams of similar age to the teams of the Study 2 participants. The remaining coach in Study 1 coached a senior team and displayed predominantly behaviour from the EG category. Despite these similarities there were differences in the means for a number of the behaviours exhibited by the coaches. The coaches in Study 2 had lower mean scores for the following CBAS categories than the coaches in Study 1, TIM 4.76 c/f 18.16, EG 25.52 c/f 52.99, TIS 46.11 c/f 74.32, and VP 1.41 c/f 15.49.

The results indicate, that during competition, the coaches displayed broadly consistent use of four main types of behaviour. At the same time, there were individual differences in the relative use of these behaviours. The distribution pattern of behaviour of coaches was similar to that found by Smith et al. (1983), who reported few punitive responses and high verbal reinforcement, as well as high specific and general technical instruction. The coaches in this study were coaching players from similar backgrounds to those in the Smith et al. (1983) study. The distribution of behaviour by coaches varied to some extent from that suggested by Gross (1990). He proposed that coaches of young basketballers would be expected to display large amounts of encouragement and verbal reinforcement. This was true for some coaches in the present study, but not for all. Coaches displayed a greater

amount of technical instruction, both specific and general, than encouragement or verbal reinforcement, although they still gave encouragement and positive reinforcement regularly. The results of the present study make sense, because, even during matches, the main aim, with younger players, is likely to be to help them learn. With mature players coaches are more likely to expect their players to know what to do, so encouragement and reinforcement would be expected to dominate or be more prominent. At the same time, coaches always need to encourage and reinforce, so a substantial amount of these behaviours could still be expected with younger players.

In Study 1, the proportion of spontaneous and reactive behaviours, was, spontaneous (66%) and reactive (34%). Perhaps the difference might be that the players in Study 2, were by and large, less talented compared to the junior players in Study 1 and may have required more feedback related to what was transpiring in the game. The distribution of reactive and spontaneous behaviour was similar to that found in Gross' (1990) study of Australian National Basketball League coaches. In that study of senior coaches, 75% of behaviours were spontaneous and 25% were reactive.

Relationship between Arousal and Behaviour

The focus of this study was to establish whether stressful events affected the behaviour of the coaches. There was little difference in the distribution of spontaneous behaviour and reactive behaviour when coaches' teams were winning or losing. One would expect that, if the coaches were influenced by whether the team was winning or not, at any particular time, that is, they became more aroused, then their pattern of behaviour would change. Previous research would suggest that

frequency of reactive behaviour would be higher when the coach's team was losing (Gross, 1990). Equally, if the coach was affected by some other events deemed stressful, such as mistakes by players, then reactive behaviour could be expected to occur at a higher frequency. That this did not occur would indicate, either that the coaches were not affected by such events or that the operationalisation of stressful events employed in this study is not accurate or sensitive enough to allow differentiation of coach behaviour.

Independent Raters

The two independent raters were clearly briefed and asked to view each game video-tape and identify those game events that they would consider to be stressful to the coaches. This approach was adopted, because the operationalisation of stress in terms of winning and losing did not show any differential patterns of arousal and behaviour. The analysis presented in Table 4.7 indicated that there was great variation in the number of events that the raters considered to be stressful, with Rater 2 identifying as stressful two and a half times the number of events classified as such by Rater 1. This difference may be attributed to how each of the raters would typically view events that they have experienced as being stressful or non-stressful, when they played or coached competitive basketball. The reasons for lack of agreement between the raters can also be applied to the lack of pattern existing between the coaches in relation to arousal and coaching behaviour. It may be that the only manner in which each coach's experience of stressful events can be understood is if the individual coach specifies their objectives for obtaining success in a particular game. It would also be of value to understand what caused the coaches to become stressed during a game, and how, this was exhibited by them during a game.

Methodological Issues

Using only one video-camera means that a decision has to be made as to whether to focus on the coach in Study 1, or the game in Study 2, with the coach's comments being recorded on the video-tape via remote microphone. To make a more sophisticated analysis of the relationship between the events of the game and the coach's behaviour, two cameras could be used that are feeding vision to a centralized mixer. The game events could then be viewed with the images of the coach appearing in a corner of the screen.

The sample in this study consisted of a greater number of coaches being studied for one game each. Future studies might use a sample as large, but with each coach being filmed for a larger number of games to ascertain whether coaches show individual patterns of behaviour that are consistent across matches, including when there are variations in outcome from easy victories, through close contests, to big defeats. It would also aid analysis, if the coaches being studied competed in the same competition.

Future Research

An issue that has not been addressed adequately by research is the thoughts and feelings of coaches during competition. This would be particularly difficult to examine during games, but could be explored using retrospective techniques involving interviews with the coaches in which they were asked to identify, and explain their perception of stressful events. In cases where the kind of event needs to be controlled by the researchers, they can cue the coach by describing an actual game event and then they can encourage discussion of the coaches' thoughts and feelings. Another approach would be to use video-tape replay of the coach in action to

stimulate interview discussion of game events. Asking coaches about their perceptions of aspects of the game, should help to clarify why they became aroused in some situations but not in others. Coaches' behaviours in various contexts could be examined by asking them why they performed particular actions.

A more sensitive definition of what qualifies as a stressful event might be achieved by asking individual coaches involved in a later study what they believed constituted stressful events for them during games. Then the focus of the research could be to measure whether this is the case.

Implications for Practice

The results of this study indicated that it was difficult to establish a relationship between coaches' arousal as measured by HR, their behaviour, and stressful events as defined by the game score. If scores moving in a negative direction are not experienced by the coach as stressful, then it would be of great value to coaches to understand what events, if any, lead them to become aroused during the course of the game. Having established these events as likely to cause arousal would enable the coach to establish a formal routine for recognising the onset of arousal and utilizing techniques for minimizing the effects it might have on their ability to coach at an optimal level.

CHAPTER 5: COACHES' RETROSPECTIVE REPORTS OF THEIR THOUGHTS AND FEELINGS DURING STRESSFUL SITUATIONS IN COMPETITION

Introduction

Study 2 examined the relationship between arousal and behaviour during periods of play that coaches experienced as stressful. This was operationalised to mean situations where a change of events occurred, for example, a turnover of the ball in the defensive end of the court that led to the opposition scoring. The majority of coaches, who participated in Study 2, were coaching at the highest level that they had coached. This was a criterion for participation, included to ensure that the coaches' resources would be challenged, as they dealt with the varying demands experienced in games. The results, however, failed to reveal a pattern across coaches between arousal and behaviour, when events of the match, defined as being stressful, were compared to events of the match defined as non-stressful. One reason for this could be that psychophysiological and behavioural measures did not give insight into what coaches were thinking or feeling at a particular time during a game. Coach perceptions of situations are likely to affect their emotional reactions and behaviours. It may be that the coaches do not share a common outcome goal in relation to what they deem to be "success". Particularly at developmental levels of the game, coaches may have a range of goals that can be met without the team winning. This may include such outcomes as the improvement of individual players and the construction of a range of cohesive team patterns to enhance the outcomes for the team.

In order to better understand the framework by which individual coaches managed their teams, five coaches, who coached in games where the scores

fluctuated, were invited to participate in an interview soon after the match that was analysed in Study 2. The interviews involved the coaches viewing video-tape of stressful segments of the match in which they were observed. They were asked what they were thinking and feeling at these times. Their comments were audio-taped for analysis.

The aim of Study 3 was to seek the views and interpretations of individual coaches about their thoughts and behaviour related to selected game situations. Examination of arousal levels and coach behaviour for those situations was undertaken to determine whether coach interpretations were linked to their arousal or behaviour.

Method

Participants

The participants were five basketball coaches, who participated in Study 2. I selected the participants for Study 3, because they coached in games where the game status changed constantly during the segments of the game that they were shown. I proposed that this would mean that the coaches would experience those parts of the game as being stressful.

Design

A stimulated recall approach was employed. The participants were interviewed within two weeks of the video-taped game. This ensured that the game events were still clear in the coaches' minds. Coaches viewed selected video-taped segments of the game, which included their instructions to the players. They were asked to comment on what they were saying and thinking, and how they were acting during the selected segment. Probes were used to explore coaches responses further.

Measures

Video-tape Game segments were presented to each coach, comprising those parts of the game where the game context was defined as likely to have been stressful for the coach. After viewing a particular segment the coach was asked for their interpretation of the play and their behaviour, thoughts and feelings. Their response was audio-taped.

Interview The research design followed a semi-structured interview approach. The coaches were asked a range of preliminary questions regarding their approach to the game. This was done to allow them to become comfortable and to gain rapport. The information gathered was also of great interest. They were then shown a number of game segments to stimulate further comments about their behaviour, instructions, and what they were thinking during those segments. This approach allowed me to follow the participants' lead during the interview. If an issue emerged that was important to either the participant or the interviewer, this method allowed further exploration.

The interview was audio-taped and content analysed using an inductive content analysis technique. The participants were assured that their responses would be treated confidentially, enabling them to be candid. They were free to respond in any manner they wished. I phrased subsequent questions depending on the initial response of each coach to the selected segment. This approach is consistent with the use of probes and follow-up questions in such interview procedures. I conducted all interviews to ensure consistency with regard to data collection.

Procedure

Prior to the interview, each coach was informed about the general nature of the research both verbally and in writing. Coaches were invited to sign a standard consent form indicating their awareness of the demands of the study, confidentiality, freedom to withdraw at any time, and their willingness to participate. Each interview followed the same format as outlined in the Design and Measures sections. Each interview was audio-taped. This procedure was followed, until all the selected game segments had been viewed by the coach. The coaches were then free to add any concluding remarks. Finally, they were debriefed and thanked for their participation.

Analysis of Interview Transcripts

The analysis of the interview followed the procedure outlined by Cote, Salmela, Baria, & Russell (1993). They suggested a two step process to analyse transcripts of unstructured interviews. The first step consists of examining the material and "meaning units' which are discrete pieces of information containing one idea or concept. Once the transcript was segmented into "meaning units" they are given "tags" that enable the second part of the process to occur, that is, grouping those that are similar into categories. The authors indicate that this is not a rigid process, and that there is a great deal of going back and forward through the material until the interviewer is happy that all discrete ideas have been "tagged" and that all tags have been placed in categories that reflect their content. Categories that have similarities are then grouped into higher order themes. This process continues until theoretical saturation occurs where no new themes or categories emerge and all the material has been grouped appropriately. Cote et al., report that Tesch (1990) distinguishes between two types of approaches to qualitative analysis:

interpretational and structural. The former indicates that the researcher overlays their own structure on the material, the latter indicates that the structure is inherent to the material and that the researchers' role is to uncover it. In this study I have followed the latter.

Results

Each coach was asked the same series of semi-structured questions as a way of introducing the topic of the coaches' reactions during games. Although I was primarily interested in how the coaches responded to game situations shown in the video-tapes that they viewed, preliminary questions directed the coaches' attention to how they typically behaved, or perceived the way they behaved, during games. This was done to encourage the coaches to talk and build rapport for discussion of the main issues. In the first instance, in response to how they prepared for an up-coming game, the coaches universally responded as to how they would prepare the team, this included such themes as scouting the opposition, establishing a game plan, briefing players individually and monitoring players to ascertain who was prepared to play. Prompting, by way of supplementary questions, focussed the coaches on what preparation they undertook to get themselves ready to perform their role as coach. Largely the coaches' responses focussed on ensuring that they were prepared to coach, often following work activities during the day that had the capacity to distract them from an optimal focus. That process proved effective for developing rapport, putting the coaches at ease, and encouraging them to talk freely in the discussion about their behaviour during the match. I have not included commentary on that part of the interview, because the content is not directly related to the research question, which concerns the coaches' thoughts, feelings, and behaviour during the matches.

In this section, I focus on the coaches' responses to questions, probes, and follow-up questions about their reactions to match situations. These questions were supported by video clips to stimulate recall of noteworthy game situations. The coaches' responses were examined using inductive content analysis of the transcripts of the interviews. The themes that emerged are presented in Table 5.1. Then they are discussed in the following sections of this presentation of results.

Analysis of the verbatim transcripts of the coaches' responses to these questions provided the following five general dimensions: coaches' level of self-awareness, coaches' control of their behaviour and emotions, behavioural indicators of the coach, role of the coach, and coaches' response to the state of the game. These general dimensions are now described, including the second order themes that I identified within each.

Table 5.1

Content Analysis Study 3

FIRST ORDER THEME	SECOND ORDER THEME	GENERAL DIMENSION
Coach unaware of physical feelings	Lack of awareness of physical arousal	
Coach unaware HR level		
Coach of repeating instructions	Coaches unaware of their behaviours	
Coach aware of own behaviour and the level of control over them	Coach aware of behaviour	
Coach comparing their behaviour in each half		
Coach aware of bad language when team making mistakes	Indicators of poor control	
Coach only aware of level of control if getting technical fouls		
Level of arguementativeness indicates level of control		
Coach aware of arousal level against top teams	Coach awareness of psychological arousal	Coaches' level of self-awareness
Coach aware of becoming aroused		
Coach happy with coaching performance		
Coach aware of being monitored	Coach aware of technical aspects	
Coach occassionally aware of the HR monitor		
Coach aware of being video-taped		
Coach more confident if players have the correct attitude	Coach aware of effect on the players	
Effect of the coach being negative		
Coach aware of his effect on the players by their response		

FIRST ORDER THEME	SECOND ORDER THEME	GENERAL DIMENSION
Coach unaware of level of control	Level of coach control	Coach's control of behaviour and emotions
The level of coach's control related to the age of the group being coached		
Coach using a breathing technique to regain control	Regaining control	
Coach regaining control without being aware of it		
Coach being aware of how negative they are becoming		
Coach able to regain control		
Coach writes notes to re-focus their mind		
Coach skilled at remaining controlled	Maintaining control	
Coach maintains control by sitting		
Coach speaking more quickly	Indicators of arousal	Behavioural indicators of coach arousal
Coach walking the sidelines more quickly		
Coach more aroused towards the end of the game		
Coach engaging with the referees	Frustration	
Coach yelling at players		
Coach's body language indicating feelings	Feelings inferred through body language	
Coach's language is positive when the game result is clear		
Coach encouraging players	Coach talk	
The intensity of the coach's voice		
Coach speaking negatively	Negative coach talk	
The difference in behaviour dependent on the game score	Factors effecting coach behaviour	
Coach' behaviour varying due to importance of the game		
Few behavioural indicators as coach handles issues internally	Psychological issues	
Coach's use of voice to motivate the team	Coaches' role as a motivator	Role of the coach
Coach reinforcing the team		
Coach trying to maintain a constant approach	Coaches' educational role versus their competitive role	
Coach's educational role versus their competitive role		
Coach's responsibility as a role model		
The difference in coaching behaviour when coaching juniors to coaching seniors		
Coach teaching appropriate plays to assist performance		

FIRST ORDER THEME	SECOND ORDER THEME	GENERAL DIMENSION
The coach becoming anxious and uptight as events go against their team	Coach reactions to play and incidents affecting the team	Coaches' response to state of game
The coach making substitutions, when unhappy with team performance		
A specific incident effecting the behaviour of the coach		
The coach sitting calmly if the result was beyond doubt	Coach behaviour reduced when result clear	
The point in the game when the result became clear		
The balance of positive and negative comments dependent on the score	Coaches' emotion and behaviour in relation to the score	
Coach being happy with the closeness of the score		
Coach's behaviour remains constant regardless of the score		
Coach's behaviour related to how players performing		
Coach's energy increases as the team performs well		
Coach's behaviour more volatile as the team catches up	Coaches'emotions and behaviour as the team catches up	
Coach more involved with the team as the team catches up		
Coach's level of talking as the team closes the score gap		
Coach's behaviour changes as the score gap closes		
Coach expressiing disappointment at the teams inablity to maintain it's scoring momentum	Coach unhappy with team performance	
Coach's behaviour changes towards the end of the game	Coach's behaviour at different stages of the game	

Coaches' Level of Self-Awareness

This general dimension dealt with the coaches' awareness of how they were feeling and behaving during games. The responses indicated a range of different experiences, which reflected occasions where coaches were aware of what they were doing and feeling, and occasions where coaches were unaware that they acted in particular ways until they saw their game behaviour on videotape. Five second order themes were identified within this category: lack of physical awareness, coach unaware of their behaviour, coach aware of their behaviour, coach aware of their emotions, and coach aware of the effect of their behaviour on the players.

Lack of Awareness of Physical Arousal

This second order theme reflected coaches' responses that indicated that they had little awareness of what they were experiencing at the time the excerpt was video-taped that concurred with what they observed of themselves on videotape. One coach reported being aware of his behaviour, when it became excessive, but not otherwise.

> If I like went out of my tree I'd probably remember, but not if I was quiet. I
>
> probably wouldn't notice it too much. (Coach 1)

That coach also observed:

> Not like, not always, like I sometimes I know I'm there…but how excited I really
>
> am or how much, how into it I really don't know…I've started to fire up a little
>
> bit, as to how much I have, I don't, I wouldn't realise. (Coach 1)

For another coach there was no awareness of whether they had become aroused.

> So how long does it take you to know if you're losing control?
>
> Me. I don't know, probably after the game. I don't stop and think about it until
>
> after the game. (Coach 5)

The coaches all wore HR monitors during the games. For all the coaches, this was a novel experience. Thus, it was not surprising that the coaches were either unaware of their HR during the game or unaware of the changes recorded by the HR monitor.

Coaches Unaware of their Behaviours

This second order theme related to those coaches who indicated that they were unaware of how they behaved during games. This theme differs from the previous theme in that it refers to how the coaches' behaved, rather than awareness of how they remembered experiencing the particular moment reflected in the video-tape segment. None of the coaches had previously been video-taped while coaching. The video-tapes often provided glimpses of their behaviour that differed from the manner in which the coaches perceived that they behaved. For one coach, repetition was a behaviour of which they were not aware. The coach commented:

> Like just the way I repeated a lot of points, whereas I, you know, didn't think I
>
> said the points as much to the kids. (Coach 2)

Another coach was similarly unaware, commenting:

> Well I was a bit surprised, I thought I was a bit more sedate after, I don't know,
>
> just a tad different, I don't know why though. (Coach 3)

Coach Aware of Behaviour

This second order theme related to how aware the coaches were of their behaviour. Four of the coaches reported being aware of their behaviour and their level of control. One coach observed:

> In control. I'd be talking to my players telling them where I want them to go and
>
> telling them they've done a good job and be pretty relaxed. (Coach 1)

The same coach reported that, even when they were not happy with the players, they tended to keep their feelings to themselves. Another coach reported that they usually sat down and did not strut around and become emotionally involved.

I just try and pull back from the emotional side of things and leave it there. (Coach 4)

Another coach, who stated that they attempted to be detached to allow analysis of the game, described how they became introspective as the momentum of the game changed.

I like to go within myself...much, and then you know something happens or I sort of call for time out and change something and refocus myself. (Coach 3)

Coaches also noted changes in their behaviour during the game. One coach observed there was a difference, as they weren't moving as much on the sidelines. They noted that they appeared to be:

more relaxed, more content, a lot more in control. (Coach 2)

Another coach was aware that they began to swear when either they or the team began to make mistakes. The coach observed that they would:

Swear a lot. When I make mistakes I go "shit" and all this other stuff. (Coach 5)

The same coach also believed that coaches largely kept themselves under control, because basketball rules provide for the eviction of a coach or players for serious breaches of rules, relating to acceptable behaviour.

Never had two tech fouls and out of the stadium. (Coach 5)

Coaches 2 and 5 were aware that either the level of arguing by them or within the team was an indicator that control was being lost. One coach stated:

Well if I'm out of control I've got everyone arguing and saying, oh but you said to do this and now you're saying do this, this and that. (Coach 2)

The other coach commented as follows:

> Yeah, normally I mean when I'm calm you know you just accept the officiating
> and try and encourage the girls to just get on with it, don't worry about it sort of
> thing, but I might start arguing calls, that's probably the first sign (Coach 5)

Coach Awareness of Psychological Arousal

This second order theme related to how aware the coaches were of their emotions during games and under what circumstances these changed. The coaches all indicated that they were aware that they became aroused at various points during matches, and that this arousal may not be advantageous to their coaching performance. A typical comment was:

> Like the other day, I knew the grading game was pretty important and I was
> noticeably, to myself anyway, stressed…I was trying not to be, just try and calm
> down and just think to myself, just relax a bit and…mentally I was okay, but I
> could feel myself physically, heart rate getting up there…sweating a little bit and
> all that sort of stuff. (Coach 6)

The same coach was aware that becoming aroused might not be conducive to sound performance.

> Like getting excited doesn't do anything I suppose. (Coach 6)

The coach was aware of their emotion.

> I can normally feel how I'm going right from the start. (Coach 6)

For one of the coaches, it was important to remain in control, but in response to a particular piece of video-tape, that coach acknowledged that their levels of arousal were changing.

I'd say you know I might be getting a bit more aroused here. Just in that they're

getting some easy baskets. (Coach 3)

After being shown a further taped excerpt, where their team was trailing, that coach

observed:

Yeah, but I feel my heart rate creep up, cause you know we win from in front, not

likely to win from behind. (Coach 3)

For another coach, remaining calm was important.

I don't get yelled at by refs when I'm out of control, but generally, no, I always

sort of feel in control the whole time. (Coach 2)

One of the coaches observed that they were more likely to be aroused against a top team.

I tend to get excited, this was a top team, get a bit pumped when we're playing the

top teams. (Coach 5)

This was confirmed by this coach when shown a video-tape excerpt of their team closing

the gap to the opposition.

Yeah, talking louder and more constantly. Yeah, that's just the emotion of

getting excited at the prospect of a win against one of the good teams. (Coach 5)

Coach Aware of Effect on the Players

The focus of this second order theme was on whether the coaches were aware of the

effect of their behaviour on players. One coach was particularly attuned to the effect of

their behaviour. The coach reported:

I start thinking I'm getting too negative and as a coach, the more negative you get

the more negative the players become, the more apprehensive they become, so

I've got to keep thinking to myself, cut that out, be more positive or don't say

anything at all. (Coach 4)

The reaction of players was the key to the appropriateness of another coach's behaviour.

...the girls will sometimes say, yeah, "shut up and sit down". (Coach 5)

Coaches' Control of Behaviour and Emotions

This general dimension related to whether and how coaches were able to control their behaviour, and what behaviour they displayed, depending on their level of control. It was important to note whether, when coaches started to lose control, they were able to regain control. The rules of basketball provide for the coach to be ejected from the game, if the referee deems their behaviour to be unacceptable. Inductive content analysis of the comments made by coaches in response to questions about their thoughts and emotions during key parts of the game revealed three second order themes, which were: the coach's level of control, the coach maintaining control, and the coach regaining control.

Level of Control

The coaches in this study all coached junior teams of varying ages and were all aware of their responsibilities as a role model. This theme related to whether the coaches were in control and in what circumstances their control varied. Those coaches who had coached senior players were aware of the different atmosphere at junior games compared to senior games. The coaches were acutely aware of the need to retain control of their behaviour. A typical comment, indicating why control of behaviour was important was:

> Obviously coaching the seniors with bigger crowds and a little bit of fanfare...I like to think of myself as a role model in that manner and get them to see what sport is about...and base my game plans on sportsmanship rather than on just winning. (Coach 4)

Only one coach reported that they were not generally aware or focussed on their level of self-control.

I probably don't stop and think about it until after the game. Unless I get a wake-up, you know, got a tech foul or something like that. (Coach 6)

One of the coaches controlled their behaviour by the way they carried themselves during the game. The coach said:

I keep a relaxed position being able to talk without emotion in my voice. (Coach 4)

Another coach had learned that a particular behaviour was more likely to invoke control than other behaviours.

I just believe that, you know, by sitting down by myself I'm more in control of myself. (Coach 3)

Maintaining Control

Despite their best intentions, coaches lost control of how they were behaving at some stages. Under this theme, coaches indicated that maintaining control was important. Two coaches recognised that they were becoming negative towards the players in the specific match observed. One coach stated:

I start thinking I'm getting too negative...so I've got to keep thinking to myself, cut that out, be more positive or don't say anything. (Coach 4)

Regaining control

This second order theme related to the ability of the coaches, if they lost control, to regain control. For one of the coaches, being aware of the uselessness of being out of control, and more particularly, in what circumstances it was likely to occur, was explained:

Try and like, try and refocus what you're trying to do, like what you're trying to achieve...I'm not gonna continue to be angry at them constantly because if it's not going to happen then there's no point. (Coach 1)

In addition to being aware of how they are thinking and acting, one coach reported a specific technique for regaining control.

This is what we are going to do, let's watch the game and sit down, write some notes now that's the thing I find best and that's the thing that really refocusses my mind. (Coach 3)

Behavioural Indicators of Coach Arousal

This general dimension relates to the significance of behaviour displayed by the coaches during games. The coaches were asked about the significance of their behaviour at certain times in the game, as they viewed excerpts of the game on video-tape. There were four second order themes. They were, indicators of arousal, frustration, feelings inferred through body language, and coach talk.

Indicators of Arousal

This second order theme related to whether the coaches were aware of any indicators of arousal in their own behaviour. The coaches reported a number of behavioural indicators and commented on their significance. The indicators included speaking more quickly, pacing the sidelines, engaging with the referees, and yelling at players.

For one of the coaches, the manner in which they spoke indicated their level of anxiety. They observed:

I'm starting to lose it a bit when I start to get all anxious and start talking a lot faster...I suppose it's a sign that I could go the other way. (Coach 3)

For Coach 3, the loss of control and increase of arousal happened in this particular game, at a point where the result was still unclear. When the coach was shown a video-clip, in which the team they coached was 29 to 25 ahead, the coach stated:

Yeah, getting a bit excited now. We've made a few sort of bad passes and then I was getting worried that we could lose it, not win it. (Coach 3)

In response to this situation the coach reported that:

> I was probably yelling more. (Coach 3)

Another coach stated that an indicator of their arousal was how much they moved on the sidelines.

> When you're mediumly anxious, you're crouching, and when you're really into it you're up and down. You're up and down, you're pacing. (Coach 5)

> Coaches' proposed that their behaviour can also change at different times during the game. For the purpose of this study, five coaches were chosen, who coached games where the result was unclear until the end of the game. Thus, towards the end of games, the outcome was usually still unclear, perhaps leading coaches to behave differently than they would, if victory or defeat was decided. One of the coaches noticed changes towards the end of the game. They reported:

> I mean, I guess when I see something I point it out, you know, and maybe towards the end of the game, if the heart rate creeps up, then I probably start seeing more in the smaller things, might become a bit more critical. (Coach 3)

Frustration

This second order theme related to how coaches displayed their frustration during games. Coaches do become frustrated during games for a variety of reasons. This can lead to engagement with referees and yelling at players. One of the coaches was aware that sometimes their frustration was directed at officials. Indicating:

> Yeah. I think so. Not intentionally but I think it happens. (Coach 2)

The coach also responded when asked what occurred when they were frustrated.

> Yell. Yep, I'd be frustrated and I'd be walking probably a lot quicker up and down in this game. (Coach 2)

Another coach reported that, when he started to walk more quickly along the sideline and his voice was raised, this indicated that he was beginning to become frustrated.

Feelings Inferred through Body Language

This second order theme was focussed on whether anything could be inferred from the coach's body language. Two coaches in particular reported that their body language reflected how they were feeling at a specific point in the game. One coach stated:

> Yeh, my body language I think has a lot to say about how I'm feeling about how
>
> I'm going about things. (Coach 2)

The same coach felt that although they were aware of their body language, they didn't think it affected what they did. When prompted further, however the coach reported the following.

> I was happy, like I was standing still. (Coach 2)

Still, further prompting elicited the belief that, when things were going well, the coach was more energetic and becoming more involved with the game, as opposed to when events were going against the team.

> When things are going against me, I sort of am more uptight, more tense but
>
> thinking more, I'm sort of trying to solve problems that we've got. (Coach 2)

The other coach was aware of what their body language indicated, commenting, after viewing a piece of video-tape:

> I think I'm actually crouching there, which is a sign that I'm a bit anxious.

(Coach 5)

Coach Talk

This second order theme related to the different types of talk that the coaches engaged in. Four of the coaches reported using their voices for a range of activities other than venting frustration. Two coaches described what they were attempting to achieve, when they were calling out to the players. One coach reported:

> I'm also reminding them about what they should be doing in our set offence and they need constantly reminding, otherwise they just go into anything they feel like. (Coach 5)

The other coach stated:

> Yeh, see most of it with this scene is just encouraging when they do the right things. (Coach 3)

Another coach, while viewing the tape, observed that, if the players did not have the game in control, then the level of intensity in their voice would be high, as opposed to when the players were in control of their game. Another coach differentiated their language when the team was winning. The coach pointed out that:

> When you're winning, you're more likely to really be positive in giving accolades. (Coach 4)

The coaches were also aware when they were becoming negative in their exchanges with players. One coach observed:

> A lot of times, if I start being negative to the boys, that's when I start realising I'm not doing the coaching that I should be doing. (Coach 4)

The same coach was tuned into what they were saying, given the effect it might have on the players. The coach said:

I start thinking I'm getting too negative and as a coach the more negative you get

the more negative the players become, the more apprehensive they become.

(Coach 4)

Another coach was also aware of the detrimental effect their manner of talking could

have.

I always make a point of not having a dig at them for missing a shot, because

everyone misses shots and throws the ball away, but the way you actually tell

them things changes and that has a detrimental effect on them. (Coach 6)

The same coach suggested to the parents of the players that, if they had an issue with

what was said to the players, then they should approach the coach.

...and some of them have said, oh yeah sometimes your criticism really pointed

towards certain players or...it's too aggressive for the girls. (Coach 6)

Role of the Coach

This general dimension relates to how coaches described the various roles

they performed when coaching junior teams. The coaches in the study were aware

that coaching junior teams required different behaviours than might be associated

with coaching senior teams. They were in no doubt that being focussed on

performing their role was of great importance and that it affected their behaviour

and, to some extent, their arousal during games. One coach reported:

I see quite a lot of coaches of juniors who are out of control all the time and I try

and think why, at that level, why, especially being a role model for juniors that

doesn't look or seem the sensible thing to do. (Coach 4)

The coach commented further:

I try to think of myself as a role model in that manner and get them to see what

sport is about and being a good sport and having sportsmanship, rather than just

being aware of having sportsmanship, I think is very important in sport and I try

and base my coaching game plans on sportsmanship rather than just on winning.

(Coach 4)

Coaches' Educational Role versus their Competitive Role

This second order theme compares two differing roles that the coaches perform. Two

coaches commented on the importance of players learning the appropriate skills of

basketball, irrespective of whether the team is winning or losing. One coach observed:

But fundamentals and skill level and team levels I believe are very important at

this age group, and without those you lose sight of the positive. You can win

games by doing the wrong things. …whereas coaching juniors you've got to

teach the whole aspect of the game and that doesn't happen in a short time.

(Coach 4)

The other coach, when asked whether they saw their role as biased towards being more

educational, commented:

I have coached another team at (location)…and (that team) is more competitive

than this lot…I guess most of it is about them doing the right stuff and if we do it

right…we'll win you know and if we do it perfectly and we're good enough and

we still lose then I'm teaching them the wrong stuff. (Coach 3)

Coaches' Role as a Motivator

This second order theme relates to a particular role the coaches reported that they play in

relation to the team. Two coaches noted the effect of how they behaved as a motivator

during the game. One commented:

Yeah, if I want the kids to be more excited I try to be more excited myself. If I want them to be calm, I try and act calm and just play it all down and that way try and squash the nerves. (Coach 6)

The other coach commented similarly:

A lot of junior teams they play well when you're up and giving them energy and especially this team, so a lot of the time I have to be up, you know, shouting "come on". (Coach 3)

At times the games could become quite competitive, and the coaches' behaviour changed as a result of the atmosphere. In response to whether they were out of control during a particular piece of play, one of the coaches commented:

I try not to do it too much because it's, well, not good for them just to see me on the bench, you know, criticising, you know, every single mistake they make. Because they don't go out there to make mistakes on purpose. (Coach 5)

Another coach commented, in response to a prompt as to whether he had to regain composure:

Not really no, when there's been a lot of heat and like sort of you know a lot of stuff going on with the other team, sort of fights, that sort of thing, and I've got to separate it and calm my players down...I just take deep breaths, just talk things through with the kids. (Coach 2)

Coaches' Response to State of Game

This general dimension dealt with how coaches responded to the state of the game at particular times. The dimension had the largest number of responses from the coaches during the interviews, as they watched the various video-taped excerpts from the games. There were six second order themes within this general dimension. They

were coach reaction to play going against expectations, coach behaviour reduced when result clear, coaches' emotion and behaviour in relation to the score, coaches' emotion and behaviour as the team catches up, coach unhappy with team performance, and coaches' behaviour at different stages of the game.

Coach Reaction to Play and Incidents Affecting the Team

This second order theme related to how coaches reacted to events affecting the team, making substitutions because of team performance, and being affected by specific incidents in the game. Two coaches reported that they responded to events that went against their teams. One stated:

> I'd be trying to change things around a little bit, and telling people where they need to go more, like telling them off more than letting them know they've done a good job. (Coach 6)

Another reported:

> Just by the things I'm saying, like I'm getting frustrated, like I'm starting to get frustrated with them. Like a couple of girls I've brought off, because like their defence wasn't good enough. (Coach 1)

Two coaches identified specific game events that unusually affected their behaviour. One of the events related to a racial slur made against a player on the coach's team. Because it had happened previously, the coach was apprehensive about the consequence of it occurring again.

> Oh shit here we go again! Because we had a problem like that in the past and he lost it completely and hit him, hit the guy. Very nervous, I was aware of the situation trying to sort of watch it as well as try and coach a game and you know read the game. (Coach 2)

The other coach's heart rate leapt from 77 to 102 beats per minute within 40 seconds.

When prompted the coach gave the following explanation:

> Oh, out of control. The miss wasn't the issue, but they'd shot when they
>
> shouldn't have. (Coach 6)

Coach Behaviour Reduced when Result Clear

This second order theme relates to how coaches' behaviour changed, when the

game outcome was evident. The coaches recognised that their behaviour changed when

the result of the game was clear, as opposed to when the result was in doubt. Two of the

coaches reported that once the result was clear, they would be much calmer in their

demeanour. One described the behaviour as follows;

> No, usually I just sit down and enjoy the game, if we're completely over the line
>
> like say we're 20 points up. (Coach 2)

The other coach reported similar behaviour:

> They have the lead one way or we have a comfortable lead one way, I probably
>
> tend to sit there and be more passive. (Coach 5)

The coaches were asked whether a certain points gap in the game indicated the likely

outcome. Two coaches reported that a losing gap of about 10 points would lead them to

think that their team was not going to win, due to the low scoring nature of junior

basketball games. When asked at what score deficit the coach would concede in their

mind that they were going to lose, one coach stated:

> Probably about 10 or 11. Yeah it depends on the time in the game as well.
>
> But…if we were down by maybe 10 or 12 at half time I wouldn't be thinking we
>
> could come up. (Coach 5)

Another coach responded to a prompt about the sort of winning or losing gap that would indicate there was still a game by stressing:

> Under 10 points. It's harder to come back in junior basketball, because of the fact it is harder to score and scores are generally lower and the scoring range and scoring ability is generally lower. (Coach 4)

Two coaches recognised that there were changes in the manner in which they talked to the players, as the team began to struggle. One noted:

> …like at the start of the second half when we were like, what was it, 12 to 15 points down, like I was a little disappointed, then I knew that I was fairly quiet, but once we picked it up I started to get back into the game. (Coach 1)

For the other coach, the amount of involvement and instruction was reduced. The coach pointed out:

> And for the first 20 to 30 minutes you know I'm there doing my best, but then the last 10 minutes just sort of made it. There's nothing to do and so you sit back. (Coach 3)

Further, in response to a prompt about calling more instructions in one half, the same coach said:

> I don't think so…probably that I am not giving enough specific instructions…we're starting to struggle here. (Coach 3)

Coaches' Emotion and Behaviour in Relation to Score

This second order theme relates to how the coaches' emotions and behaviour changed as the score changed in the game. The coaches' responses fell into two categories with respect to their behaviour in relation to the score. First, a primary concern was to ensure that the players were performing the fundamental skills well,

regardless of the score. Second, the coaches aimed to act in a relatively stable fashion, even though early in the game the outcome was still unclear. For those coaches concerned with the basic skills, the following response typifies their standpoint.

> I don't think my focus is different, because...my focus at this age group is not winning...but fundamentals and skill levels and team levels. (Coach 4)

Another coach commented:

> I believe again, if you're winning and we're doing the right things, that's what I want to do, I don't want to go out there and crush an opposition. (Coach 5)

A coach, whose team was not performing entirely as they would wish, as evidenced by the video-tape, felt that they were under control. The coach proclaimed:

> I think I was still under reasonably good control there, although I could have had a better influence on some of the players. (Coach 6)

Considering their reaction to their team's start, one coach responded as follows:

> When we were down I wasn't really worried to be honest, it really didn't phase me. (Coach 2)

At an early point in the game, this coach's team had begun to extend their lead. His reaction to how he was behaving on the tape was:

> Yeah, just relaxed and you know in the game giving instructions and just try and get the boys to keep concentrating. (Coach 4)

Two coaches responded to a prompt about whether they would react differently to the same score differential, if they were losing as opposed to winning. One indicated:

> The positive would, I'd just be reinforcing the basics, I wouldn't be positive upbeat, it would be just keep working. (Coach 5)

For the other coach, losing was also more of a trigger for negative comments. The coach observed:

> That would depend on how we're playing. If we were playing well, I'd let it be. I wouldn't say much about it, yeah it'd be worse if we were losing by a lot and we were playing pretty poorly. But, if we were playing well, it wouldn't worry me as much as if we're playing poorly. (Coach 6)

One of the coaches reframed the scoreline to get the players to play as if the game had started again.

> I was sort of trying to put the first half behind us, …trying to get kids to think of it as a whole new game, it's back to zero, and they're just playing like another game, so basically from 5 all. (Coach 2)

Another coach, whose team let a lead slip, responded in the following way:

> Still, still happy. Not unhappy with it being so close, because it's only two baskets. (Coach 4)

For another coach, although the team had fallen 10 points behind, the coach's response was quite positive:

> So I was fairly happy with the score being 10 points, because that's…that was our aim at the start of the game, to try and keep it at that. (Coach 1)

Three coaches reported that, at times, their mood and behaviour were dictated by how the players were performing. One coach exemplified this by saying:

> If we were playing alright, but, you know, just not making inroads, I'd probably still be up there…but still talking. If we were making lots of mistakes, I'd probably be sitting down, you know saying shit and this sort of stuff. (Coach 5)

Another coach responded in the following way:

Whether we are stepping up on help. So, if we're doing that or not that probably controls my arousal. (Coach 3)

That coach also reported that they were more aroused as a result of the team being ahead. The coach said:

You're encouraging more, you're more aroused and you're more focussed.

(Coach 4)

Coaches' Emotions and Behaviour as Team Catches Up

This second order theme describes how coaches behaved and what emotions they displayed as the team caught up. Four of the coaches reported that their behaviour changed as their team began to close the gap in score. One coach observed marked changes in their own behaviour as the gap closed, expressing it in this way:

I was really quiet at the start of the second half, just hoping that the game wouldn't blow out…but as soon as the score started to get a bit closer and now we're only six points down, like I'm shouting out a bit more trying to keep them working. (Coach 1)

For another coach, although they were not volatile, they felt that they were more involved as the score gap closed.

I'm very enthusiastic walking on the sidelines, you know getting them going like that. (Coach 5)

Another coach, when asked, felt that their rate of instruction increased in these circumstances.

Yeah, probably because of the closeness to half time, being aware that just before half time and just after half time are the times when teams run out that lead. (Coach 4)

Another coach reported more talking at a slightly more aggressive level.

> Yeah…a little bit more aggressive, as far as aggressive is probably not the right
> word, but talking a bit quicker, yeah a bit louder, a bit quicker. (Coach 4)

Coach Unhappy with Team Performance

This second order theme relates to the circumstances under which coaches were unhappy with the performance of their team. Three coaches indicated that they became disappointed with the team at various stages in a game. After viewing a video-tape excerpt, one coach said the following:

> Like I'm a little bit disappointed that it was 8 to 20, because I know that we
> could have, if we wanted to, have been a lot closer. (Coach 1)

Another coach stated that they would normally express their disappointment to the player, suggesting they might change the manner in which they are playing:

> Normally, if I pull someone off or they get close enough, so I can have a short
> conversation with them, I would say don't do this, you should do this, or you
> should have done this. (Coach 6)

Coaches' Behaviour at Different Stages of Game

This second order theme describes coaches' behaviour at different stages of the game. Two coaches noted that they behaved differently near the end of the game, one coach in terms of their behaviour, and the other coach, if their team was behind, would give the players on the bench time on court. The first coach here stated:

> Well close to the end of the game you tend to be a bit more aroused, arousal
> would probably be more than aggressive aroused. (Coach 4)

The second coach observed:

There's still a bit of a chance, but you've gotta be realistic...I would try and stay positive and, if they get back into it they get back in, but yeah, you do coach differently, like pick certain players. (Coach 6)

Discussion

In this discussion, I first address conclusions based on the five general dimensions arising from the content analysis of the coach interviews. Then I consider the relationship of the conclusions from this study to the relevant literature. Next, I discuss methodological issues resulting from the design of the study, that is, what assisted the research and what might have been undertaken in a different manner to enhance the research. Then, I propose some issues that future research might examine, based on the findings from the present study, such as, further use of the stimulated recall technique, utilising video-tape excerpts in the study of coaching. Finally, I put forward implications for coaching practice and make concluding comments to the study.

Conclusions

This section deals with conclusions about the major dimensions of coach reports on their own behaviour and about issues that arise from each of the five general dimensions. As with the results section, coach responses to questions that related to how they prepared individually for the games and how they prepared their teams for their respective games have been omitted. The five general dimensions to be discussed are coach self-awareness, coaches' control of behaviour, behavioural indicators of the coach, coaches' response to the state of the game, and the role of the coach.

The first dimension to be discussed is coach self-awareness. It would be reasonable to assume that the level of control coaches display during competition is related to being self-aware of their behaviour. None of the coaches had previously viewed themselves coaching by way of video-taped recording, so they had not had the opportunity to compare their perception of the way they typically act to a video-tape of their actual behaviour. During the interviews, the coaches reported variations in their level of physical awareness during games. At times, the video-taped excerpts confirmed the coaches' beliefs about how they felt during games. Coaches indicated that they were aware of trying to behave in a controlled manner, and that the excerpts matched that perception. For example, some coaches referred to sitting down, rather than pacing the sideline; to talking in a relaxed manner; or for one coach, to the tendency to swear a lot when players made mistakes. Two coaches were also able to describe the behavioural indictors that signalled when they were out of control. The coaches also reported that they were normally aware when they were becoming aroused. In particular, one coach usually became aware through physical indicators, such as HR and sweating. When prompted regarding the level of their HRs, however, two coaches reported that they were not aware that their HRs had risen to the level recorded by the HR monitor. Another coach was surprised that he was not as sedate as he thought he normally was, but was unable to explain why this might be. Another coach indicated that he was unaware that he "fired up" as much as the video-tape portrayed.

Despite not always being aware of how they felt, the coaches reported that they were largely aware of how they behaved during games. The coaches acknowledged the importance of having that awareness in order to control how they

behaved. The coaches reported that they were also aware of changes in their behaviour during the game and they claimed that they knew whether these changes were detrimental to their coaching. Although the coaches were predominantly aware of their behaviour, when they watched the video-tape, two of the coaches, commented that they were surprised by the repetitiveness of their behaviour and the extent of their activity. Of interest, given the novelty of the monitoring procedure used in this study, were the comments made by some of the coaches that they were largely unaware of the HR monitor or of being video-taped. In general, however, the awareness by the coaches of their behaviour might be a result of the stringent behavioural requirements imposed by basketball league rules and the resultant sanctions for misdemeanours.

The coaches were all aware that they became aroused at various points during games. They all reported that this arousal may not be advantageous to their coaching, but that it was likely to occur in certain circumstances, for example, when playing against a top team, in an important game, or as the game circumstances changed. Equally, the coaches reported that elevated HRs, speaking in a louder voice than usual, and being spoken to by referees, were some indicators that helped them gain awareness that they were becoming aroused. Although they were aware of their emotion some of the time, the coaches reported that there was variability in the immediacy of their response to the emotion during games.

The next general dimension to be discussed here is that of coaches' control over their behaviour. This dimension included the level of their control, maintaining control, and regaining control. Central to this dimension was an understanding, described by one of the coaches, that behavioural expectations of junior coaches

required perhaps even higher levels of control by coaches over their own behaviour than might be expected at senior levels. This is possibly due to strict codes of conduct that apply to junior basketball coaches, and to the increased focus by junior sporting bodies in general on the need for the behaviour of coaches to be exemplary, so that the experience of the players is positive. If the players experience of the sport is positive, then they are more likely to continue playing. The coaches described developing techniques, such as sitting down or remaining in a relaxed position, as a means of establishing control during games. Equally, coaches observed that they were aware of idiosyncratic indicators that prompted them to maintain control. Having become aware of behaving in a less controlled manner, the coaches indicated that they had developed techniques for regaining control prior to being warned by the referees. In the interviews, I gained the impression that being in control was very important to these coaches from two perspectives. One concern was the expectation that they should appear under control to the players, because the coaches of junior teams act as models for players in their team. The second reason was that the coaches believed that having their own emotions and behaviour under control was important in that this allowed them to perform their coaching duties to a higher level.

The third general dimension is related to behavioural indicators of the coach. Viewing excerpts of the game allowed the coaches to comment on the significance of their behaviour during games. Through their comments, the coaches demonstrated that they were aware of what the indicators meant in terms of their behaviour, and the coaches could describe the behaviour in the context of the excerpt. The coaches could also explain the significance of their behaviour in relation to their coaching. For example, they reported that speaking loudly, pacing more quickly, yelling at

players, and engaging with referees, were indicators that their behavioural control was wavering. The coaches also indicated that they were aware of the differences in the way they used their voices during the game. They commented on the positive or negative influence that their tone of voice could have on the players, and also noted that players could infer various things from the coaches' body language.

The fourth general dimension is the coaches' response to the state of the game. The largest number of coach responses, using the stimulated recall technique, occurred under this dimension. Coaches' responses clearly indicated that differing game states did elicit a range of differing behaviours from the coaches in this study. The coaches reported that they displayed different behaviour when play was going against their expectation. Whether that relates to frustration with what the players were doing or, more particularly, not doing, in passages of play or in response to specific incidents, the coaches reported that they act to change or control those circumstances.

Of interest was the finding that there was a reduction in the frequency of observed coach behaviour when the result of the game was clear. Two coaches reported that they tended to become more passive if the result is clear, regardless of which team had a substantial lead. I asked the coaches whether there was a specific margin that indicated, in effect, that the game was over. The margin given, towards the end of the game, was generally around 10 points, because scoring is usually low in junior basketball. Two coaches also reported that their level of involvement in terms of frequency of instructions, reduced as the gap widened, although one coach indicated that this behaviour changed, if their team reduced the gap in points.

Having indicated that the impending result of the game influenced their behaviour, the coaches seemed to understand that they should still be performing the requirements of their role, regardless of the score or result. They indicated that it was important to continue focusing on the fundamentals, and that, for juniors, winning wasn't everything. They also focused on the style of play, that is, they proposed that, irrespective of the score, it was important that the players as a group were playing well. The coaches also utilised techniques to keep the players interested and concentrating, regardless of the score, by reframing the context, using strategies, such as asking players to imagine that the game starts at nil all at half time.

Despite the desire to appear calm and consistent irrespective of the game score, the coaches did acknowledge that their emotions were different as their team began to catch up. They reported that this was usually indicated by their level of involvement in the game, instanced by their voice level, the amount of aggression in their voice, the rate of instruction, and their movement along the sideline. It is interesting to note that the coaches, despite largely saying that their focus was developmental, did at times have to re-focus on their developmental goals when their team was struggling to win, because they tended to become involved in the effort to achieve victory.

The fifth general dimension was the role of the coach. The coaches frequently referred to their role, as they discussed their behaviour during the match. They were clearly able to delineate the differing roles they undertook as a coach. They understood the differences between coaching junior teams and senior teams. The need to model acceptable behaviour, based on displaying sportsmanship as part of their behaviour, was a noteworthy difference, which appeared to be more important

in coaching juniors. The coaches also understood the need to control their behaviour. The other roles they understood, in addition to that of being a role model, were their competitive and educational role. As part of the long-term player development, the coaches were clearly aware that utilising an approach that emphasized or prioritized the team winning could have shortcomings for player development in the long term. The coaches also spoke of their role as a motivator. That is, they were aware that the way in which they displayed their emotions affected the way in which junior teams approached the game, and that the coach had the capacity to enhance the enthusiasm of the team, or, conversely, to reinforce undesirable behaviour in the players.

I am mindful that the number of coaches interviewed was small, but I consider that two general conclusions can be drawn from their responses. For a range of reasons, including the requirements of the sport, the coaches considered that is was important to be in control of their behaviour during games. Largely this was to do with the belief that, because they were coaching junior players, one of their responsibilities was to set a sound example. In attempting to achieve this end, the coaches monitored their behaviour closely to ensure that they remained in control. If they began to lose control, they had cues that brought to attention that their behavioural control was declining. They then instituted techniques to return to a state of control.

Relationship of Results to Theory and Research

One advantage of the method used in this study is that it overcomes a number of the problems of research that has been described by Ahlgren, et al., (1998) as being largely limited to descriptions of coach behaviour. Ahlgren et al. proposed that eliciting comments from coaches regarding what they are thinking or feeling, when

they are coaching at a particular time, shown to them on video, adds richness and depth to research. According to Ahlgren et al., the use of both quantitative and qualitative methods provides triangulated, convergent data. The same point is made by Abrahams and Collins (1998), who observed that most research into coaching has followed a behaviourist line, where coaching expertise has been inferred from frequencies of particular observed behaviours, rather than understanding the coach's intent for the particular behaviour.

Previous research showed that coaches tended to have little awareness of how they behaved (Brennan & Hassan 2002; Smith, et al.,1978) and that there were marked differences between coaches' perception of their behaviour and its effect on players. From the content analysis of the general dimension related to coach self-awareness, the analysis indicated that the coaches in the present study had, at times, an awareness of their behaviour, but at other times they were unaware of their behaviour and relied on a cue, such as bad language or receiving technical fouls from the officials, to become aware of either the content of their behaviour or its intensity. The levels of coach awareness in this study appears to be different to those observed by Smoll and Smith (1989), who stated that coaches appeared to have limited awareness of the types of behaviour in which they engaged, with perhaps the exception of punishment. The coaches in the present study appeared to be aware of the connection of certain behaviours with their level of arousal, and also with the state of the game.

An issue emerging from the present study with regard to this point is that, although the coaches observed a video-tape of their coaching behaviour, they were still self-reporting on the interpretation of that behaviour. My experience of the

coaches' responses during the interviews was that they were interested in seeing their behaviour on video-tape and that they were very frank in their interpretations of their behaviour. I had the feeling that they saw the research as an opportunity to learn about themselves as coaches, rather than as a threatening evaluation by an outsider. I am, therefore, confident that the coaches were honest in their responses to the excerpts shown to them during the interview. I am however mindful that there exists the possibility that the coaches may be presenting a response that they believe to be more acceptable as an explanation of their behaviour in a particular instance.

Early studies of arousal in officials and coaches (Gait et al. 1979; Gazes et al 1969; Kostelnik et al. 1990) indicated that individuals vary in their response to game situations. These studies utilised heart rate telemetry to record the HRs of coaches during competition. The researchers in early studies made certain assumptions as to what particular aspects of the game might be associated with concomitant rises in the coaches' HR. In Studies 1 and 2, I was unable to establish a strong relationship between changes in HR and specific game situations. The use of interviews where the coaches were able to view excerpts of a game they coached allowed me the opportunity to clarify what the coaches thought or felt was happening in the excerpts.

The coaches in the present study reported the significance of certain behaviours in relation to their level of arousal, for example, walking the sidelines more quickly, engaging with referees, or yelling at players. They also identified factors that might affect their behaviour, such as game score and the importance of the game. This is similar to what McCafferty et al. (1978) found in relation to the perceived importance of the game.

Unlike the coaches in the study by Smith, Smoll, and Curtis (1978), the coaches in this study reported that they had a clear notion of the differing roles of the coach, and whether they were in control of their behaviour. Coaches in the present study also indicated that they were aware of how coaching juniors differed from coaching seniors, and the importance of their educational role, both as a role model and as a teacher of the basic elements of basketball, including individual skills and teamwork. The coaches also reported having developed techniques for becoming aware of their level of control and they said they had established the means to regain control. The difference between the early Smith et al. study and the present research might be attributed to the fact that nearly 30 years have passed since the Smith et al. study and that great emphasis has been placed on the behaviour of coaches in terms of being an acceptable role model. The Australian Sports Commission (ASC) has placed importance on encouraging sporting organisations to educate coaches at all levels of their sports. The ASC has also developed a range of policies that are designed to make participating in sport, particularly at junior level a positive and safe experience. The National Sports Accreditation Scheme (NCAS) education courses have attached a great deal of importance to coaching the process, rather than only coaching for outcomes. This is an indication that the results of the game in the short term are outweighed by the goal of coaching the players in a manner that ensures sound long-term development. It also presupposes that focussing on the process of coaching will enhance a range of outcomes, including the result and probably more importantly, the experience of participating for the players. Other possible reasons for the differences between this study and that of Smith, Smoll, and Curtis might be that the groups of coaches in the present study and the teams they were coaching

were not matched to the groups studied by Smith, Smoll, and Curtis. The differences may also be attributed to the cultural differences of the both Australian and American society at a general level and the more specific differences in the manner in which sport is conducted in the two countries.

Gross (1990), in his study of head coaches and assistant coaches in the Australian National Basketball League, examined whether the behaviour of coaches was related to winning or losing, and whether they displayed different behaviours when winning as compared to losing. He established that winning coaches exhibited more behaviours, and that the behaviours were more spontaneous. He reported that losing coaches demonstrated behaviours that, in his view, were reactive to game situations and consistent with being out of control. Coaches in the present study described similar behaviours to those reported by Gross (1990), as occurring occasionally, dependent on the game state at the time. They described reductions in behaviour when the result was clear, reactions to play going against their team, changes in mood and the balance of positive and negative comments, dependent on the score. Coaches in the present study also talked about behaviour that was less dramatic than in Gross' study and noted how, having recognised that their behaviour was becoming inappropriate, they undertook strategies to regain control of their demeanour. One coach in the present study reported that he believed his behaviour to be constant regardless of the score. This would seem to indicate that the focus of that coach was not the game outcome , but that there might be other issues relating to the game that were more important to him.

Wilcox and Trudel (1998) developed a method, utilising video-tape, called verbal cueing stimulated recall interviews (VCSRI), because they believed that

asking coaches to view video-taped excerpts and then to comment on the intent of their behaviour might compromise the validity of the resulting data. Thus, they proposed that coaches should be asked to report on verbally presented situations first, and then the video-taped excerpts would be used to corroborate their comments. One of the advantages of Wilcox and Trudel's method is that, having heard the coach's account, the video-tape excerpt either validates what the coach said or calls it into question. In the current study, I was interested in events in the game that appeared that could be stressful for the coach, given what was occurring on the video-tape, or that might have been deemed as stressful as a result of an increase in the coach's HR, as measured by the HR monitor. On the basis of these definitions, I utilised a purposive sampling technique and selected game events or sequences that might be deemed as stressful to the coach. Each coach viewed in excess of ten game segments during the interview, without having previously viewed the tapes. The focus of the study was to further understand what underpinned the behaviour of the coaches in a particular game situation. Unlike Wilcox and Trudel, I was not attempting to validate the coach's version of events, by asking them for their an explanation of their behaviour, prior to allowing them to view the video-taped excerpt.

This study provides further information regarding specific components that impact upon the behaviour of coaches in competition. Cote et al., 1995, note that one issue with most research into coaching is that the resultant material is treated in a independent manner rather than as part of a more comprehensive coaching model such as that they have developed. The material in this study adds to the knowledge of what constitutes a coach's the mental model underpinning their coaching practice.

Methodological Issues

Unlike players, coaches are not used to seeing their performances on video-tape, nor are they used to assessing their coaching behaviour using this medium. The feedback from the coaches was that they found the exercise very helpful, although, given it was their first exposure to it, they were aware of the presence of the video camera and the remote microphone in the initial parts of the game. As the coaches wore a remote microphone when they were video-taped, not only was their non-verbal behaviour obvious, but the accompanying verbal behaviour gave greater meaning to their physical behaviour, recorded on video-tape. This meant that, in the interview, the coaches could comment on what they perceived or recalled to be occurring at that time in terms of their verbal, as well as non-verbal, behaviour.

In future studies, the methodology might be improved by having each coach video-taped in more than one game. This would establish whether their behaviour was consistent in different games, rather than the result of the novelty of being monitored in only one game or varied depending on a range of circumstances surrounding coaches' psychological state and the context of the specific game, such as whether the team is winning or losing.

A certain amount of the early material in each interview was not utilised in this study, because it related to the coaches' individual preparation and their preparation of the team for the game. It did, however, serve to establish rapport with the coaches and to give me an indication of how they saw their role in terms other than technical and tactical aspects of coaching in competitive basketball. Using other aspects of the context to get interviews flowing, is a common practice. It did seem to help in the present study.

The positive reaction of the coaches to the use of the video-tape excerpts indicated to me that its use could be of great value for coaches to become aware to a greater degree of how they actually behave. It could also be a useful tool for coaches to monitor any changes they may wish to make, regarding their coaching style. Equally, the material generated could be of use in coaching courses, for the provision of examples of the varying styles of coaches, and how video-tape could be used as a means of changing or modifying coaching behaviour as part of an on-going process. A change that might reasonably be made to the procedure used in this study would be to ask the coach to comment on a particular piece of play or incident without having first seen the video excerpt (see Wilcox & Trudel, 1998). Coaches' responses could then be compared with their behaviour on the video to validate their explanation of their behaviour in the situation.

One of the advantages of the method I used was that it allowed sound rapport to be established on the basis that no judgements were being made as to what was occurring in the excerpts, nor of the coaches' interpretation of the excerpt. The method used also allowed identification of the game situations and coach behaviour of interest. These were usually related to closeness of the score, changes in the score, or particular reactions to game situations. Given that the coaches did not see the video-tape in its entirety, they may have considered that there were more meaningful examples of how they felt or behaved at particular points in the game had they had the opportunity to examine the whole video-tape. Nonetheless, the examples chosen by me, reflecting game segments that might be deemed stressful, were adequate in generating responses by the coaches, about what they considered their actions and comments to mean in the context of the game.

For future research greater outcomes of greater power could be obtained by increasing the sample size and to utilize a range of observers trained to use whatever coding system was chosen. In this research small numbers of coaches were studied, and the coding for studies one and two was undertaken by me. Equally in Study 3, the analysis of the interviews was undertaken solely by me. The conclusions of the research should be viewed in this light.

Another concern with the present study was of a more technical nature. The quality of each of the video-tapes was affected by the low level of sophistication of the remote microphone. Thus, at some stages of each game the recording was less than satisfactory. Nonetheless, a sufficient portion of the verbal behaviour was recorded to allow interpretation to be made by the coaches of the meaning of their statements in the game context. In future, more extensive pilot work should be done with equipment to ensure that the research data will be recorded reliably.

Future Research

One limiting factor for making generalisations from this study is that it was conducted with a relatively small sample and each coach was only taped on one occasion. This, of course, raises the question of whether the findings are limited to the idiosyncratic sample. Future research with larger samples will allow conclusions to be drawn as to the validity of the findings of the present study. Likewise, the present study utilised criteria established by me, then proposed a relationship between the closeness of the scores and behaviour of the coach under these circumstances. The findings indicated that the coaches focussed on issues other than the score as being of importance. The coaches did report that their behaviour varied at times despite them reporting that the game outcome was not the primary objective

of junior coaching. The small sample and the fact that the junior competitions in which the coaches operated were not junior elite basketball raise the question whether the findings would be generalised to differing levels of competition. A future study could examine all coaches in a specific higher level competition for an extended period of time to ascertain whether the developmental focus of the coaches in the present study is replicated at more competitive levels of junior basketball.

The results of the present study indicated that the coaches attempted to behave with restraint, and to be seen as positive role models, and that the coaches' focus was on development of the individual. The coaches reported being aware of their responsibilities in this area, although at times some of their behaviour, such as the repetitive nature of their instructions to players, surprised them, when they saw themselves on video-tape. This raises the question of whether this focus, given the rules pertaining to the behaviour of team officials, is true of the wider group of coaches involved in basketball coaching. A future study could utilise the methodology of the current study to video-tape and then interview a group of senior coaches and ascertain whether they operate with similar restraint to the coaches in the present study.

In this study, I dispensed with the material that related to the coaches' own preparation and the preparation of the team. The material indicated that the coaches engaged in basic rituals designed to gain control over the way they were feeling prior to the game, in order to be focused on how they were going to coach. The generally accepted view is that the preparation of players affects the players' performance. This raises the question of whether preparation using sound psychological principles is equally important for coaches in the performance of their

duties. Future research could focus on investigating what practices coaches, at a range of levels, engage in prior to games and what the coaches believe the desired outcomes of these practices are meant to be.

Another finding from the material relating to coaches' preparation was that some of the coaches indicated that they believed that their manner of behaviour towards the players could affect the motivation of the players toward the game. As this evidence is purely anecdotal, it raises the question of what effect coaches believe they have on player motivation prior to the game and whether players perceive this to be the case. Future research could focus on what players believe motivates them and whether coaches affect this by the manner in which they behave prior to games. It would be of interest to see whether this differs at various age groups.

The findings of the present study were not only limited by the small number of coaches involved, and the homogeneity of the level of competition, but also by the fact that the study utilised coaches from only one sport. In addition to questions regarding the ability to generalise across basketball, there is also a question of the applicability of the findings to other sports. Different sports are conducted under a range of differing rules and constraints, relating to acceptable coach behaviour. This raises the question of what differences may occur in other sports, given the differing rules and constraints, and the affect this has on coach arousal and behaviour. This may allow insights into the manner in which coaches behave in specific sports, and whether the different demands of those sports require different types of behaviour by the coaches or indeed different levels of arousal to perform their duties at an optimum level.

Another question arising from this research relates to how coaches are trained or educated to perform their duties in a manner deemed as acceptable to the sport. The findings of studies across a range of sports would be particularly important for coach educators, who, at this point, do not seem to discriminate between the varying demands of differing sports in terms of optimal coaching behaviour. It seems to be assumed that varying sporting contexts do not require differing approaches by the coach, or that the differing contexts may place different pressure demands on the coach. More detailed, insightful research may provide data that would allow more sport specific training to be provided for coaches.

In my view, the present research has provided material that points to a range of questions relating to how coaches behave during games. The current study does not provide definitive answers to these questions, but indicates directions in which future research might usefully go.

Implications for Practice

For coaches, it is clear that substantially more is known about their team's preparation, what aids the players' performance and their development, and what constitutes sound practice, than is known about the same areas in relation to coaches. The results of the present study indicated that video-recording and the stimulated recall technique could be used as part of normal coaching practice to provide much detailed information as to how coaches perceive and interpret their behaviour during games. The majority of judgements made of coaching performance are arrived at by way of inference or connection with the performance of the team or individual being coached. There is no clear prescription about what constitutes successful coaching behaviour, especially with senior players, so any method or technique that furthers

our understanding of coaches and coaching is to be encouraged. In other domains, where the basis of the work is with individuals or groups, for instance, counselling, the practitioner is encouraged, and often required, to closely scrutinize the key elements of their professional behaviour. This would seem to be a fruitful avenue for coaches to pursue in order to monitor and improve their performance.

The results of the present study indicated that coaches do not always control their arousal or their behaviour, even at the developmental level of the coaches who participated here. Further, the study showed that these coaches had little idea of effective techniques to manage arousal and reduce the occurrence of inappropriate behaviour. The coaches in this study saw their major focii to be on the developmental aspects of the sport and to provide an appropriate role model for the players by the manner in which they coached. The coaches' responses indicated that, while they were generally aware of how they behaved, there were instances when they were surprised by the repetitiveness or intensity of their behaviour. It would be helpful for coaches to be better equipped to recognize when their behaviour was becoming more intense or repetitive than required, and to be able to take steps to rectify it. The introduction of training in such techniques into coach education would help coaches to manage their emotions more effectively and meet their aims to focus on their roles of training the players in their team, and behaving as a role model for the players. These techniques might be introduced at a basic level at introductory coaching courses so that coaches can be made aware of the circumstances under which unwanted coaching behaviours might appear. If the coach then progresses through to more competitive levels of coaching then more individualized education in sport psychology should be made available to them.

Video-taped highlights are used extensively to monitor players' performances and to provide feedback to players about their performance. Given the coaches in this study found instances of their behaviour as recorded on video-tape that was at variance to their recollection of their behaviour, it would seem that more extensive use of this medium would be of great value to coaches. It provides a valid method for reviewing how they behaved in relation to the circumstances of the game. This would allow them to recognize whether there was a pattern to their behaviour in relation to a game circumstances, and allow them the opportunity to change and then measure whether change has been affected.

Concluding Comments

The aim of this study was to seek the views and interpretations of individual coaches about their thoughts and behaviour related to selected game situations. In particular, I aimed to explore whether these interpretations were linked to coaches' arousal and behaviour. The results indicated that the coaches placed greater emphasis on the developmental process of coaching juniors than on the game outcome. As a result, they believed that they should act in a manner designed to enhance that process, rather than becoming preoccupied with the game outcome. Having said that, however, there were times in the games when coaches admitted that they slipped into behaviour that seemed to be related to the outcome, rather than the developmental process. The coaches reported that this behaviour related to game state, typically occurring when games were close towards the end. The analyses of arousal and behaviour in Study 2 did not support this. That there wasn't a pattern to these stressful events may be to do with the subjective definition of a stressful event. The coaches indicated that they are aware of when they became overly aroused and that

they had established rudimentary techniques for re-establishing control. What would be of benefit for these coaches would be to become more sensitive to circumstances in which they become aroused and to learn and utilise appropriate techniques to avoid undesirable increases in arousal level. The coaches found the video-tape of their coaching to be of great value, and could see the benefits of undertaking this process on a regular basis as a means of monitoring and then, by focusing on specific aspects of their behaviour, improving their behaviour when they are coaching in matches.

Asking the coaches' comments regarding the video-taped excerpts added value to the study. Their comments regarding what they were thinking, or feeling at a particular time in a game helped enrich the information gained by the observation and objective measurement process. This will be explored in greater detail in the next chapter.

CHAPTER 6: GENERAL DISCUSSION

The original aim of this thesis was to examine the relationship between the arousal levels of coaches and their behaviour during matches. While early studies had examined the levels of physiological stress that coaches and officials experience during games, none had examined whether these physiological changes, particularly arousal, influenced the behaviour of coaches. Further, there had not been any studies examining whether coaches' anxiety prior to competition had any influence on their subsequent coaching behaviour. The implicit model underlying the first and second studies could be illustrated as shown in Figure 6.1.
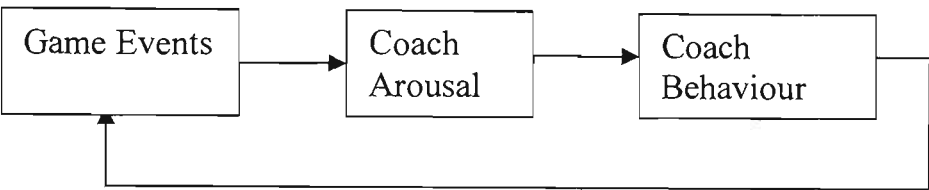

Figure 6.1 An implicit model of the relationship between game events, coach arousal, and coach behaviour

This model was conceptualised on the basis that, in a game, the response of a coach to specific game events could lead the coach to become aroused, resulting in possible changes, in their coaching behaviour. Studies 1 and 2 were designed to test the link between coach arousal and coach behaviour that is suggested by this implicit model. In addition to the importance of understanding coach arousal and behaviour, another important concern, suggested by the implicit model, is that coach behaviour impacts on game events, through the reaction players have to the coach's behaviour. Although this issue is beyond the remit of the present thesis, it is an assumption

which has implications for coach behaviour, as well as coach arousal, if arousal affects behaviour, as predicted.

The findings of Study 1 were established using a small sample of four coaches, who were experienced in coaching at relatively high levels. Study 1 focused on three areas; state and trait anxiety, levels of arousal as measured by heart rate (HR), and coach behaviour. The results indicated that measuring anxiety by way of paper and pencil tests 15 minutes prior to a game was of limited use, as the measure did not reflect the changes that occur during the game. As a consequence anxiety was not measured in Study 2.

With the exception of the tests of anxiety being removed, Study 2 followed the same model as that described for Study 1, but with a larger number of coaches, who were each studied, for one game. As distinct from Study 1, where the sample comprised coaches who had coached at high levels, the coaches in Study 2 were selected on the basis that they were coaching at the highest level that they had coached. The aims of the study were (a) to compare arousal levels and behaviour of coaches in stressful and non-stressful game situations, (b) to compare coach behaviours in stressful and non-stressful game situations, and (c) to examine the relationship between coach arousal levels and behaviours. Stressful events in Study 2 were classified to be segments where the coach's team went from winning to losing or vice-versa over a short period of time, or where there was a substantial change in game score.

I will briefly review and compare the findings of Studies 1 and 2 with regard to arousal and then behaviour. In Study 1, the coaches' HR's varied considerably, despite the coaches being involved in similar game situations. One trend to emerge

was that coaches' HR's tended to decrease towards the end of games where there was a perceived certainty regarding the game outcome. The coaches in Study 2 also showed great variability of HR when they were coaching in games where the scores fluctuated. The patterns of coaches' HR's were not as consistent as those of the coaches in Study 1, however. For example, two coaches in Study 2 had increases in HR towards the end of games despite the game outcome being clear.

In both Studies 1 and 2, coaches' behaviour, as coded using CBAS, was drawn from a small number of categories. In both studies, there was a large amount of technical information given to players in addition to encouragement and verbal reinforcement. In this regard, the findings of both studies differed from the results reported by Smith, Smoll, and Curtis (1979), who reported that the coaches of junior teams displayed more encouragement and reinforcement, than behaviour related to giving explicit coaching information to the players. This may be related to differences in the make-up of the playing groups. For example, the players in the Smith et al. study were recreational sport participants, as opposed to competitive level junior basketball players in the present research. There were also cultural differences between the sports and the approach to youth sport in the countries in which they are played. In addition, there is 20 years difference between the time the two studies were undertaken, and the focus of coaching may have changed in that time. The results of Studies 1 and 2 also differed from those of Cote et al. (1993), who reported that when coaches in the teams in their study were behind the coaches tended to disagree more than when their team was winning. Further, Cote et al. reported that the coaches in their study displayed conflicting behaviour by encouraging their players to respect the rules, yet at the same time exhibiting

behaviour that indicated disagreement with the rules. In the present studies, the behaviour of the coaches tended to be consistent irrespective of whether their team was winning or losing.

The division of coaching behaviours into spontaneous and reactive resulted in nearly two-thirds of coaching behaviour in Studies 1 and 2 in the present thesis being classified as spontaneous. This, perhaps, indicates that the focus of the coaches is on developing the style of the game and the skills of individual players, rather than responding to mistakes or poor passages of play that occur during games. This focus would be consistent with a developmental coaching approach. A similar proportion of spontaneous behaviour was exhibited by the coaches in Study 2, when the game situation was defined as stressful, that is, when the score difference was less than five points. This might indicate that the coaches were attempting to influence the outcome of the game by utilising spontaneous behaviour as a means of directing the play of their team, and not merely reacting to the stressful game situation. Statistical analysis revealed no significant difference, however, between the frequency of spontaneous or reactive behaviour between the stressful (less than five points margin) and non-stressful (more than five points) game states.

Arousal and Behaviour

An examination of the data in both Study 1 and Study 2 related to arousal and behaviour failed to identify any patterns of arousal for the various categories of coach behaviour as measured by the CBAS. In Study 1, where coach behaviour fell mainly into seven CBAS categories, no significant difference was found for mean coach HR's for those categories. In Study 2, the seven games that were close revealed mainly spontaneous coach behaviour, but not related to whether the team

was winning or losing. Equally, the coaches' HR showed no significant difference for when the coaches' teams were winning or not winning, and without a clear pattern being apparent for HR between the two conditions. The differences in patterns between Studies 1 and 2 prompted me to interview some of the coaches who participated in Study 2, in order to examine what underpinned the coaches' behaviour during games.

The aim of Study 3 was to clarify what the coach was thinking or feeling during selected parts of the game in which they were monitored. In Study 3, five coaches from Study 2 discussed their thoughts and feelings during sections of their game, which had been identified as stressful. The coaches were selected because they coached in games where the game score showed substantial fluctuations. The responses of the coaches in Study 3 allow greater understanding of why these coaches behaved in the manner they did, especially in the game situations that were defined as stressful yet did not necessarily present as stressful given the difficulty of establishing a relationship between coaches' arousal as measured by HR, their behaviour, and stressful events as defined by the game score in Study 2.

One of the general dimensions to be identified in Study 3 related to coach-self-awareness. Under this dimension, three second-order themes were related to arousal, namely, coach aware of emotion, coach lack of physical awareness, and coach awareness of physiological arousal. Under the lack of physical awareness second-order theme, two coaches reported that they were unaware of their physical feelings and of their HR level at particular times during the game. One coach reported that he would need to be "out of their tree" to remember when he was becoming aroused. Another coach believed that he would not be aware of his level of

arousal until after the game, because he was too involved in game events to notice what he was experiencing personally. Under the second-order theme, coach awareness of physiological arousal, all coaches reported that they did become aroused at various times during the game, even if they were not aware of the arousal at the time. The coaches also expressed the view that high levels of arousal might not be advantageous to their coaching performance. The coaches' responses indicated that, although they had some awareness of their arousal, there were times when their arousal level rose higher than they had realised or would have wished. The coaches were able to report the types of situations in which they might become aroused, for example, when the opposition was getting easy baskets, or when their team was about to play a game against a top team. One of the conclusions that could be drawn was that the coaches were aware of their arousal level the majority of time during a game, but that increasing arousal was occasionally brought to their attention by an incident or event occurring during a game, for example, a missed pass or shot. It did not appear as though the coaches were able to monitor the rises in a systematic manner or to manage them effectively.

The coaches were also asked whether they were aware of how they were feeling or behaving at particular points in the game. As with arousal, some of the coaches were not aware of how they actually behaved, as compared to their behaviour depicted on video-tape. For some of the coaches, the difference in their behaviour was associated with either the repetitiveness or intensity of the coaches' behaviour, not so much with how the coaches believed that they were actually behaving. Most of the coaches reported that they were in control of their behaviour and aware of what they were doing. Having said that, the same coaches described

what they did when they recognised that they were behaving in an uncontrolled manner. This would seem to contradict the claim made by the same coaches that they felt that they were always in control of their behaviour, as they relied on external cues to focus their attention on their behaviour at a particular point in time. From the interviews conducted as part of Study 3, it is apparent that coaches' awareness of their arousal and behaviour was variable, and not as accurate as they claimed. The coaches were able to talk about indicators that related to their level of arousal and what the likely outcomes might be as a result of knowing that they became aroused. They also indicated that the manner in which they behaved was related, at various times, to the state of the game.

The data from Study 3 indicated that an overriding concern of the coaches was with the development of the players as individuals and as team members. Typically, this developmental role appeared to supercede the coaches' concern with winning. The coaches reported that an important part of this developmental approach was the desire to be a good role model for the junior players who they coached. There were instances, where the coaches reported that their behaviour was related to the score, as opposed to focussing solely on the developmental aspects of the game. This point is interesting given that the data from Studies 1 and 2 indicated that the coaches typically did not "lose it", when the score was going against their team. This may be related to the rules of basketball that require officials to act in a proscribed manner or risk being sanctioned. It is also likely that, although their focus may have occasionally shifted from the developmental aspects to the competitive aspects of the game, the overriding concern of being a good role model, as reported by the coaches in Study 3, encouraged them to demonstrate a controlled demeanour externally, and

to act appropriately as a role model. The reports that the coaches made of being aware of a shift of focus from the developmental to a win-the-game orientation might also reflect the way in which such shifts stand out, if they occur only occasionally.

In summary, it is clear that the coaches were very mindful of monitoring their behaviour, so that it reflected their desire to focus on the development of the players and the team, and to do so in a manner consistent with demonstrating appropriate behaviour for the age group that they were coaching.

Thesis Conclusions

The coaches, at the level studied in this thesis, reported that their major coaching focus was on the educational and developmental aspects of junior basketball and that an inherent part of this was their desire to act as an appropriate role model for the players. Because of their development role, for these coaches, it appears from their reports that the game score was often overridden by the extent to which players and the team were carrying out the developmental tasks the coach had set for them. Thus, if the team fell behind, this would not necessarily be of great concern to the coach, as long as the players were following the guidance given to them by the coach related to performing tasks that would further their development as players. The coaches did, however, indicate that they could become aroused or emotional, if the players were not performing the development tasks asked of them in an appropriate manner. Thus, arousal might not be high when expected from the context of a game, and it might not correspond to behaviour as predicted on the basis that high arousal reflected coach concerns with individual and team performance associated with the game score. This might help to explain the absence of the expected patterns of arousal and behaviour in Studies 1 and 2.

As a result of their focus on the developmental aspects of coaching, coaches in Study 3 reported that they monitored their behaviour closely and tried to ensure that they behaved in an appropriate manner, even when the circumstances or context of the game might in some circumstances cause them to react emotionally. The CBAS results from Study 2 indicate that the majority of coaches' behaviour fell into four categories that were related to giving instruction and encouraging players. This supports the view held by the coaches that their focus was on developing the players and not on winning.

The coaches also reported that they made efforts to control their behaviour in spite of arousal increases. This would also be likely to lead to a mis-match between arousal and behaviour, or at least, the absence of a systematic relationship between these two variables. From the material the coaches provided in the interviews, it appears that, although coaches broadly recognised the nuances of their behaviour in relation to the game context and the performance of the players, they did not necessarily have the sensitivity to recognise the onset of arousal early enough to manage it effectively. Likewise, the methods that were used to control arousal and regain control seem, at best, to be rudimentary. Thus, although arousal levels in Studies 1 and 2 did not reflect predictable patterns, a number of coaches did show high levels of arousal. Presumably, these high arousal levels were related to events that the coach perceived to be stressful, but which were not detected by the frame of reference I was using in these studies.

The Revised Implicit Model

The model used as the basis for Studies 1 and 2 indicated a relationship between game events, coach arousal, and subsequent coach behaviour. The results of

those studies and the material derived from Study 3 indicate that the model was not

appropriate for understanding these relationships. The model in Figure 6.2 might

better reflect an implicit model for understanding what determines why coaches

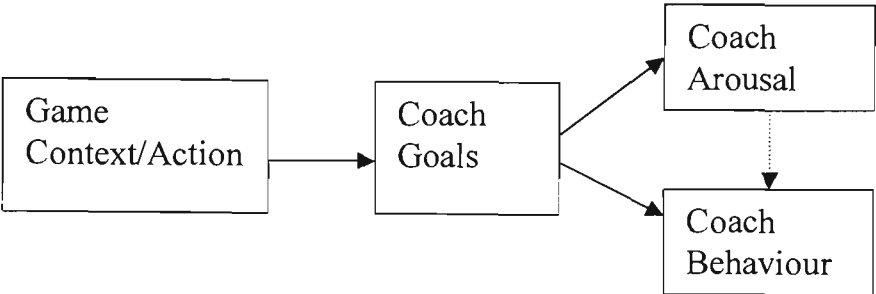become aroused and what underlies their behaviour.

Figure 6.2 A revised implicit model of the relationship between game events, coach arousal, and coach behaviour

The results of Study 3 indicate that, to understand what process underpins the arousal

and behaviour of a coach, it is important to know the game context that exists at a

particular time and what the goals of the individual coach are in relation to that

context. In Study 1, there was a general pattern of coaches' HR decreasing towards

the end of the game when the game outcome became clear. In Study 2, the same

pattern was not clear, with a range of different HR responses occurring given the

likely game outcome. The results of the interviews in Study 3 indicated that the

coaches had goals for particular games that were related to the developmental

process, rather than to the sole goal of winning. Likewise, the behaviour of the

coaches was focussed on being a positive role model for junior players, rather than

exhibiting behaviour associated with winning at all costs, as might be more likely to

occur in senior competition. The predominant behaviours coded, using CBAS in Study 2, were from four categories, all spontaneous, and related to providing encouragement, reinforcement, and technical information.

From the results of the three studies in this thesis, it would seem that it is difficult to draw conclusions as to coach arousal and behaviour without understanding what the goals or intentions of the coach were for the particular game. This would suggest that the implicit model that was the stimulus for the initial study of this topic might be an over-simplification. In future, research might be better guided by an implicit model like the one proposed in Figure 6.2. The revised implicit model assumes that coaches enter specific games with clear goals in mind as to how they wish the players to perform. Thus, to understand the significance of a coach's arousal and behaviour, specific game contexts would have to be viewed in the light of those goals being made explicit by the coach. Retrospective techniques, such as utilising video-taped excerpts, allow researchers the opportunity to compare the intention of a coach's behaviour in a particular context, to what actually transpired. Trudel, et al., (2001) gave a detailed explanation of how they utilise video-tape for the purpose of validating what the coach reported to have happened in a particular instance, with what was recorded on the video-tape.

Future Research

The results of the three studies in this thesis indicate that it is difficult to explain the arousal of coaches by examining what is happening in the game. That is, arousal level is not simply a mechanical response to competition events. Likewise behaviour cannot be understood solely on the basis of examining coach arousal during games. To understand arousal and behaviour, it is important to understand the

goals of coaches, including how coaches perceive their role. Then research can be undertaken to examine how those goals affect coaches' subjective interpretation of game situations. In a recent study, Gilbert and Trudel (2004) utilised the concept of the role frame of coaches (after Schon, 1983), as a means of understanding how a coach's belief system acts as a filter, influencing the manner in which they define their professional responsibilities. That study of six youth sport coaches, three coaching junior ice hockey teams and three coaching junior soccer teams, followed the coaches over a two year period of time. The study identified a composite role frame for the coaches, consisting of three boundary components and nine internal components. Gilbert and Trudel reported that boundary components, for example, age group of players and competitive level, are situational factors that influence the coach's approach to coaching. Internal components are the coach's personal attitudes or views that are framed by the external boundary components, for example, whether the game should be fun or what emphasis is placed on team. Gilbert and Trudel noted that, because role frames are tacit, they are not always apparent to the specific coach, and that a process needs to be established to assist coaches to become aware of what underpins the way in which they approach their coaching. A process similar to this would be of great value to further our understanding of what values, both implicit and explicit, drive the coaching practice of coaches at different levels. Clearly, to do this, researchers will need to use a medium like video recording to capture the behaviour of coaches in situ for later analysis and interpretation by the coach, as it is difficult to obtain the co-operation of coaches to undertake intrusive research during competitive matches. Concurrently, research utilising the approach that Gilbert and

Trudel have designed would generate data relevant to Australian conditions, at a range of competitive levels.

Future research could also focus on a range of sports and a range of competitive levels in order to determine whether the influence of the goals of the coach on coach arousal and behaviour is universal and to understand what variables affect this relationship. Of interest would be research that compared the approach and behaviour of coaches deemed to be successful by their peers. Utilising this approach would allow greater understanding of what coaches consider to be an effective focus during games, and how that affects their arousal and behaviour. It would also be informative to investigate the differences that exist between successful coaches and those evaluated by their peers as less successful, while coaching at the same level of competition. This, of course, depends on whether success is defined entirely on win/loss records or if, for example, with junior sport, if it is defined more by the developmental gains that players make during a season. A simple method might be to use a sample comprising all the coaches in a particular competition. This might be undertaken for a junior competition, where the focus is on development, and a senior competition where the focus is supposedly on winning. Interviews with both the coaches and the players they coach might give insight into whether there are different approaches utilised by those coaches deemed successful as opposed to those coaches regarded as less successful. Clearly one of the inherent issues would be to define what being successful means from the perspective of both coaches and players.

To examine the proposition that coaches, who focus more on developmental versus outcome (win/loss) goals, might respond differently to various game events or states, in terms of arousal and behaviour, a more fine-grained approach could be

adopted. This would involve three phases. In the first phase, coaches would be interviewed in-depth to explore their goals and how the coaches perceived these would be translated into player and team behaviour. The second phase would involve video recording of one or more matches, accompanied by recording of coach arousal and behaviour. In the third phase, coaches would be interviewed, using the VCSRI technique. The focus of the VCSRI would be on the coaches' interpretation of game events that matched their goals and events that did not match, as well as their arousal levels and behaviours during those events. Careful analysis of the coaches' responses (arousal, behaviour, and retrospective interpretation) in relation to their goals would reveal whether all coaches' react to the game on the basis of the score or whether the coaches' goals colour their perception, cognition, and, thus, their physiological, psychological, and behavioural responses.

Walsh and Morris (2003) examined the characteristics of successful coaches. They identified 20 successful coaches in a range of team and individual sports on the basis of peer evaluation. Using in-depth interviews, Walsh and Morris found that one of the strongest and most consistent themes reported by these coaches was their focus on the personal development of players. Interestingly, this emphasis was observed for coaches, who were working at an elite level. These findings suggest that it is possible that the successful coaches, even at the elite level, focus on player development. Perhaps this leads to greater success in terms of win-loss records. Further research is needed to address this issue and its relationship to coach arousal and behaviour.

I have indicated that in the interviews undertaken in Study 3, I questioned the coaches as to the manner in which they prepared for games. I did not include the

material in the results as the information was not central to the research question. It would be of interest to study how coaches prepare themselves to coach in competition, from the point of view of the coach being the performer. The discipline of sport psychology has developed a range of methods and techniques designed to assist the performance of athletes. Little research has been undertaken to ascertain whether coaches utilise similar techniques prior to competition. In Study 1, I employed the CSAI-2 to study the pre-game trait and state anxiety levels of the coaches. The results did not reveal a relationship to the other measures used in the study. Research involving a greater number of coaches over a longer time frame, using a technique such as Hanin's (1995) IZOF, might reveal idiosyncratic patterns for coaches in games. As the work of Hanin relates patterns of emotions to performance for individual athletes, this kind of systematic monitoring of individual coaches could compare different patterns of arousal or anxiety to their behaviour. The differences between such research and the work undertaken in the present study are, firstly, the focus on patterns of arousal and behaviour in the individual coach and, secondly, the extensive measurement of each coach's arousal and behaviour to identify idiosyncratic patterns and relationships. This technique may also assist coaches to identify what pre-game preparation routines would best assist their performance as a coach.

Implications for Coaches and Coach Education

Most coach education is focussed on coaches gaining the necessary technical knowledge intrinsic to a specific sport to be able to enhance the performance of their players. Substantially less time is directed to assisting coaches to become aware of how they plan and perform their role as coach, and how they evaluate their

performance. The results of this thesis indicate that it is difficult to make judgements as to why and how a coach is behaving without being aware of the coach's intention in relation to the players involved in the games they coach. Equally, the thesis indicates that, while the coaches studied here had some notion of how and why they were behaving or feeling, it was at a very broad level. They also understood that emotions could affect their behaviour in a negative manner, and are likely to affect the effectiveness of their coaching. Equally, over a long period, high levels of arousal and the use of ad hoc techniques to control arousal, for example, sitting down, are likely to lead to burn out in coaches. Emphasis in coach education could be directed helping coaches to become more aware of how they behave in specific circumstances, in relation to what they consider the optimal manner of behaviour is for them. As with athletes performing under pressure, coaches would benefit from learning techniques related to establishing and maintaining optimal arousal levels for enhancing their coaching. Equally valuable would be for coaches to learn techniques to monitor their arousal and to determine whether they are functioning within their optimal zone at any point during training, or matches. Further it would be of benefit for coaches to learn techniques for regaining control of their arousal, when they recognise that they are operating outside that zone.

Monitoring coaches' behaviour and verbal comments could be undertaken by coaches at all levels at relatively little cost. The majority of teams, in a broad range of sports, video-tape games as a normal part of their practice. With the addition of a remote microphone, it would be possible for the coach's comments during the game to be added to the game footage for subsequent evaluation. This would allow the coach to concurrently evaluate the performance of the team and their own behaviour,

and to make any inferences about the relationship between their behaviour and player performance. It would also allow the coach the opportunity to monitor their behaviour in relation to the game context, and to be able to compare their performance across games. This monitoring and evaluation takes on greater relevance, if the coach is prepared to verbalise what their goals are for a particular game, because the coach's behaviour, as recorded on vide-tape, can be viewed in relation to their expressed goals for the game.

Coach education should also address is the issue of player development versus winning, and what possible affect a conflict between these two aims may have for coaches in terms of arousal and behaviour. Coaches need to be aware of techniques that enable them to monitor their arousal and behaviour, particularly in game situations that may cause their focus to shift unknowingly from a developmental focus to a competitive focus. My coaching experience leads me to believe that remaining entirely focused on the developmental aspects of the game can be difficult, particularly given the desire of players and their parents to be associated with winning teams. It can be difficult for young coaches to emphasize the developmental focus unless they have undergone coach education specifically directed towards that end. It can also prove difficult to continue to display appropriate behaviour when games are very competitive. Although the test of this will always occur during competition, it is possible for coaches to be shown context appropriate behaviour through coach education courses and to practise it using techniques, such as role play, where, in addition to performing the behaviour in a non-threatening situation, coaches are able to experience debriefing, regarding their experience of the context and the behaviour.

The results of the present thesis, as well as a range of recent research on coaching, suggests that there are exciting challenges ahead for the field of coach education. The complexity of coaches' experience and behaviour is far greater than has been conceptualised by coach education in the past. New curricula need to be developed for the preparation of future generations of coaches, in which coach goals and intentions should be primary considerations.

The Research Journey

The research process related to this thesis began as a result of my work as a full-time elite field hockey coach. I had experienced coaching a number of teams that were of different playing standards. My initial experience was with a team that was very talented, including several international players, making my role more that of a co-ordinator, because the players were capable of performing at a very high level. This meant that there were very few frustrating periods during games. One of the other teams that I coached at a similar level consisted of players who did not possess the same ability as the first team. My behaviour as a coach changed from the manner in which I coached the first team described. I experienced periods of arousal and anger related to the manner in which the players were performing and to the performance of the officials. By profession I am a counsellor and therefore have extensive knowledge and experience as to how people behave. I have also been a keen student of the sport psychology literature and was aware of how being overly aroused could affect the performance of athletes. I was interested to know whether over arousal affected the behaviour of the coach. This led me to pursue a Masters level qualification. The essence of my ideas was distilled in Study 1 of this thesis: game events affect coach arousal, and coach arousal affects coach behaviour, which then

impacts on player development (game events again). The results of Study 1 on coach arousal and coach behaviour did not support my original proposal about the relationship between coach arousal and behaviour. As I have indicated in the thesis, I proposed that this might have been related to the high level of experience of the coaches in this Study 1, and the lack of a clear definition of game events that were expected to be arousing . This led to Study 2, in which the design tightened the focus on "stressful" game events. The results still indicated a variable pattern of coach arousal and behaviour, among a larger sample of less experienced coaches. To clarify this, for Study 3, I interviewed coaches involved in Study 2, focussing on the coaches who coached in games where the lead fluctuated, to understand what underpinned their behaviour in specific game situations. The two issues that the coaches believed were of prime importance when coaching junior teams were to be a good role model and to focus on the development of the players.

I commenced the research as a Masters thesis, and subsequently converted to a PhD after the successful conduct of Study 1, in which the results proved to be inconclusive. Because I am a full-time coach, the research has been undertaken part-time, so it has spanned a 10-year period. During that time, I acknowledge that research on coaches has changed substantially. Study 3 was undertaken, because it appeared to be the appropriate way to understand, in more detail, what was affecting the coaches' arousal and behaviour. At the same time, it does reflect the shift in research on coaching to a more in-depth, qualitative approach that aims to understand what coaches are thinking and feeling and how this affects their behaviour. The outcomes of this thesis show that understanding the arousal and behaviour of coaches is aided by knowing what goals the coach has established for themselves and the

team. This then allows an evaluation of the arousal and behaviour of the coach in relation to these goals.

Concluding Comments

Coaching is clearly a key component of sport at all levels, but particularly at the higher levels of sport. Our understanding of coaching is limited, although this has developed substantially since I commenced this thesis. There appears to have been a change in direction from measuring frequencies of specific coach behaviour to understanding what the intent of the coach was in a particular situation, and whether their behaviour reflects that intent.

Studies 1 and 2 showed that despite precision in methods, monitoring variables that lack meaning or interpretation is problematic. Study 3 revealed how an understanding of what coaches are aiming to achieve can help. I hope that the insights into the less than predictable arousal and behaviour provided by the coaches interviewed in Study 3 will stimulate other researchers to study coach arousal and behaviour from the perspective of coaches' understanding of their role, their goals, and their perception of the situations in which they are coaching.

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Appendix A

School of Human Movement, Recreation & Performance
Study of Coach Arousal and Behaviour During Matches

Informed Consent Form:

We would like to invite you to participate in a study about coaching behaviour and arousal. Whilst you are engaged in coaching a game in the normal course of competition, all your behaviour and the whole game will be independently video-taped including recording of all your verbal behaviour during the game. You will be asked to wear a heart rate monitor from just before until just after the game to record heart rate. I will meet you approximately 15 minutes prior to the game for the HR monitor to be fitted, and you will stay after the game for approximately 15 minutes for the HR monitor to be removed. The HR monitor consists of a small transmitter that is worn around the chest and that contains two electrodes to record HR. The HR monitor is powered by an extremely low voltage battery, therefore there is no risk of harm to you. The HR transmitter sends HR data to a receiver that is similar in size and appearance to a digital watch and is worn on your wrist. Again there is no risk from the watch-type receiver. Following analysis of the video-tape, and within a week or so of the game, you may be invited to participate in another study, which entails an interview reviewing an edited video-tape of you coaching during selected parts of the game mentioned above. The interview will consist of questions about game situations and your thoughts and feelings. The interview will be recorded on audio-tape for analysis. All materials generated from both studies will remain totally confidential. You are free to withdraw at any time. You are also encouraged to ask questions to clarify aspects of the research at any time.

Informed Consent

I   , acknowledge that:
> The nature of the study has been explained to me.
> I have been given the opportunity to ask questions.
> I may ask questions at any time.
> I have been informed that my results will be confidential.
> I may stop or withdraw at any time.

and that I am willing to participate in this study examining coach behaviour under these conditions

Signed: Date:

Witness other than experimenter:

Signed: Date:
Any queries about your participation in this project may be directed to the researcher (John Mowat ph. 9528 3134). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MCMC, Melbourne, 8001 (telephone no: 03 9688 4710).