

**THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND
AGGRESSION ON PSYCHOPHYSIOLOGICAL WELLBEING**

by

RENARDO TREURNICH

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SUPERVISOR: DR N. COETZEE

CO-SUPERVISOR: PROF P. DU TOIT

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Abstract

The benefits of participating in sports are well documented. Recent times have seen an increase in the participation in contact sports and the seemingly accepted forms of anger and aggression. Examples of these sports are kickboxing and rugby. Anger and aggression, however, have a negative impact on wellbeing, and have been associated with various psychological disorders. This poses the question: what are the effects of accepted anger and aggression in sport on the wellbeing of the individual?

The specific aim of the present study is to explore the effects of the pro-social physical expression of anger and aggression on psychophysiological wellbeing. This is accomplished by measuring and comparing the psychological and physiological wellbeing of males participating in kickboxing (n=18), males participating in rugby (n=23) and males not participating in either (n=50). The participants, all of them South Africans, were drawn from a kickboxing club in Pretoria; a rugby academy in KwaZulu-Natal; and the University in Pretoria.

Psychological wellbeing was measured by using the State-Trait Personality Inventory (Form Y) (STPI-Y), which provides information about state anxiety, trait anxiety, state curiosity, trait curiosity, state anger, trait anger, state depression, and trait depression. The presence, or absence, of these constructs was considered and evaluated to provide an indication of psychological wellbeing. Physiological wellbeing was measured by the Viport, a novel device that provides insight into the current stress load on the heart via the cardiac stress index. Blood pressure was also utilised as a measure for physiological wellbeing. These results were statistically analysed to determine the

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relationships between anger, aggression and psychophysiological wellbeing, and to differentiate between the results obtained from the groups.

The investigation revealed multiple and significant relationships, both positive and negative, between anger, aggression and psychophysiological wellbeing for both the kickboxing and rugby groups. Almost all measures of psychological wellbeing revealed significant relationships for the group not participating in kickboxing or rugby; however, no significant relationships were found for measures of physiological wellbeing. For the kickboxing group, a positive relationship was found between anger, aggression, and heart rate. The rugby group obtained an inverse relationship between anger, aggression, and heart rate variability. A relatively strong positive relationship between anger, aggression, and trait anxiety exists in all three groups, with an overall negative relationship between anger, aggression, and curiosity. The three groups were compared to identify differences regarding psychological and physiological wellbeing. Significant differences were observed between the three groups regarding some forms of psychological and physiological wellbeing. The results indicated that the pro-social physical expression of anger and aggression does have an effect on psychophysiological wellbeing, but that these effects do vary. Further research on the topic is recommended to gain a better understanding of the exact effects that expressing anger and aggression in a pro-social physical manner have on psychophysiological wellbeing.

Keywords: anger, aggression, psychophysiological wellbeing, cardiac stress index, blood pressure, kickboxing, rugby.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

Research has shown that participation in sport has a positive impact on psychophysiological wellbeing (Scully, Kremer, Meade, Graham & Dudgeon, 1998). The World Health Organisation (WHO) (2011) defines health as not simply the absence of disease, but as a state of complete physical, psychological and social wellbeing. The presence of curiosity and the absence of anger, anxiety and depression are considered to have a positive effect on wellbeing (Spielberger & Reheiser, 2009).

Certain sports, however, are characterised by the presence of some form of anger and aggression. An example of such a sport is kickboxing, a contact sport where opponents kick and punch one another. As a result, kickboxing is perceived as a sport where overt aggression and anger are manifested in order to perform well. According to Rabadi and Jordan (2001), contact sports such as kickboxing are becoming increasingly popular in South Africa. Another sport often associated with the expression of anger and aggression is rugby (International Rugby Board, 2013; Kimble, Russo, Bergman & Galindo, 2010) in which aggression and anger manifest in the form of tackling, scrumming, rucking, mauling, and hand-offs. However, unlike kickboxing, rugby is a team sport and kicking and punching an opponent is unacceptable and contrary to the rules of the sport.

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Both kickboxing and rugby thus share a common restriction, namely that anger and aggression must be displayed in a controlled manner (Anshel, 2012). In order to ensure this, these sports are governed by strict rules and regulations. Aggressive behaviour is therefore tolerated provided that players adhere to the rules and regulations. Aggressive behaviour displayed in these two forms of sport is seemingly sanctioned by society, and could be described as pro-social forms of expressing anger and aggression. However, anger and aggression experienced by the general population seem to impact negatively on wellbeing, and are symptomatic of different psychological disorders (Novaco, 2010; Sadock & Sadock, 2007). Anger dimensions, particularly anger suppression, may lead to depression and has a negative effect on mental health in general (Abdolmanafi, Besharat, Farahani, & Khodaii, 2011). Bjork, Dougherty and Moeller (1997) found a positive correlation between aggression and depression in a non-clinical sample. Research conducted by Haukkala, Konttinen, Laatkainen, Kawachi, and Uutela (2010) has shown that anger is also related to cardiovascular disease in that low anger control could be a predictor of cardiovascular disease. Anger was also found to be a predictor of future hypertension (Howell, Rice, Carmon & Hauber, 2007). In a study by Denollet, Gidron, Vrints, and Conraads (2010), it was found that suppressed anger could increase the risk of adverse cardiac events in patients with cardiac artery disease. Although anger and aggression negatively impact psychophysiological wellbeing, one should take cognisance of the fact that the suppression of anger and aggression is also detrimental to wellbeing.

1.2 Research problem

In light of the previous discussion, one might speculate whether or not aggression and anger could benefit psychophysiological wellbeing when expressed in a sporting context, as is the case with kickboxing and rugby. It therefore needs to be determined whether there is a difference in the psychophysiological wellbeing of kickboxers, rugby players, and individuals not participating in these sports. Robertson, Daffern, and Bucks (2012) proposed that aggressive behaviour outside the laboratory environment should be researched further. To date, there has been no empirical research outside the laboratory environment which focused on the link between aggression, anger, and wellbeing by investigating a sample from a population that actively exhibits aggressive behaviour on a regular basis. By examining a sample of kickboxers and rugby players, this shortcoming in literature on anger and aggression will be addressed.

1.3 Aim of the study

The study primarily aims to provide better insight and an understanding of how anger and aggression impact on the psychophysiological wellbeing in the South African sport context. Overall, a better understanding of anger and aggression as it relates to psychophysiological wellbeing could assist in treatment planning, diagnosis, and the prognosis of psychophysiological disorders. It may influence public policies and lead to governmental programmes by focusing on schools for example, to facilitate early intervention to prevent violence and crime. In order to attain its primary aim, this study explores the impact that expressing aggression and anger in a pro-social physical

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manner may have on individuals' psychophysiological wellbeing. In order to achieve this, the following objectives were set:

- To determine if contact sport allows for the pro-social expression of aggression.
- To determine if kickboxers measure high on anger and aggression.
- To determine if rugby players measure high on anger and aggression.
- To determine if anger and aggression are experienced by a sample of individuals not participating in rugby or kickboxing.
- To investigate if there are differences with regards to anger and aggression between kickboxers, rugby players, and individuals not participating in these sports. To measure this, the following hypotheses were formulated:

Null hypothesis: No significant differences will be observed with regards to anger and aggression between kickboxers, rugby players, and individuals not participating in these sports.

Research hypothesis: Significant differences will be observed with regards to anger and aggression between kickboxers, rugby players, and individuals not participating in these sports.

- To determine if there is a relationship between anger, aggression and psychophysiological wellbeing. To measure this, the following hypotheses were formulated:

Null hypothesis: No significant relationships will be observed between anger, aggression, and psychophysiological wellbeing.

Research hypothesis: Significant relationships will be observed between anger, aggression, and psychophysiological wellbeing.

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- To investigate if there are differences with regards to psychophysiological wellbeing between kickboxers, rugby players, and individuals not participating in these sports.

To measure this, the following hypotheses were formulated:

Null hypothesis: No significant differences will be observed with regards to psychophysiological wellbeing between kickboxers, rugby players, and individuals not participating in these sports.

Research hypothesis: Significant differences will be observed with regards to psychophysiological wellbeing between kickboxers, rugby players, and individuals not participating in these sports.

1.4 Outline of chapters

The information obtained in the present study will lay the foundation upon which the next five chapters will be based.

Chapter Two will explore the constructs of anger and aggression and provide definitions as they pertain to the study. Anger and aggression will be described within the context of sport, and the relevant theoretical models that have informed the understanding of anger and aggression will be investigated.

Chapter Three will examine literature relating to the concept of psychophysiological wellbeing, and look separately at psychological wellbeing and physiological wellbeing and the elements they are composed of. The elements that constitute psychophysiological wellbeing and their relationships to anger and aggression will also be explored.

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Chapter Four will explain the methodology applied in the study, and will elaborate on the research design, sampling techniques, the sample, measures used, data collection, and data analysis.

Chapter Five will provide and interpret the results obtained from the data analyses.

Chapter Six will discuss the results and implications of the data. The hypotheses as stated in Chapter One will be reviewed, based on the relevant data.

The limitations of the study and recommendations for future research are also included in this chapter.

1.3 Conclusion

Chapter One provided a brief introduction to the literature that informed the research problem. The aim of the study was explained by means of its objectives and hypotheses of interest. An outline of the study was given and the next chapters will follow this outline.

CHAPTER TWO

LITERATURE REVIEW: ANGER AND AGGRESSION

2.1 Introduction

Since the focus of this study is to determine the effects of the pro-social physical expression of anger and aggression on psychophysiological wellbeing, this chapter will examine the constructs of anger and aggression. The definitions of anger and aggression are described and discussed. Both constructs will be explored by means of a relevant theoretical model. This chapter will also focus on the use of the constructs within the context of sport, specifically that of rugby and kickboxing.

2.2 Anger and aggression

Although anger and aggression have been the focus of numerous studies (Ramirez & Andreu, 2006), researchers still appear to differ when discussing their meaning, causes and definitions. The following sections of the chapter will discuss anger and aggression as they pertain to this study.

2.2.1 Anger

For the purposes of the present study, Cox and Harrison's (2008) definition of anger will be used because it includes the affective, behavioural and cognitive dimensions of anger. They have defined anger as a "subjective negative feeling state associated with cognitive deficiency and alteration as well as physiological changes in response to a perceived negative stimulus and may result in maladaptive patterns of behaviour" (Cox & Harrison, 2008, p. 372). The present study will in particular focus on the affective and

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behavioural dimensions of anger. The affective dimension of anger, hereafter referred to as anger, is a common emotion that is often experienced by most individuals (Anshel, 2012; Deffenbacher, Oetting, Lynch & Morris, 1996a). Ramirez and Andreu (2006) refer to anger as feelings and attitudes that represent the emotional component of aggressive behaviour. A feeling is the current mood of an individual, and an attitude is the assessment of aspects of the social world (Baron, Branscombe, & Byrne, 2008).

Anger can further be defined in terms of state anger, trait anger, anger-in and anger-out (Cox & Harrison, 2008; Spielberger & Reheiser, 2009). State anger is a psychobiological condition consisting of angry feelings that may vary in intensity with associated activation of the autonomic nervous system (Spielberger & Reheiser, 2009). The autonomic nervous system acts as a control system functioning largely below the level of consciousness (Silverthorn, 2007). It controls visceral functions such as cardiac muscles, smooth muscles, glands, and some adipose tissue (Silverthorn, 2007). The autonomic nervous system regulates the internal environment of the body to maintain homeostasis. It is composed of sympathetic and parasympathetic branches. The sympathetic branch promotes increased metabolic functioning to deal with demands from outside the body, whereas the parasympathetic branch is associated with promoting rest and growth (Porges, 1995). State anger is thus a normal emotional state that is subjective, varies in intensity, and is utilised to adapt to environmental demands. The intensity of state anger ranges from mild irritation or annoyance to intense fury and rage (Spielberger & Reheiser, 2010).

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Trait anger is the difference in the frequency that state anger is experienced over time by an individual (Spielberger & Reheiser, 2009). Here anger is seen as a personality trait, where it is assumed that individuals high on trait anger find more situations to be anger-provoking (Spielberger & Reheiser, 2010). According to Ramirez and Andreu (2006), situations in which anger can be experienced range from a wide variety of innocent stimuli to more tailored classes of stimuli. Innocent stimuli include situations such as a brief interruption in a satellite signal while watching television, or noticing unexpected spelling errors in an article. Alternately, tailored classes of stimuli include competition, rejection or apparent discrimination.

Anger-in is defined in terms of how often an individual experiences but suppresses angry feelings (Spielberger & Reheiser, 2009; Spielberger, Sydeman, Owen & Marsh, 1999). Anger-out, on the other hand, relates to how frequently an individual expresses angry feelings through verbal or physical behaviour (Spielberger & Reheiser, 2009; Spielberger, et al., 1999). Anger-out refers to behaviour taking place, whether physical or verbal. As mentioned previously, the behavioural dimension of anger is aggression. Aggression, however, is not similar to anger-out. Anger-out refers to angry feelings being expressed. Aggression, on the other hand, can take place in the presence or absence of anger (Lewis, 2010; Fernandez & Wasan, 2010) and is purely behavioural. Aggression will be discussed in the next section in an effort to distinguish it from anger-out.

2.2.2 Aggression

The generally accepted definition of aggression is behaviour with the primary intent or function to injure, harm or damage another organism physically and/or psychologically (Buss, 1961; Cox & Harrison, 2008). Anderson and Bushman (2002) define aggression as having the immediate intent to cause harm and added that the target of the aggression should be motivated to avoid it.

Other researchers such as Ramirez and Andreu (2006) and Spielberger and Reheiser (2009) do not include “intent” as part of their definitions of aggression. These researchers merely state that aggression has various motives, functions and mechanisms, and rather define aggression as involving a punitive or negative behaviour directed towards other individuals or objects. Fischer and Evers (2010) pointed out that situational social demand also plays a role in the expression of aggression.

Instrumental, proactive, premeditated or predatory aggression all refer to the same type of aggression, namely instrumental aggression. Reactive, impulsive or affective aggression (Anshel, 2012; Ramirez & Andreu, 2006; Weinberg & Gould, 2003), on the other hand, refer to hostile aggression. The instrumental and hostile aggression dichotomy has been widely used within the context of sport, and will be explored in more detail later on in the chapter (see 2.4). Other terms used to describe and distinguish between types of aggression are direct-indirect, active-passive, verbal-physical, and goal orientation (Anderson & Bushman, 2002; Buss, 1961; Ramirez & Andreu, 2006).

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Direct aggression involves a confrontation where the aggressor and the target are directly opposite each other. An example of direct aggression would be two individuals in a verbal or physical altercation, where both parties are aware of each other. Indirect aggression involves the aggressive act being delivered in a roundabout way, such as when rumours are used to discredit a fellow competitor (Buss, 1961; Ramirez & Andreu, 2006). Active aggression refers to the extent of the behaviour that individuals are engaged in, whereas passive aggression refers to aggressive behaviour when something is not being done (Buss, 1961; Ramirez & Andreu, 2006). The physical-verbal continuum refers to whether actions or words are used as aggressive behaviour (Buss, 1961; Ramirez & Andreu, 2006). Goal orientation can be divided between immediate and ultimate goals of aggression (Anderson & Bushman, 2002). It can be viewed as short- and long-term goals. Spreading rumours about a colleague at work who applied for the same promotion can be considered an indirect, active, verbal aggression with the immediate goal of putting that colleague in an unfavourable light and ultimately to gain the promotion (Anderson & Bushman, 2002; Buss, 1961; Ramirez & Andreu, 2006). A fight between two men of different gangs in prison can be considered direct, active, physical aggression with pride as an immediate goal, and territorial dominance as the ultimate goal (Anderson & Bushman, 2002; Buss, 1961; Ramirez & Andreu, 2006).

In light of the above discussion, it is concluded that aggression does not refer to a simple behaviour (Ramirez & Andreu, 2006), but that it is rather a complex action that manifests with diverse motivations, functions and means (Spielberger & Reheiser, 2009). It further demonstrates that the different types of aggression can be observed in

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a variety of contexts. To better understand the relationship between anger and aggression, attention will now be given to theoretical models explaining its occurrence.

2.3 Theoretical models of anger and aggression

Various theories have been developed in order to predict behaviour (Bandura, 1973). Similarly, theories on anger and aggression have been formulated (Anshel, 2012) in order to better predict and understand this phenomenon. This section of the chapter will give a brief description of the four main theories of recent times, namely instinct theory, frustration-aggression hypothesis, social learning theory, and the general aggression model. Anger and aggression can also be explained by displacement and the catharsis hypothesis. Displacement and the catharsis hypothesis are informed by the instinct theory and frustration aggression hypothesis and these will therefore be discussed first.

2.3.1 Instinct theory

The basic principle of instinct theory is that aggression is an inherent instinct in all people, and that when it is not expressed it builds up until expression is imminent (Freud, 1973; Lorenz, 1966; Weinberg & Gould, 2003). Instinct refers to genetically derived, specie-specific patterns of behaviour that is independent from learning (Sadock & Sadock, 2007). Instinct theory was mostly influenced by the works of Freud (1973) and Lorenz (1966).

The work of Freud on aggression started with his viewing it as a variant or displacement of libido that activates living organisms. He later changed his views, expressing his philosophical pessimism, and announced that life consists of two conflicting forces, Eros and Thanatos (Kaufmann, 1970). Eros refers to the life instinct, and Thanatos refers to

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the death instinct. These two instincts are regarded as the forces underlying sexual and aggressive instincts (Sadock & Sadock, 2007). The death instinct represents an organism's wish to return to a state of nothingness, from whence it originated (Buss, 1961; Kaufmann, 1970). The life instinct, on the other hand, opposes the death instinct, and exhibits libido and self-preservation tendencies. Both instincts aim to reduce tension. The death instinct aims to release the tension of simple living, and the life instinct aims to release sexual tension (Kaufmann, 1970). The stronger the death instinct in a person, the more essential it becomes to direct aggression outward against other objects and/or people (Buss, 1961; Kaufmann, 1970).

Lorenz's views were similar to those of Freud (Lorenz, 1966). He perceived the aggressive instinct as a major, indispensable and an inevitable component to life (Kaufmann, 1970; Lorenz, 1966). According to Lorenz (1966), the aggressive instinct motivates behaviour such as protecting territory, defending the young, and selecting mates for procreation. Lorenz (1966) argued that other more basic instincts make humans capable of love, feelings, friendship, relationships, and so forth. Lorenz (1966) agreed with Freud (1973) and believed that instincts must find periodic outlets or they will increase *ad infinitum*. This is related to the idea of displacement and catharsis later adopted in the frustration-aggression hypothesis, as catharsis forms the basis of the hydraulic model (Bushman, 2002). Displacement and catharsis will be discussed in 2.3.2.1 under the heading, Displacement and Catharsis Hypothesis.

The instinct theory has been widely criticised and even rejected (Buss & Shackelford, 1997). The reliability of Lorenz's experiments to prove the theory has been questioned by Schneirla (1973). Montagu (1973) criticised the instinct theory for formulating an

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understanding for humans by inferring it from animals. Buss and Shackelford (1997) also noted that aggression has many possible causes. According to these researchers, it is mostly evoked by external stimuli and rarely occurs spontaneously (Buss & Shackelford, 1997). Berkowitz (1973) furthermore stated that the instinct theory only recognises one possible cause for aggression, an inherent drive to aggress.

This inherent drive to aggress has also been criticised, as it is near impossible to distinguish a learned behaviour from an unlearned behaviour in humans; that is assuming that instincts refer to unlearned behaviour (Buss, 1961). Instinct theory also neglected the influence of individual experiences on behaviour. It thus completely disregarded the role of learning (Berkowitz, 1973; Buss, 1961; Montagu, 1973; Schneirla, 1973), seeing all behaviour as unchangeable and biologically based. This allowed the instinct theory to be all-inclusive. The instinct theory only provided new terminology for observation, rather than a theory able to predict behaviour (Berkowitz, 1973; Buss, 1961; Kaufmann, 1970; Montagu, 1973; Schneirla, 1973). Instinct theory in essence then fails to explain aggression in different contexts, and ignores the role of learning on behaviour. In response to this critique, the social learning theory of aggression was proposed and will be discussed in 2.3.3.

2.3.2 Frustration-aggression hypothesis

The frustration-aggression hypothesis, as is the case with instinct theory, is influenced by and based on the work of Freud (Buss, 1961). It differs, however, from instinct theory in that it could be seen as a response to the instinct theory, where a cause for aggression is provided, other than an inherent drive to aggress. The frustration-

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aggression hypothesis states that aggression is always a consequence of frustration (Dollard, Miller, Doob, Mowrer & Sears, 1939). The frustration-aggression hypothesis further specifies that aggression always presupposes the existence of frustration, and that frustration always leads to aggressive behaviour. Aggression following frustration is not always immediately obvious because social learning teaches humans to suppress and restrain overt aggression (Dollard et al., 1939). However, no assumption regarding the nature of the frustration-aggression relationship was made, whether innate or learned (Kaufmann, 1970), and this hypothesis can thus be viewed as a gateway from instinct theory towards social learning theory.

Frustration causes an interruption in the order of goal-directed behaviour (Dollard et al., 1939; Kaufmann, 1970), and it manifests when an individual who was expected to perform a certain act is prevented from doing so (Dollard et al., 1939). When such an act is prevented, aggression is experienced. Aggression, however, does not necessarily imply overt behaviour but may also refer to acts such as fantasy and dreams or plotting revenge (Dollard et al., 1939). Aggression can be directed at the self, animate or inanimate objects. It is considered an act of aggression if it would cause injury to an animate object. With this in mind, aggression can also be undirected toward any object. These objects may or may not be the source of frustration. Aggression can thus be directed at the immediate source of frustration or displaced to an unintended object (Dollard et al., 1939).

The frustration-aggression hypothesis limits aggression to being a response to frustration. According to Buss (1961), the hypothesis acknowledged and suggested that learning and time may be important variables in aggression, but that these are given

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little attention. This limitation was also recognised in the formulation of the hypothesis by Dollard et al. (1939). This hypothesis lacks the ability to predict behaviour, and like instinct theory, serves only as a new way of observation. The hypothesis has also been criticised for its broad definitions of frustration and aggression (Geen, 2001).

As mentioned previously, displacement and the catharsis hypothesis were adopted from the instinct theory. It will be discussed in the following section since it is grounded in both the instinct theory and the frustration-aggression hypothesis.

2.3.2.1 Displacement and catharsis hypothesis

Displacement is an unconscious defence mechanism where an emotional component of an unacceptable idea or object is transferred to a more acceptable one (Sadock & Sadock, 2007). In the case of aggression, the emotional component refers to anger. Displacement in this context can be identified as paradoxical behaviour where the intensity of a response is excessive to what is normally expected (Buss, 1961). Displacement, according to Dollard et al. (1939), serves to explain situations in which excessive aggression is expressed without an obvious cause. The assumption is that inhibiting anger leads to a build-up of aggression. This is similar to the views of Freud (1973) and Lorenz (1966), who believed aggressive energy builds up to a point where it boils over and is released (Anshel, 2012; Buss, 1961; Kaufmann, 1970). Dollard et al. (1939) also assume that the inhibition of any act of aggression can cause frustration that in turn increases the likelihood to aggress. By contrast, it is also assumed that any act of aggression decreases the likelihood to aggress (Dollard et al., 1939). This is known as catharsis.

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Catharsis is broadly defined as the expression of emotional impulses (Sadock & Sadock, 2007). In the context of aggression, catharsis is defined as the expression of aggression (Buss, 1961). Catharsis is the basis of the hydraulic model of anger, where anger is seen as an aggressive impulse. It is suggested that frustration leads to anger by building up pressure, much like the hydraulic pressure in a closed system, until it is released in some way (Bushman, 2002). According to Freud (1973) and Lorenz (1966), the expression of aggression occurs spontaneously, thus releasing the aggressive impulse. The decrease in the tendency to aggress as a result of expressing aggression is known as the cathartic effect (Buss, 1961; Sadock & Sadock, 2007). Aggression then is followed by a cathartic decrease in energy, followed by the beginning of a new build-up of aggressive energy (Geen, 2001).

Buss (1961) proposed that when an aggressive act takes place in the absence of anger, no cathartic effect takes place. Dollard et al. (1939) were of the opinion that a cathartic effect takes place whenever an aggressive act is carried out. Conflicting results and opinions about catharsis do not stop there, however. Feshbach (1984) claims that catharsis takes place as a subtle phenomenon. Conversely, Bushman (2002) found results which directly contradict the catharsis hypothesis. He found that individuals who expressed their anger by hitting a punching bag were angrier afterwards than those who did not hit a punching bag. Bushman, Baumeister and Phillips (2001) and Bushman, Baumeister and Stack (1999) found similar results which disproved catharsis. Results that disprove the catharsis hypothesis bring into question the legitimacy of the instinct theory and frustration-aggression hypothesis as an explanation for anger and

aggression. As a response to the critique of both, the social learning theory of aggression was suggested. This will be explored in the following section.

2.3.3 Social Learning theory

The social learning theory of aggression was proposed by Bandura (1973) in an effort to address the criticism levelled against the instinct theory and the frustration-aggression hypothesis. It focuses on the importance of learning in aggression (Anshel, 2012) which was ignored by both the instinct theory and the frustration-aggression hypothesis. The social learning theory discards the innate aggression dichotomy because complex behaviour does not emerge as a unitary pattern (Bandura, 1973). The social learning theory also criticises the frustration-aggression hypothesis because of its diverse use of the term frustration. According to Bandura (1973), the social learning theory does not see frustration as creating aggression, but rather that aversive experiences create emotional arousal capable of bringing forth a variety of behaviours. Emotional arousal is a shift away from instinct/drive. The internal emotional state can include a wide variety of emotions; these emotions are influenced by external stimuli and include physiological arousal. Behaviour depends on the types of reactions which the individual has learned for coping with stressful events and/or conditions (Anshel, 2012; Bandura, 1973).

According to social learning theory, aggression can be learned by observational learning or direct experience (Anshel, 2012; Bandura, 1973; Geen, 2001). It is argued that individuals are not born with a range of aggressive behaviour, but that it is learned in one way or another (Bandura, 1973). Although this is a move away from the innate

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theories of aggression, Bandura (1973) does recognise the limitations that biology imposes on behaviour.

Social learning theory states that aggression can be learned through observation in a deliberate or accidental manner. Observational learning has three major sources: family members, the broader sub-culture, and symbolic modelling (Reed et al., 2010). Symbolic modelling refers to casual observation of real-life models that include, but are not limited to, actions, pictures and words. By observing the actions of others, one can gain an idea of how behaviour can be expressed; it also serves as a guide for action in later representations of similar situations (Bandura, 1973; Pratt et al., 2010). However, not everything that is observed is necessarily learned, and not everything that is learned is expressed through action. Learned behaviour is rarely expressed if it has no functional value or if it is disapproved of.

Direct experience, another form of learning, refers to patterns of behaviour learned from simple reward and punishment based on trial-and-error behaviour (Bandura, 1973; Pratt et al., 2010). Aggression in everyday life is learned by observation and refined through rehearsal. Aggression can be provoked by a variety of stimuli. The timing, context and form of provocation can play a role; it can also be directed towards certain objects or individuals (Bandura, 1973). Stimuli, or events, have the ability to evoke aggression through learned experiences. These learned experiences differ from individual to individual, and a situation which evokes aggression in one person may not do so in another (Bandura, 1973; Geen, 2001). Social learning theory of aggression refers to the following as instigators of aggression: modelling influence, negative consequences, positive consequences, instructional control, and delusional control.

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Modelling influences refer to the phenomenon where individuals would use another person's behaviour as a model for their own (Pratt et al., 2010). A person would thus emulate the aggression exhibited by another in a similar situation. Modelling influences can function as a potential teacher, enhancer, inhibitor, provoker, activator, or emotion arouser for aggression (Bandura, 1973). Negative consequences, perceived or actual, can be a motivator for aggression. Bandura (1973) specifically refers to physical assaults, verbal threats or insults, unpleasant conditions, and blocking of goal-directed behaviour as motivators of aggression due to the perceived negative consequences these actions may evoke. Conversely, aggression can be motivated by potential reward and positive consequences of such actions. An example is the rugby player who performs an aggressive tackle to win the game and is awarded the man-of-the-match honours. Similarly, individuals are socialised by being rewarded for obedience and punished for disobedience. This socialisation allows authority figures to control and command others to be aggressive, especially when pressurised or justified by the authority figure (Bandura, 1973; Reed et al., 2010). Delusional control is a more pathological form of control, where aggression takes place under circumstances of bizarre beliefs or hallucinations. The individual with schizophrenia who has auditory hallucinations commanding him to burn down his house is an example of someone with delusional control.

Social learning theory states that aggression, like any other behaviour, can be sustained under certain conditions (Pratt et al., 2010; Reed et al., 2010), the basis being that behaviour is mostly controlled by its consequences (Bandura, 1973). Consequences reinforce behaviour. There are three forms of reinforcement control, according to social

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learning theory: direct external reinforcement, vicarious or observed reinforcement, and self-reinforcement (Bandura, 1973; Pratt et al., 2010). Direct consequences of aggression can be in the form of, for example, tangible rewards, status, social rewards, lessening of undesired treatment, or injury. Observed consequences are those that individuals observe through the behaviour of others who are rewarded, punished or ignored. Self-reinforcement refers to the response, either critical or approving, or to the standards of behaviour an individual sets for him- or herself. These consequences serve to maintain aggression as a behavioural action, but as in other behaviours, individual variation is to be expected (Bandura, 1973).

Social learning theory is a useful theory for understanding aggression (Anderson & Bushman, 2002). It acknowledges the importance of our hereditary limitations, but it is not taken into consideration in the theory. As such, social learning theory purely refers to learned behaviour. Yet, to some degree individuals also exhibit inherent behaviour. As Anderson and Bushman (2002) stated, research in aggression has reached a point where there is a need for a unitary theory, where innate ability and learning are taken into consideration. An example of such a theory is the general aggression model which will be discussed next.

2.3.4 General Aggression Model (GAM)

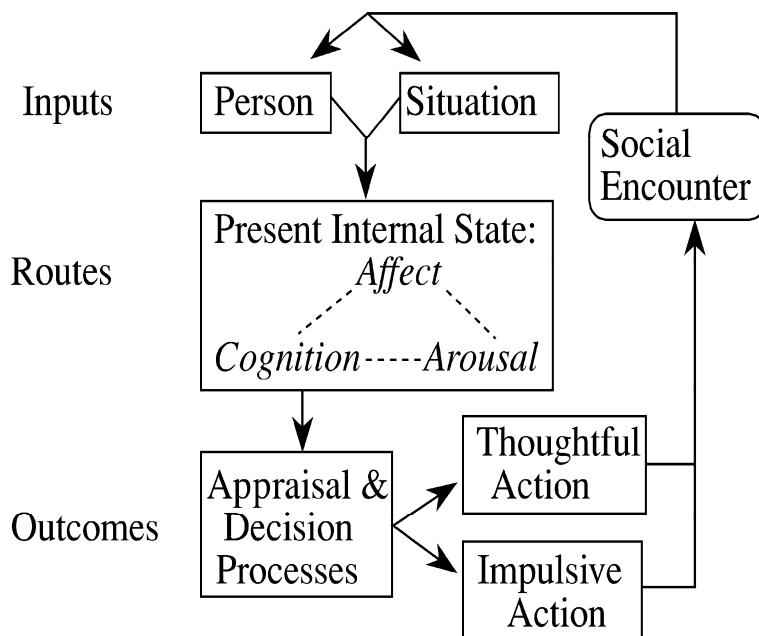
The general aggression model (GAM) is an integrative framework, combining a variety of smaller aggression theories into a unified whole (Anderson & Bushman, 2002). The GAM is concerned with the learning, development, initiation, and expression of

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aggression (Anderson et al., 2004). The focus of the GAM is on the person in a specific situation, and this is called an episode.

An episode consists of a cycle of ongoing social interactions. The three main concerns of the model are: person and situational inputs; cognitive, affective and arousal routes on which the input factors have an impact, and lastly, the outcomes as either aggressive or non-aggressive (Anderson & Bushman, 2002). In short, the model consists of inputs, routes and outcomes which then loopback in a circular fashion, and the process starts all over again (see Figure 2.1 below).

Figure 2.1. Episode of the general aggression model



Source: Anderson, C. A., Bushman, B. H. (2002). Human aggression. *Psychology*, 53(1), 34.

2.3.4.1 Inputs

Inputs are features of the person and/or situation that could lead to possible aggressive or non-aggressive behaviour. This includes, but is not limited to, biological, environmental, psychological, and social factors (Anderson & Bushman, 2002). Input factors of the person include all the characteristics of the individual. The GAM makes use of consistently available scripts and knowledge structures, and assumes that input factors of the person are stable. Scripts are sets of rehearsed, associated concepts in memory created by social learning, much like that of an actor in a play who needs to be well-versed in his lines to make the story come alive, and whose script is followed according to certain cues (Anderson & Bushman, 2002; Anderson et al., 2004).

Person input factors encompass the individual's preparedness to aggress (i.e. aggressive instinct) (Freud, 1973; Lorenz, 1966) and is influenced by personality traits, gender, attitudes, beliefs, values, long-term goals, and scripts (Anderson & Bushman, 2002). Personality is seen as the sum of a person's knowledge structures which also influence the situations an individual will either seek out or avoid (Anderson & Bushman, 2002; Ferguson & Dyck, 2012).

Situational input factors include any important features not included in personal input factors that can impact behaviour. Situational factors have an impact on aggression by influencing cognition, affect and arousal. This includes, but is not limited to, aggressive cues, being provoked, fatigue (Weinberg & Gould, 2003), frustration (Dollard et al., 1939), drugs or other substances, and incentives which could all contribute to

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aggressive or non-aggressive behaviour (Anderson & Bushman, 2002). Inputs provide the information of an episode that is utilised by the routes.

Examples of input in the sporting context could be the venue of the sport activity, the importance of the particular match/game/contest, etc., the number of spectators, the time of the match/game/contest, etc., and the level to which aggression is approved by those involved.

2.3.4.2 Routes

Routes act as the middle ground in the model and are influenced by inputs which then have an impact on the outcome. Although this step is referred to as routes, it should be thought of as the current internal state of the individual (Anderson & Bushman, 2002). The internal state routes that are influenced by the input variables are cognition, affect and arousal (Anderson & Bushman, 2002; Anderson et al., 2004; Bushman & Anderson, 2002; Ferguson & Dyck, 2012). Another way of looking at it is that the input factors can follow a route of cognition, a route of affect, and a route of arousal to reach the destination of outcomes.

The cognitive route influences, and is influenced by, hostile thoughts and aggressive scripts (Anderson & Bushman, 2002; Ferguson & Dyck, 2012). Some input variables influence aggressive behaviour by increasing the relative accessibility of aggressive concepts in memory; the thinking process therefore becomes more involved in aggression. For example, a trained boxer who can easily recall previous fights and punching combinations, as he starts thinking of one combination, he recalls others where it has been successful.

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Input variables can influence affect directly with changes in moods, emotions and expressive motor responses (Anderson & Bushman, 2002). Expressive motor responses occur automatically in combination with specific emotions, mostly associated with facial expressions such as a smile in response to a euphoric mood, but may also include other motor responses (Anderson & Bushman, 2002) such as a slouching posture or hitting an object.

Arousal influences aggression in three ways: from an unrelated source it can strengthen dominant action tendencies; it can produce anger-motivated behaviour; and possibly during times of uncommonly high or low arousal it can lead to a negative emotive state (Anderson & Bushman, 2002), although the latter effect has yet to be tested. Participating in sport could possibly be seen as a time of unusually high arousal. Input variables could influence physiological and/or psychological arousal such as an increase in heart rate and blood pressure. All three possible routes are highly interconnected and each can influence the other, and vice versa. Thus cognition could influence affect and arousal, or arousal could influence cognition and affect, even if the input variables only directly influence one of the routes. As stated previously, all these routes lead to a current internal state that informs the outcome of an episode of the GAM.

2.3.4.3 Outcomes

Outcomes involve various ranges of information processing, from those which occur automatically to those which are heavily controlled (Anderson & Bushman, 2002; Bushman & Anderson, 2002). Results from these inputs, after having gone through the

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cognitive, affective and arousal routes and influencing the current internal state, then enter the process of evaluation and decision making. The more immediate information processing takes place automatically, whereas the controlled process involves re-evaluation, making it more time-consuming and thoughtful. In cricket, for example, the fast bowler automatically responds by a need to embarrass the opposing batsmen, visualising how he throws the ball at him. However, on walking back to the start of his run-up he realises it is not good sportsmanship or within the rules of the game to throw a ball at an opponent. The bowler decides to rather bowl an unplayable delivery near the feet of the batsman.

Re-evaluation of the event will only take place in circumstances where the outcome is important and the initial evaluation was unsatisfying. This would require a certain amount of time and cognitive capacity. The eventual outcome or the final action of the episode is determined by the outcome of the decision process (Anderson & Bushman, 2002). When only immediate evaluation takes place it results in an aggressive or non-aggressive impulsive act. Where controlled information processing takes place a calculated thoughtful aggressive, or non-aggressive, act will result. In the case of the fast bowler's delivery near the feet of the opposing batsmen, it will be considered a thoughtful aggressive act as he evaluated the decision before acting.

This is the final action of the episode, and it is greatly influenced by inputs and routes, especially the current internal state. Not only does the current internal state influence the outcome process, but the outcome process reciprocally influences the current internal state and there is a constant interaction between these two stages (Anderson & Bushman, 2002; Anderson et al., 2004; Ferguson & Dyck, 2012). An outcome of the

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event then influences future input factors, and the episode goes full cycle. For instance, a bowler's delivery is not dealt with well by the batsman and results in no runs being scored. The bowler now acknowledges that the batsman struggles with that kind of delivery, and he will use it again in the next over.

The GAM includes both biology (e.g. instinct) and learning. It also allows for multiple situations or stimuli to be the provoker of aggression. Unlike instinct theory and the frustration-aggression hypothesis, the GAM makes room for emotion to play a role in the progression of aggressive behaviour. This is similar to the emotional arousal mentioned in social learning theory. Emotional arousal refers to an excited internal state that can motivate a variety of behaviours. As such, the GAM does not focus exclusively on aggression but makes room for anger (and other emotions) to be present. This is more in line with the definition of aggression as described in 2.2 above.

Another strong point of the GAM is that it does not limit aggression to a single, universal experience. It also includes elements of the theories discussed previously such as an internal current state as well as biological factors. It allows for aggression to be understood in light of individual differences and mixed motivations. The GAM provides a way of describing aggression in different situations. The GAM, however, has elicited a fair amount of criticism. Ferguson and Dyck (2012) contended that the data in support of this model has been inconclusive. They also questioned the authenticity of the scientific method used in the development of the model. Despite this criticism, the GAM remains the most comprehensive theory available to describe aggression.

2.4 Anger and Aggression in Sport

Most sports can be classified as either contact or non-contact sports (Ahmadi, Besharat, Azizi & Larijani, 2011). Contact sports include football, rugby, martial arts (e.g., kickboxing) and wrestling, whereas athletics (track and field events), swimming and darts can be considered non-contact sports (Ahmadi et al., 2011). According to Weinberg and Gould (2003), aggression forms part of the essence of both contact and non-contact sport. Aggression can include various motivators (Anderson & Bushman, 2002; Spielberger & Reheiser, 2009). This is also true within the context of sport.

In sport, aggression occurs and is tolerated in a socially accepted context (Fischer & Evers, 2010) provided that it occurs within the rules of the game. In the context of the present study, the term pro-social refers to behaviour that is socially accepted. Bresin and Gordon (2013) view aggression as a highly adaptive behaviour, a view that is shared with other researchers (Anderson & Bushman, 2002; Novaco, 2010). Pro-social aggression is then considered a pro-social form of aggression as it is sanctioned by the larger community, albeit predominantly in the sporting community.

In sports, aggression is generally referred to on a continuum of hostile and instrumental aggression (Anshel, 2012; Weinberg & Gould, 2003). Hostile aggression includes the intention to do harm, either physically and/or psychologically (Anshel, 2012; Ramirez & Andreu, 2006; Weinberg & Gould, 2003). An example of hostile aggression in sport is when a rugby player decides to punch an opposing player in a ruck. This is contrary to the rules of rugby. Instrumental aggression lacks the intention of doing harm, although it may occur accidentally, and is rather referred to as aggression which is enforced or

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applied to achieve a specific goal (Anshel, 2012; Ramirez & Andreu, 2006). Usually, in the sporting context, the goal would be to gain ascendancy over an opponent to ultimately win the game. An example of instrumental aggression in sport is when a kickboxer punches the opponent in the face in order to win the fight. Within a sporting context, instrumental aggression is most commonly seen, as opposed to intentionally harming (hostile aggression) another player. This behaviour is often punished (Anshel, 2012). Hostile aggression thus takes place outside the rules of the sport, and cannot be considered a pro-social form of aggression. Conversely, instrumental aggression is considered a pro-social form of aggression as it occurs within the rules of the sport and is sanctioned by the larger community.

Aggression and anger in sport have received considerable attention in research. Rahimizadeh, Arabnarmi, Mizany, Shahbazi, and Bidgoli (2011) found that there is a significant difference in aggression between athletes and non-athletes. They found that male athletes score lower on aggression than their non-athlete counterparts. These results confirmed that there is an inverse relationship between physical performance and aggression. In a study based on an Eastern population, results indicated that participants of rugby in particular, but also other contact sports such as football, scored higher on anger scales than non-contact sport participants (Maxwell, Visek, & Moores, 2009). Ahmadi et al. (2011) found competitive aggression to be positively associated with anger subscales in contact and non-contact sport. Only anger-in and anger-out were able to predict changes in aggressive behaviours.

From these studies it can be seen that there is a relationship between anger and sports, and aggression and contact sports. The assumption is that anger and aggression in

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these sports are considered mostly pro-social. Kickboxing and rugby are two contact sports where anger and aggression are present (Kimble et al., 2010; Maxwell et al., 2009). The next few sections will look at kickboxing and rugby and the extent to which anger and aggression are sanctioned in these sports, and whether it can be considered pro-social.

2.4.1 Kickboxing

Kickboxing is a contact sport based on the punching or hand techniques of boxing and the kicking techniques of the more traditional martial arts such as karate. These techniques are combined to shape a unique fighting style that contains a variety of attacking and defensive manoeuvres. It is an individual sport, much like tennis or fencing, where a participant will have a direct opposing participant to compete against. Kickboxing can be divided into two basic formats: tatami and ring sports (World Association of Kickboxing Organizations, 2013). Tatami sport refers to the fight, or match, which takes place on an open mat/floor, whereas ring sport takes place in an enclosed ring, much like that used in boxing. Competitions usually take place indoors, with a minimum of three officials judging a match/fight at any one time so as to ensure the rules are enforced (South African Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013). According to the World Association of Kickboxing Organizations (2013), the basis for all kickboxing competitions (and by implication all matches or fights) is honour, fair play, and honest competition.

Kickboxing, like other sports, has various modes of participation which include semi-contact, light contact, full contact, kick light, low kick, and K1 fighting (South African

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Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013). Each style of competition has a slightly different set of rules which apply. Semi-contact fighting is based on, and rewards, accuracy, speed and technical ability without the use of excessive power. Kickboxers are awarded points for clean and controlled punches or kicks against their opponents. Punches and kicks may be directed at the head and body from the hips upward. Semi-contact fighting follows a stop-start style. The fight would be stopped after every clear, controlled punch or kick, where the point is awarded to the kickboxer who struck first. This is where speed and accuracy become essential. A semi-contact fight ends either when the time has elapsed or when a kickboxer has gained a ten-point lead.

In contrast to the stop-start mode of semi-contact fighting, light contact fighting is continuous. Kickboxers continue to fight until the allocated time has elapsed (South African Amateur Kickboxing Association, 2013). A referee ensures that the rules are followed, stopping the fight from time to time if kickboxers transgress in any way. During every round of fighting each kickboxer is scored by sideline judges for making contact with the opponent. At the end of the round, scores are tallied and the kickboxer with the most points wins. Similar to semi-contact fighting, light contact fighting tests a kickboxer's technical ability and the use of excessive power is prohibited. Contact needs to be clear and should take place in a controlled manner. The area for scoring is the same as in semi-contact fighting. Light contact fighting is seen as a stepping stone for developing kickboxers to participate in ring sport (South African Amateur Kickboxing Association, 2013).

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Full contact fighting is a form of ring sport, where there is a referee controlling the fight and three side judges who do the scoring (South African Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013). The area of scoring is similar to semi- and light contact, but here the kickboxers are allowed to use all power at their disposal. The most important aspect of full contact fighting is the safety of the kickboxers, especially that of the weaker kickboxer. Kickboxers must be able to protect themselves at all times, and if they are not capable of doing so, the fight is stopped immediately. Low kicks and K1 rule fighting are similar to full contact in that kickboxers may utilise maximum power. Low-kicks fighting allows the added technique of kicking the opponents' thighs (South African Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013). Kick-light fighting is a light-contact version of low kicks, where power needs to be controlled. K1 rules fighting includes the use of a spinning backhand, kicking of the legs, and also the use of clinching or holding an opponent for no more than five seconds in order to strike them with the knee (South African Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013).

Full contact fighting needs to take place in the presence of a medical doctor and/or paramedics to ensure the safety of participants (World Association of Kickboxing Organizations, 2013). As such, most training sessions only focus on semi- and light contact fighting. For the present study, the sample mostly consisted of kickboxers participating in semi- and light contact fighting, with some participating in full contact fighting (see 4.4.1 Kickboxers, for a description of the sample).

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In addition to the rules and description of the various fighting styles, there are general rules and regulations that apply to all forms of fighting. Kickboxers compete according to age and weight classes so as to keep all contests fair. Kickboxers need to wear the correct equipment as stipulated by the World Association of Kickboxing Organizations (2013). Equipment is there to ensure safety and includes head protection, gloves, mouth guards, shin guards, foot protection, and breast/groin protection. Equipment is checked by the officials before fights. Officials (referees and judges) ensure the safety of kickboxers by strictly applying the rules of fair play, controlling the kickboxers, and deciding whether or not to disqualify (both with repeated transgressions and situations that qualify for automatic disqualification). They have the power to stop the fight (South African Amateur Kickboxing Association, 2013; World Association of Kickboxing Organizations, 2013), particularly when transgressions develop into hostile aggression which includes behaviour such as striking the opponent in the groin area or refusing to stop after the officials have halted the fight.

Within the context of kickboxing, it is possible to say that aggression takes on a direct, active and physical form with both immediate and ultimate goals. Aggression in kickboxing is observed through the acts of punching and kicking (active, direct and physical), and this can be considered an explicit form of aggression. There is also the added dimension of an opponent motivated to avoid being hurt (Anderson & Bushman, 2002) by these punches and kicks. One can assume that both kickboxers have the same goal to initially injure the opponent physically and/or psychologically and to ultimately gain ascendancy and win the fight. Overall, kickboxing utilises instrumental

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aggression in a pro-social form, unless it takes place outside the rules when it is then viewed as hostile aggression.

2.4.2 Rugby

Rugby was “created” in 1823 by William Webb Ellis, who one day at rugby school, decided to pick up the ball and run with it during a game of football (International Rugby Board, 2013). Rugby is a team contact sport and, unlike kickboxing, is also a ball sport. Rugby is played on a field of grass (synthetic grass, snow or sand are also allowed) not exceeding 100m in length and 70m in width. The game is played between two teams of fifteen players each. The object of the game is for the two teams to score points by players carrying, passing, kicking, and grounding the ball (International Rugby Board, 2013), where the team with the most points wins. Play needs to take place in accordance with the laws of the game and in a sporting spirit.

According to the International Rugby Board (2013), rugby has a spirit of discipline, control, and mutual respect that make the game appealing. Contest for possession of the ball is one of the key features of rugby. These contests occur in different situations throughout the game such as in contact, general play, and when play is restarted. Contests are balanced to reward the player or team with the superior skill set. Balance is obtained by one team trying to maintain possession, as the other team strives to contest for possession (International Rugby Board, 2013). Key features relating to the contest is the backwards pass and the offensive tackle.

The tackle occurs when a ball carrier (player) is brought to the ground (International Rugby Board, 2013). Any player is allowed to tackle, hold or push an opponent holding

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the ball. The other areas of contact allowed are scrums, rucks, mauls, lineouts, and hand-offs. In the game of rugby it is perfectly acceptable to exert extreme physical pressure on an opponent in an attempt to gain possession of the ball, and it is thus a form of instrumental aggression. Malicious intent to inflict injury (hostile aggression), however, is prohibited. Tackling an opponent with excessive power, but within the laws of the game, is allowed. Rugby can therefore be described as a full contact sport. Similar to full contact kickboxing, contact actions in rugby need not be controlled, and the full range of power and technique can be utilised.

There are situations, however, where players will be penalised for transgressing the rules pertaining to a tackle. A player may not be tackled early, late, or dangerously. A tackle is considered dangerous when (a) a player without the ball is tackled, (b) a ball carrier's feet are off the ground (when a player is in the air/jumps), (c) a stiff arm is used to strike an opponent, or (d) when the tackle takes place above the shoulder line or around the neck (International Rugby Board, 2013). In rugby, punching, striking, stomping, trampling, tripping, and/or kicking an opponent are all considered dangerous play (International Rugby Board, 2013). All of the above-mentioned actions are forms of hostile aggression. Punching and kicking, however, form the basis of kickboxing, and provided it takes place in a controlled manner and with good technique it is seen as instrumental aggression.

Dangerous play is associated with foul play. Foul play also includes obstruction, unfair play, and repeated infringements. Infringements can be contrary to a variety of laws, not all of them pertaining to the physical contact of the sport, but some are also related to the technical aspects of the game. The laws of rugby are constantly under review

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(International Rugby Board, 2013) but are too numerous to fully describe and comprehend in this work. Infringements can be anything that a player does contrary to the spirit of the game (International Rugby Board, 2013). Not all foul play is dangerous play, however, but all dangerous play is a form of hostile aggression.

Similar to kickboxing, the referee is the enforcer of the laws. The referee is assisted by two additional referees stationed along the touchline. The duties of the referee include (a) being the exclusive judge of the law, (b) keeping time, keeping score, giving permission for players to leave the field, and/or to be substituted, and (c) allowing medical personal and coaching staff to enter the field of play (International Rugby Board, 2013). The punishments for transgressing laws vary from the player being penalised, cautioned, and temporarily suspended for ten minutes or in extreme cases, being sent off the field. A player being sent off is the equivalent of a kickboxer being disqualified, although with disqualification the kickboxer also automatically loses the match. When a rugby player is sent off the field, the rest of the team can still continue to play and win the match. Another area where rugby and kickboxing differ is in the use of safety equipment. In rugby the use of safety equipment such as mouth guards and head gear are optional, whereas in kickboxing it is compulsory.

2.5 Conclusion

This chapter has established that aggression could occur with or without the presence of anger, has multiple motivations, and that it might occur in a context that is accepted by society. This form of pro-social aggression and anger is seen in sport, particularly contact sports. The contact sports of kickboxing and rugby have been described and

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explored. In both these sports, aggression takes on a direct, active and physical form. In kickboxing and rugby, one could say that anger and aggression expressed within the boundaries of rules and regulations refers to pro-social aggression. Such forms of aggression are also known as instrumental aggression. Hostile aggression, however, refers to aggression with the deliberate intention to harm or injure, and when expressed within the sporting context would be punished since it is not in accordance with the rules and regulations of the sport. The remainder of the study will attempt to determine if the physical expressions of pro-social anger and aggression have an impact on the psychophysiological wellbeing of kickboxers and rugby players. However, before this is done, an in-depth discussion will be presented to define and discuss what psychophysiological wellbeing is.

CHAPTER THREE

LITERATURE REVIEW: PSYCHOPHYSIOLOGICAL WELLBEING

3.1 Introduction

Chapter Two defined and described the concepts anger and aggression as they relate to the current study. Theoretical models underpinning these concepts were also discussed. The chapter also explored anger and aggression in the context of sport. Chapter Three will now focus on the other construct measured in the current study, namely psychophysiological wellbeing. Defining and describing psychophysiological wellbeing and how it relates to anger and aggression will be examined. Because psychophysiological wellbeing is a multi-faceted construct, psychological and physiological wellbeing will be explored separately.

3.2 Psychophysiological wellbeing

Research has indicated that sport is good for one's psychophysiological wellbeing (Scully, et al. 1998). It appears that the health benefits of sport participation are independent of gender, age, and the extent of participation (Steptoe & Butler, 1996). Steptoe and Butler (1996) found an inverse relationship between sport and symptoms of psychological distress amongst adolescent participants in a sample. Other studies have also indicated that sport contributes positively to the psychophysiological wellbeing in rural communities (Townsend, Moore & Mahoney, 2002) and urban communities (Eime, Payne & Harvey, 2009). The World Health Organisation (2011) defines health as not simply being the absence of disease, but as a state of complete physical, psychological,

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and social wellbeing. Because of time and cost constraints, the present study will not explore the social aspect of wellbeing.

In order to fully understand what is meant by psychophysiological wellbeing, one needs to investigate the two variables that are combined to form the construct, namely psychological and physiological wellbeing.

3.3 Psychological wellbeing

According to Spielberger and Reheiser (2009), depression, anxiety, curiosity, and anger are key indicators of psychological distress and wellbeing. These four emotions, varying in duration and intensity, provide fundamental information about individuals' mental health. The presence of curiosity and the absence of anger, anxiety, and depression are deemed to have a positive effect on wellbeing (Diener, 2000; Diener, Suh, Lucas & Smith, 1999; Richman et. al, 2005; Spielberger & Reheiser, 2009). Each of these constructs will be defined and described as it relates to wellbeing, and to anger and aggression.

3.3.1 Anger as indicator of psychological wellbeing

Anger manifests in various psychological disorders, but there are no diagnostic criteria to support this contention (American Psychiatric Association, 2013; Novaco, 2010; Sadock & Sadock, 2007). Anger in psychopathology can be seen in personality disorders, delusions, and hallucinations (particularly persecutory and paranoid), mood disorders, impulse control problems, dementia, and culturally bound disorders such as running amok (Novaco, 2010). In extreme instances, anger and aggression have been associated with violence which impacts the broader community, and individual

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functioning in incidences such as road rage (Overseas Security Advisory Council, 2012). Anger is therefore not merely a universal human experience but is of clinical significance in the field of psychology and related disciplines. It is evident that there is a relationship between anger, aggression, and psychological wellbeing as they manifest in psychological disorders. As anger and aggression have been explored at length in Chapter Two, this chapter will not expand on the subject. Closer attention will be given to how anger and aggression relate to anxiety, depression, and curiosity as contributing factors to psychological wellbeing. The following section will focus on depression in the context of psychological wellbeing.

3.3.2 Depression as indicator of psychological wellbeing

Major depressive disorder is a psychiatric condition which falls in the category of mood disorders (American Psychiatric Association, 2013; Sadock & Sadock, 2007) and is common amongst individuals in all spheres of life (Sharp & Lipsky, 2002). The primary symptom for a diagnosis of major depressive disorder includes having either (a) depressed mood or (b) loss of interest or pleasure (American Psychiatric Association, 2013; Sadock & Sadock, 2007).

Mood is a persistent and constant emotion that impacts an individual's perception of the world (American Psychiatric Association, 2013; Sadock & Sadock, 2007). Depressed mood can manifest at a variety of intensities such as feelings of sadness, loneliness, irritability, worthlessness, hopelessness, agitation, guilt, emptiness, and is often accompanied by suicidal thoughts (Barlow & Durand, 2009; Sadock & Sadock, 2007; Sharp & Lipsky, 2002). Due to the varying degrees of intensity and how frequently it

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can take place, depression can further be classified as state or trait depression. State depression refers to the intensity of depressive feelings and cognitions at a particular time (Spielberger & Reheiser, 2009). This then serves as an interpretation of the individual's current mental state. It can range from sadness to suicidal thoughts and feelings. Trait depression refers to the frequency of these episodes of depression-related cognitions and feelings over time (Spielberger & Reheiser, 2009). Here depression is seen as a personality trait, and the assumption is made that individuals with elevated trait depression are more likely to react negatively to situations which could provoke a depression-like response (Spielberger & Reheiser, 2009)

Along with a depressed mood, symptoms of depression are expressed in an array of physical conditions, including weight loss or weight gain, insomnia or hypersomnia, and fatigue (American Psychiatric Association, 2013; Sadock & Sadock, 2007). Evidence of the myriad of physiological symptoms that are attributed to depression can be seen in the Beck Depression Inventory (BDI). Based on clinical observations, a questionnaire was designed to measure the intensity of depression without referring to a particular theory of depression (Beck, Steer & Garbin, 1988). This questionnaire included a total of 21 symptoms and attitudes ranging from mood, pessimism, feelings of guilt, suicidal ideation, irritability, social withdrawal, crying, fatigue, and other somatic complaints (Beck et al., 1988). Other rating scales of depression have also been suggested and include similar domains of exploration such as mood, suicide, loss of interest, and somatic symptoms (weight gain and gastro-intestinal complaints) (Hamilton, 1960). One such measure is the State-Trait Personality Inventory which has been shown to have a high correlation with the BDI (Spielberger & Reheiser, 2009).

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From the range of symptoms inherent in depression, certain features can be identified that can specify the type of depression. This is mostly used for descriptive purposes in diagnoses (American Psychiatric Association, 2013; Sadock & Sadock, 2007) and includes descriptions of the severity, remission, presence of psychosis, and additional symptom features. Depression can include psychosis, although this is a poor prognostic factor (Sadock & Sadock, 2007). Melancholic depression is characterised by severe anhedonia, guilt, weight loss, and early morning awakening. Depression with melancholia is further identifiable by changes in the autonomic nervous and endocrine systems (American Psychiatric Association, 2013; Sadock & Sadock, 2007). Overeating and oversleeping are features of atypical depression (American Psychiatric Association, 2013; Sadock & Sadock, 2007).

Depression can also include catatonia. Catatonia is a disorder of movement involving immobility or excited agitation (Barlow & Durand, 2009). Over 40 motor signs of catatonia are known, and it has been suggested that catatonia should be considered a disorder in its own right (Fink & Taylor, 2001; Taylor & Fink, 2003). From the discussion it can be stated that the presence of depression, in any form, can impact and prevent an individual from functioning in an optimal manner in a variety of contexts. How depression relates to anger and aggression will now be discussed.

3.3.2.1 Depression, anger, and aggression

Anger dimensions, particularly anger suppression, may lead to depression and has a negative effect on mental health in general (Abdolmanafi, et al., 2011). The maladaptive expression of anger can result in problems most commonly associated with

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psychological distress. Gilbert, Gilbert and Irons (2004) looked at the suppression of the fight or flight reaction as playing a causal role in experiencing depression. The purpose of their study was to explore unexpressed anger and entrapment in depression as explained from an evolutionary derived theory. The present study applied anger as fight and entrapment to explain responses to a perceived threat (Gilbert et al., 2004). Data collection procedures included interviews and questionnaires with 50 diagnosed depressive individuals receiving treatment. More than 80% of participants indicated that they were suppressing their anger. The majority of participants who indicated that they suppress their anger, also claimed that they suppress their anger before the onset of depression. Gilbert et al. (2004) concluded that anger and depression are intertwined on a physiological and psychological level.

Other dimensions of anger and depression that have been explored include anger expression in situations of entrapment and how this is influenced by perceived social rank (Allan & Gilbert, 2002), the influence of pain intensity on anger management styles in the clinically depressed (Estlander, Knaster, Karlsson, Kaprio, & Kalso, 2008), the role of insecure attachment (Triosi & D'Argenio, 2004), and also anger control in the clinically depressed, non-clinically depressed, and control samples. Fayyaz and Besharat (2011) compared anger control between 60 normal, 60 non-clinically depressed and 31 depressed individuals. They found that normal individuals control their anger better than the non-clinically depressed group. The non-clinically depressed group, however, showed better anger control than the clinically depressed group. This shows that when depression is placed on a continuum, individuals diagnosed with clinical depression have less control over their anger than those on the continuum. The

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study found anger control to relate positively to depressive symptoms, and described the relationship as a causal one (Fayyaz & Besharat, 2011).

Depression has not only shown correlations to anger, but also to anxiety. Anxiety and depression showed a bidirectional relationship with insomnia (Jansson-Fröjmark & Lindblom, 2008). After reviewing the relationship between anxiety and depression, Frances et al. (1992) proposed that anxiety and depression (a) might be considered to be on the same spectrum, (b) are different external manifestations with a similar origin, (c) that one predisposes the other, or (d) the definition of both constructs overlap due to the measuring instruments being used. Lovibond and Lovibond (1995) also found a high correlation between measurements of anxiety and depression. Anxiety will be defined and described as it relates to psychological wellbeing in the following section.

3.3.3 Anxiety as indicator of psychological wellbeing

Anxiety is a negative mood state characterised by physical tension (American Psychiatric Association, 2013; Barlow & Durand, 2009) and feelings of apprehension, caused by the anticipation of either internal or external dangers such as being concerned about monthly finances (internal) or the threat of war (external) (American Psychiatric Association, 2013; Sadock & Sadock, 2007). Anxiety by definition includes physiological responses and symptoms, but is categorised as a psychological disorder, much like depression. For both anxiety and depression, the primary diagnostic criteria are related to the mood state or feeling, categorising them as psychological disorders. Distinctions could also be made between state anxiety and trait anxiety. State anxiety is defined as the intensity of subjective feelings of tension, apprehension, nervousness,

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and worry at a particular time with associated arousal of the autonomic nervous system (Spielberger & Reheiser, 2009). It is thus a transitory feeling of anxiety, with its accompanying physical manifestations such as heart palpitations or increased perspiration. Trait anxiety, on the other hand, refers to a relatively stable individual difference in anxiety proneness, as reflected in the frequency of state anxiety experienced in the past and potentially in the future (Spielberger & Reheiser, 2009). It is assumed that state and trait anxiety can be distinguished from one another by looking at time as a variable, where state anxiety refers to the current moment, and trait anxiety to an individual's predisposition to constantly experiencing anxiety. Therefore, individuals who have high levels of trait anxiety would experience more situations as anxiety provoking than those measuring low on trait anxiety.

Anxiety can be seen as an adaptive response in the face of danger and/or threat (Hawkins & Cogle, 2011; Sadock & Sadock, 2007). Anxiety could be experienced by healthy individuals in a variety of contexts including, but not limited to, threats of bodily harm, pain, damage, and social situations (Sadock & Sadock, 2007). It is assumed that anxiety is adaptive in the sense that it prepares one to take action in response to danger and/or threat (Hawkins & Cogle, 2011; Sadock & Sadock, 2007). Increased somatic and autonomic activity, controlled by the sympathetic and parasympathetic nervous systems, accompanies and assists the individual in preparing to take action. Anxiety becomes maladaptive when it is present in the absence of danger and/or threat and leads to a disruption of normal functioning (American Psychiatric Association, 2013; Pinel, 2011; Sadock & Sadock, 2007). This disruption of normal functioning contributes

to impaired psychological wellbeing. The following section will look at the relationship between anxiety, anger, and aggression.

3.3.3.1 Anxiety, anger, and aggression

Hawkins and Cogle (2011) explored the relationship between anger and anxiety disorders (such as post-traumatic stress disorder, panic disorder, social anxiety disorder, specific phobias, and generalised anxiety disorder) by administering a questionnaire to a large adult sample. During data analysis, they classified various demographics such as age, gender, ethnicity, and marital status as well as co-morbid disorders. The results of the study indicated a correlation between anger and the anxiety disorders under investigation (Hawkins & Cogle, 2011). Anger expression, on the other hand, demonstrated correlations to all the anxiety disorders except post-traumatic stress disorder and social anxiety disorder. DeWall, Buckner, Lambert, Cohen and Fincham (2010) described individuals with social anxiety disorder as having an increased vigilance and sensitivity to hostility from others, yet with a decreased likelihood of being aggressive. They also found higher levels of social anxiety to be associated with increased suppression of anger.

Kashdan and Collins (2010), in their study of social anxiety and anger, found that individuals with social anxiety disorder experience anger more frequently. This occurred in situations of both isolation and socialisation. As a result, Kashdan and McKnight (2010) proposed a type of social anxiety disorder that moves away from the prototypically shy individual. This alternative presentation of social anxiety disorder is

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atypical and characterised by aggressive, impulsive, and thrill-seeking behaviour that in the short term might serve to alleviate anxiety (Kashdan & McKnight, 2010).

Apart from anxiety disorders, research has also focused on external cues and the interplay of anxiety, anger, and aggression. The external cue that received the most attention was facial expressions. Honk, Tuiten, de Haan, Van den Hout, and Stam (2001) reported that trait anger, and not trait anxiety, was related to an attentional bias towards angry faces. These researchers studied attentional bias by conducting two experiments where stimulus cards depicting neutral and angry faces were presented to participants. In the first experiment, participants were selected according to their trait anger scores. In this experiment individuals scoring high on trait anger showed an attentional bias towards angry faces. The second experiment involved the selection of participants according to their trait anxiety scores. No relationship between anxiety and attentional bias was found in the second experiment. Following this, the participants of the second experiment were reassigned according to their trait anger scores. This yielded similar results to that found in the first experiment. This study questions whether attentional bias plays a role in the aetiology and perpetuation of emotional disorders.

Curiosity is another construct that correlates with anxiety. It is important to note, however, that these constructs are negatively related with one another (Kashdan & Roberts, 2004; Penney, 1965). Peters (1978) conducted a study on students' verbal behaviour in a classroom to determine the effects of anxiety, curiosity, and a perceived threat from the lecturer. The study included the observation of the verbal behaviour of more than 150 students attending four different classes at university. The study also

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made use of self-report questionnaires to measure the students' anxiety and curiosity levels. Peters (1978) found that students who measure high on curiosity tend to initiate verbal interaction when the lecturer is perceived as non-threatening. The study also found that high anxiety correlated with inhibited verbal responses from men when the lecturer was perceived as threatening. In another study conducted by Kashdan and Roberts (2004), participants were recorded on camera while being exposed to an interview that included various questions of a personal nature. The aim of the study was to determine the roles of trait curiosity and social anxiety in predicting positive and negative affect. Their study also included the dimension of threat while examining anxiety and curiosity. Kashdan and Roberts (2004) found that high social anxiety had an overall damaging impact on curiosity. The following section will define and describe curiosity as it relates to psychological wellbeing.

3.3.4 Curiosity as an indicator of psychophysiological wellbeing

Unlike anger, anxiety, and depression, curiosity is seen as a positive indicator of psychological wellbeing (Spielberger & Reheiser, 2009). Curiosity is a positive emotive system that involves exploration and absorption. Exploration refers to the inclination to seek out novel situations while absorption relates to the ability to focus total attention on a single task (Gallagher & Lopez, 2007). Curiosity has an impact on thoughts, feelings, and behaviour (Kang et al., 2009; Spielberger & Reheiser, 2009) and plays a crucial role in motivation, learning, and wellbeing (Kashdan et al., 2009). The immediate function of curiosity is to learn and explore, with the long-term effects of building up a knowledge base and improving competency (Kashdan & Silvia, 2009).

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A distinction could furthermore be made between state and trait curiosity. State curiosity is defined as the thoughts and feelings related to curiosity and exploratory behaviour at a particular time, whereas trait curiosity refers to how often these feelings and thoughts are experienced over time (Spielberger & Reheiser, 2009). Curiosity and how it relates to anger and aggression will be explored in the next section.

3.3.4.1 Curiosity, anger, and aggression

According to Kashdan et al. (2013), curiosity contributes to discovery and personal growth. Kashdan et al. (2013) conducted four studies in a laboratory setting that measured trait curiosity, and compared it to aggression in romantic relationships, general aggression in daily living, provoked aggression in daily living, and aggression towards a romantic partner. They found that curiosity was inversely related to aggression toward romantic partners, but that in long-term relationships high and low trait curiosity participants showed no difference with regards to aggression. The researchers concluded that the presence of curiosity is associated with lower levels of aggression (Kashdan et al., 2013).

Other studies of curiosity explored the parent-child relationship in high pro-social and aggressive boys (Saxe & Stollak, 1971); curiosity about morbid, aggressive and sexually explicit viewing material (Zuckerman & Litle, 1985); and appraisals in socially anxious individuals regarding social rank, conflict and risk-taking behaviour such as aggression, substance use, and sexual behaviour (Kashdan, Elhai, & Breen, 2008). Overall, these studies indicated that the presence of curiosity is related to better global

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functioning, but that it does not imply an absence of interest or participation in risky behaviour.

In the discussion presented above, anger, depression, anxiety, and curiosity and their relationship to psychological wellbeing have been explored. It seems that anger contributes towards psychological wellbeing by being both present and suppressed. Anger suppression has been positively correlated with the presence of depression. Depression itself can be a debilitating factor in daily living. Both depression and anxiety have been shown to be associated with a negative mood state. When this negative mood state is present, an individual cannot function optimally. Curiosity, on the other hand, serves as a positive aspect of psychological wellbeing since its presence signals an intention to improve the optimal functioning of the individual. The next part of the chapter will focus on physiological wellbeing.

3.4 Physiological wellbeing

Physiological vital signs such as blood pressure, heart rate, body temperature, and respiratory rate are equivalent to their psychological counterparts of anger, depression, anxiety, and curiosity (Spielberger & Reheiser, 2009; U.S. National Library of Medicine, 2013). Blood pressure, heart rate, body temperature, and respiratory rate can be measured to evaluate physiological wellbeing (Austin et al., 1998; Taylor, 2006). A body that functions efficiently with a decreased likelihood of illness is an indication of physical health (Austin et al., 1998; Taylor, 2006). This implies that the heart, lungs, immune system, and other organs all function normally, that muscles are flexible, and

bones are strong (Austin et al., 1998; Taylor, 2006). For the purpose of the present study, attention will be focused on cardiovascular health.

3.4.1 Cardiovascular health as an indicator of physiological wellbeing

The cardiovascular system is a closed system, designed to achieve dynamic stability (Pumprla, Howorka, Groves, Chester & Nolan, 2002). It consists of a network of arteries and veins that are filled with blood that are connected to the heart and lungs (Silverthorn, 2007). The heart serves as a pump that supplies the body with nutrients and oxygenated blood (Austin et al., 1998; Moore & Dalley, 2006; Silverthorn, 2007; Taylor, 2006). In order for the heart to function as a pump, the cardiac muscles need to contract and relax on a constant basis. The time it takes from one contraction to the next is called the cardiac cycle (Guyton, 1971; Silverthorn, 2007). The period of relaxation in the cardiac cycle is called diastole and the period of contraction is referred to as systole (Guyton, 1971; Silverthorn, 2007).

When the heart contracts (systole), it pushes an increased volume of blood through the arteries which then circulates through the various routes to organs, muscles, tissues, glands, and other blood vessels. During relaxation (diastole), blood returns to the heart through the veins and via the lungs, where it is oxygenated, and the cycle is repeated continuously (Guyton, 1971; Moore & Dalley, 2006; Silverthorn, 2007).

Blood is an essential, life-sustaining substance (Silverthorn, 2007) that continuously circulates through the body. Essentially, the number of contractions per minute correlates with the increase in volume of blood the heart will pump. Blood pressure is the force exerted by blood against the wall of an artery or a vein (Guyton, 1971). The

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systolic (maximum) and diastolic (minimum) pressure is measured in millimetres of mercury (mmHg) by a digital sphygmomanometer. Blood pressure is considered an important factor in cardiovascular disease (Licht et al., 2009). High blood pressure is known as hypertension and constitutes a major health risk (Wright, Gregoski, Tingen, Barnes, & Treiber, 2011). Low blood pressure is not *per se* a health risk but it can lead to problems such as dizziness, headaches, fatigue, blurred vision, and even unconsciousness (Perloff et al., 1993; Pilgrim, Stansfeld, & Marmot, 1992; Wessely, Nickson, & Cox, 1990). The expected value for normal blood pressure is 120mmHg systolic and 80mmHg diastolic. This, however, would be too rigid a measurement, and the range for normal blood pressure is 100-139 mmHg (systolic) and 60-85 mmHg (diastolic) (Perloff et al., 1993). There are, however, limitations to the functioning of the cardiovascular system. If the cardiovascular system appears to function outside these limits, it can be considered a risk factor to optimum health (Guyton, 1971).

The heart must be able to adapt to changes inside and outside the body on a moment-to-moment basis (Guyton, 1971; Porges & Byrne, 1992; Pumprla et al., 2002). High variability in heart rate indicates good flexibility and implies healthy functioning in autonomic nervous system control. Conversely, low variability could indicate inadequate and/or irregular flexibility of the autonomic nervous system implying potential malfunction (Du Toit et al., 2012; Pumprla et al., 2002). Autonomic control of blood pressure and heart rate provides stability for the cardiovascular system (Pumprla et al., 2002). As such, heart rate and blood pressure that deviate from established, normal limits can serve as indicators for cardiovascular disease, which implies poor physiological wellbeing (Betensky & Contrada, 2010).

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According to the World Health Organisation's (2011) definition of health (see 3.2), supported by the above discussion, cardiovascular health can be defined as the absence of any cardiovascular disease, and the functioning of the cardiovascular system within its expected normal limits. The relationship between cardiovascular health, anger, and aggression will be discussed in the next section.

3.4.2 Anger, aggression, and cardiovascular health

The possible adverse effects of anger on cardiovascular health have been a well-researched topic in psychosomatic medicine (Haukkala, et al., 2010). In a longitudinal study using over 7000 participants, Haukkala et al. (2010) found that low anger control is a significant predictor of cardiovascular disease. The study looked at the relationship between trait anger, anger-in, anger-out, and anger control, and cardiovascular disease and ischemic heart disease. When the different forms of anger and their relationship with cardiovascular disease were compared, it appeared that low anger control was most predictive of cardiovascular disease (Haukkala et al., 2010). In a similar study conducted by Denollet et al. (2010), it was found that suppressed anger increased the risk of adverse cardiac events in patients with cardiac artery disease. Research has indicated that anger expression and anger suppression could be associated with coronary heart disease (László, Janszky & Ahnve, 2010), and cardiovascular prognosis and recovery (Dorr, Brosschot, Sollers, & Thayer, 2007). Similar studies have shown that anger impacts cardiovascular health before, and after, disease has been diagnosed.

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Anger in the workplace, mostly in combination with work-related stress, and its effects on physiological wellbeing, has also received considerable attention. Anger openly expressed in the workplace showed a close association with women's blood pressure (Bongard & Al'Absi, 2005). Bongard and Al'Absi (2005) found individuals scoring high on anger-out in the workplace showed greater elevations in blood pressure and heart rate than those scoring low on anger-out.

Anger expression style refers to the manner in which anger is expressed. Not all anger expression styles affect blood pressure in the same manner (Igna, Julkunen, & Vanhanen, 2009). In a study conducted by Igna et al. (2009), anger-in was associated with elevated blood pressure. It was noted, however, that lifestyle factors confounded this result. The results could not be duplicated with anger-control, where lifestyle factors seemed to play no significant mediating role. Igna et al. (2009) suggested that open anger expression, or aggression, showed a direct beneficial relationship with blood pressure. Research conducted by Bongard and Al'Absi (2005), however, seemed to yield contradictory findings. The researchers discovered that high anger expression was associated with elevated blood pressure. In another study that explored participants' blood pressure, heart rate, aggression, and depression levels when exposed to a stressor, Betensky and Contrada (2010) found that verbal aggression and depressive symptoms combine to elevate blood pressure. Heart rate, however, was not affected. According to Betensky and Contrada (2010), this elevation in blood pressure could become an early contributing factor to heart disease.

In light of the discussion provided above, the assumption is made that anger expression styles affect blood pressure in direct ways. These direct ways are referred to as

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pathways (Igna et al., 2009), and one could therefore presuppose that anger expression styles impact on direct pathways. Igna et al. (2009), however, suggested that anger expression could also impact blood pressure through indirect pathways. Indirect pathways are not directly influenced by anger expression, but rather in some roundabout way. Indirect pathways of anger expression have an influence on lifestyle factors such as alcohol consumption and body mass index which in turn could influence blood pressure. An example of an indirect pathway is when the anger expression style influences alcohol consumption, for example drinking beer when angry, and in turn the alcohol consumption impacts blood pressure. Factors other than alcohol consumption considered indirect pathways are age, a healthy diet, smoking, and inactivity (Igna et al., 2009).

Apart from anger expression, it seems that anger also impacts the occurrence of cardiovascular disease. Howell et al. (2007) found that long-term anger and anxiety are predictive factors of future hypertension. Nichols, Rice and Howell (2011) found a positive correlation between trait anger and systolic blood pressure. Suls and Bunde (2005) conducted a literature review to determine if anger, anxiety, and depression are risk factors for cardiovascular disease. They concluded that the said constructs influenced the development of cardiovascular disease more than it impacted the progression of the disease.

3.5 Conclusion

In this chapter, anger, anxiety, depression, and curiosity were discussed as indicators for psychological wellbeing. Distinctions were also made between the state and trait

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aspects of each of the four constructs. It was furthermore shown that the presence of curiosity along with the absence of anger, anxiety, and depression could indicate optimal psychological functioning.

On the other hand, blood pressure and heart rate variability that are capable of adapting to the demands of a changing environment, were shown to be indicators of cardiovascular health and thus physiological wellbeing. It was assumed that anger expression and the experience of anger would impact negatively on cardiovascular health.

Based on the discussion above, it is now concluded that psychophysiological wellbeing would be indicated by the presence of curiosity, along with the absence of anxiety, depression, and anger as well as an actively adapting cardiovascular system. The next chapter will focus on how the constructs related to psychophysiological wellbeing were measured, and will thus provide an in-depth discussion of the research methodology used for this study.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

In Chapter Three, the literature review was concluded by looking at the constructs which were grouped together during the study to explain the elements of psychophysiological wellbeing. As stated previously (see 1.3), the primary aim of the study is to determine whether pro-social physical expression of anger and aggression have an impact on psychophysiological wellbeing. In order to attain this aim, a sample was drawn and data collected. This chapter will describe the research methodology used to investigate the aims and objectives set out for the study.

4.2 Research design

An exploratory research design was employed during the study (Brown & Suter, 2012; Gravetter & Forzano, 2009). The main purpose of an exploratory research design is to gain new ideas and insights into a research problem or area (Brown & Suter, 2012). Exploratory research allows for the comparison of nonequivalent groups. A nonequivalent group design is one in which different groups of participants are formed under circumstances that are not controlled by the researcher (Gravetter & Forzano, 2009). The researcher does not assign participants to particular groups based on whether they underwent treatment or not, but rather the groups are formed by another commonality. The commonality for this study was the participation in kickboxing or rugby, and another group not participating in either of these sports. The groups were not alike and random assignment to groups could not be used (Gravetter & Forzano,

2009). In the present study, exploratory research allowed for the comparison of the three groups to measure differences regarding psychophysiological wellbeing. Exploratory research also allows for determining whether there are correlations between the variables that the groups are exposed to (Brown & Suter, 2012). In this case, the variables under investigation were the physical expression of pro-social anger and aggression and psychophysiological wellbeing. A discussion of the groups that formed the sample of this study will be discussed next.

4.3 Sampling technique

The sample used in the study consisted of three groups. Two groups were formed by using purposive sampling while the third group was formed through convenience sampling. Convenience sampling forms part of non-probability sampling, and participants are selected based on their proximity to the researcher and ease of access (Gravetter & Forzano, 2009). Purposive sampling, which is also a form of non-probability sampling, is a technique used when a sample presenting certain characteristics is required for study (Tongco, 2007).

The first group to participate in the study consisted of kickboxers that were sampled using purposive sampling. The inclusion criteria for this group involved individuals with good comprehension of the English language, who actively participated in any form of kickboxing and had any amount of experience.

The second group to participate in the study consisted of rugby players. This group was also formed using purposive sampling. The inclusion criteria for this group concerned

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individuals with a good comprehension of the English language, who were actively participating in rugby and had any amount of experience.

The last group consisted of students who did not participate in either kickboxing or rugby. A convenience sample was used during the formation of the group. This group was obtained from the Hatfield campus of the University of Pretoria.

The kickboxing and rugby groups were selected because of the researcher's belief that they need to physically express anger and aggression in a pro-social manner to excel in sport. The students, on the other hand, acted as a control group. It was assumed that when they experience anger and aggression, it would not be expressed in a pro-social manner.

4.4 Sample

As mentioned in 4.3, the sample used was divided into three groups. The first group consisted of kickboxers and will be discussed next.

4.4.1 Kickboxers

As a result of a purposive sample drawn to select kickboxers as participants for the present study, the kickboxing group consisted of a single kickboxing club in the Pretoria region of the Gauteng province. The kickboxing club is officially registered with the kickboxing governing body of South Africa, the South African Amateur Kickboxing Association (SAAKA). Written permission (see Appendix A) had been granted by the President of SAAKA to approach the club in order to obtain the sample. The club consists of individuals who participate in kickboxing for recreational purposes, and are

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considered amateurs. The researcher approached the club in person and asked for volunteers to participate in the study.

Table 4.1: *Descriptive statistics of age of kickboxers*

n	Mean	SD	Minimum	Maximum
18	26.83	10.39	15	53

The 18 kickboxers who participated in the study were all Caucasian males. Five of them participated in full-contact kickboxing as well as semi- and light-contact fighting. They all participated in both semi- and light-contact fighting.

4.4.2 Rugby players

The rugby group consisted of rugby players who are currently enrolled at the Investec International Rugby Academy based in Durban, KwaZulu Natal. This particular club was approached by Prof du Toit (co-supervisor) since the University of Pretoria has a longstanding agreement with the club to conduct research there. The purpose of this academy is to provide a platform for those individuals who wish to pursue rugby as a profession, and thus select only elite players to participate. Since this particular rugby club only has male rugby teams, the sample consisted of only males. The rugby group consisted of 12 Caucasian and 11 African rugby players.

Table 4.2: *Descriptive statistics of age of rugby players*

n	Mean	SD	Minimum	Maximum
23	19.22	1.09	18	22

4.4.3 Individuals not participating in kickboxing or rugby

The group consisted of students studying at the Hatfield campus of the University of Pretoria. They volunteered to participate in the study, although none of them played rugby or participated in kickboxing. Since the kickboxing and rugby groups only consisted of male participants, the researcher targeted male volunteers. Of the 50 volunteers, only 47 provided their biographical information. These individuals then formed the last group. The group consisted only of males: 30 Caucasians, 13 Africans, two Asians, one Indian and one Coloured.

Table 4.3: Descriptive statistics of age of individuals not participating in kickboxing or rugby

n	Mean	SD	Minimum	Maximum
47	20.09	1.28	18	24

4.5 Measures used

4.5.1 State-Trait Personality Inventory

The State-Trait Personality Inventory (Form Y) (STPI-Y) provides information about an individual's current and previous psychological wellbeing by making use of the state-trait continuum. The questionnaire comprises eight subscales that in turn consist of 10 items each. These subscales represent state and trait anxiety, state and trait depression, state and trait curiosity, and state and trait anger (Spielberger & Reheiser, 2009). The STPI-Y has no time limit and can be administered to groups or individuals. The STPI-Y describes whether the states of anxiety, depression, and curiosity are present or absent. The STPI-Y describes the presence of anger but not

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the absence thereof (Spielberger & Reheiser, 2003). State anger is further divided into feeling angry, and feel like expressing anger. Feeling angry measures the intensity of the anger that the person feels. Feel like expressing anger measures the intensity of the desire to express that anger (Spielberger & Reheiser, 2009). Trait anger can be divided into angry temperament and angry reaction. Angry temperament measures individual differences in the disposition to experience anger without any specific provocation. Angry reaction measures the frequency that angry feelings are experienced in reaction to situations that involve negative evaluations or being treated badly (Spielberger & Reheiser, 2009).

The STPI-Y is a reliable measure for the South African context, as indicated by the following Cronbach alpha values (Du Plessis, 2013): state anxiety (0.84), trait anxiety (0.80), state anger (0.90), trait anger (0.82), state depression (0.84), trait depression (0.87), state curiosity (0.76), and trait curiosity (0.78).

4.5.2 Viport

The Viport measures the current cardiac stress load, the duration of QRS-complex that indicates the stimulus conduction through ventricles (QRS represent waves on the electro-cardiogram), whether heart rate is rhythmic or not, and the standard deviation as an absolute degree of heart rate variability (Energy-Lab Technologies, 2005; Silverthorn, 2007). The Cardiac Stress Index (CSI) shows the capacity of the heart to respond to the internal and external environment, and describes the current stress load. Any score below 25% is considered ideal whereas 26-50% is an increased score indicating an increased stress load on the heart. The QRS duration is measured in milliseconds

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(ms), where 70ms to 110ms is the expected range. Heart frequency (HR) specifies the number of heart beats per minute. The expected range is 55 to 95 beats per minute. The fluctuations in heart frequency (RRDS) play an important part in calculating the CSI. The expected range for RRDS is 30ms to 70ms (Energy-Lab Technologies, 2005).

The Viport has been used in South African (Du Toit et al., 2012; Persad et al., 2012) and international studies (Aghamohamadi et al., 2010) and has proved to be an innovative and objective measuring instrument of cardiac health. Cardiac health forms part of physiological wellbeing that is being investigated in the present study. The novelty of the device is that few studies have included it in its research, and it may therefore provide new and different insights into cardiac health.

4.5.3 Digital sphygmomanometer

Systolic and diastolic blood pressure was measured by a digital sphygmomanometer from the left arm while the participant was in a seated position. The digital sphygmomanometer consists of a pressure gauge and automatic inflatable cuff (Du Toit et al., 2012; Silverthorn, 2007). The cuff is inflated to stop arterial blood flow; thereafter the cuff is gradually deflated until blood flow returns to normal. During the process of deflation the digital sphygmomanometer measures blood pressure. Digital sphygmomanometers provide a convenient, yet standardised method of measuring blood pressure.

4.6 Data-collection procedures

The following data-collection procedures were implemented during the study:

- Data collection for the kickboxing group took place at a kickboxing gym in Pretoria on two consecutive Saturdays.
- Data collection for the rugby player group took place at the Investec International Rugby Academy as part of the annual research that the University of Pretoria conducts there.
- Data collection for the individuals not participating in kickboxing or rugby took place at the University of Pretoria.

At each of the venues, data was collected at separate stations. The first station was responsible for the measurement of blood pressure, the second focused on the application of the Viport, whilst the last station involved completion of the STPI-Y. Assistants, trained in the use of these instruments, were provided by the Department of Physiology, University of Pretoria, to take the physiological measurements. As was previously noted, the STPI-Y is a self-report questionnaire and hence no professional was needed to administer it.

4.7 Data analyses

Due to differences in group sizes, non-parametric analyses were done to search for differences between groups or to determine if relationships exist between the constructs under investigation. Spearman's correlation coefficient was used to determine if a relationship exists between state and trait anger and psychophysiological wellbeing. The Kruskal-Wallis test, designed for the comparison of means across more than two

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groups, was used to determine if significant differences occurred with regards to the psychophysiological wellbeing of the kickboxers, rugby players, and individuals not participating in either of the sports. In the event that the Kruskal-Wallis test indicated significant pair-wise differences, post hoc tests were performed to determine in which groups these differences occurred.

4.8 Ethical considerations

Informed consent was obtained from all participants via an informed consent form (see Appendix B). The letter contained an explanation of what the study entailed. All queries were directed via e-mail to the researcher to eliminate any misconceptions that arose. Results were kept confidential and participants had the right to withdraw at any given moment. Anonymity of participants was protected using participant numbers. Where results indicated any psychological or physiological risk factors, which may be indicative of poor health or harm, the participant received adequate referrals to a health care professional or other appropriate professionals. All participants gave their permission for the data to be used for research purposes.

Data collected during the study will be stored at the Department of Psychology, University of Pretoria, for a minimum period of 15 years.

4.9 Conclusion

In this chapter, in-depth discussions were presented on the research design applied for the purposes of the present study and sample formation. Discussions were also presented on the measures used during data-collection procedures. It was furthermore shown that data regarding anger, aggression, and psychophysiological wellbeing was

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collected from a group of kickboxers, rugby players, and individuals not participating in rugby or kickboxing. This data was statistically analysed to determine correlations and between-group differences. The results of these analyses will be presented in the next chapter.

CHAPTER FIVE

RESULTS

5.1 Introduction

Chapter Four explored the research methodology applied in the current study. As a result of the implementation of this methodology, data was collected and analysed. This chapter will focus on the results yielded.

5.2 Descriptive statistics for state anger and trait anger

The aim of the study was to explore the impact of expressing aggression and anger in a pro-social, physical manner on individuals' psychophysiological wellbeing. In order to measure this aim, certain objectives were set. The first three of these were:

- To determine if kickboxers' mean scores will be higher for anger and aggression than the STPI-Y midpoint of 20.
- To determine if rugby players' mean scores will be higher for anger and aggression than the STPI-Y midpoint of 20.
- To determine if individuals not participating in kickboxing or rugby will yield mean scores that are below the STPI-Y midpoint of 20.

Since the maximum score on any of the subscales of the STPI-Y is 40, a decision was made to use the midpoint of 20 to indicate if a score could be perceived as above the mean. For the subscales of state and trait anger, the maximum score is calculated by combining the subscales they are composed of (i.e. state anger – angry feelings, and state anger – feel like expressing anger). For each of these smaller subscales the

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maximum value is 20, and it was decided that the midpoint value of 10 would be used to indicate a score above the mean.

Therefore, in order to determine where kickboxers, rugby players, and individuals not participating in these two sports lie with regard to their scores on anger and aggression, these groups' mean scores were compared with the STPI-Y midpoint. As was stated previously in 4.5.1, the STPI-Y measures anger and aggression by looking at state anger and trait anger. The first table will look at the descriptive statistics of state anger.

5.2.1 State anger

Table 5.1: *Descriptive statistics for state anger*

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	13.67	4.70	10.00	28.00	18
Rugby	11.00	1.93	10.00	18.00	23
No Sport	12.55	3.20	10.00	27.00	49

State anger is a psychobiological condition consisting of angry feelings that may vary in intensity, with associated activation of the autonomic nervous system (Spielberger & Reheiser, 2009).

Table 5.1 indicates that all three groups scored below the midpoint for state anger. The rugby player group showed the lowest mean ($M=11.00$, $SD=1.93$). The rugby group also showed the least variance, as indicated by the small standard deviation when compared to the other two groups. The kickboxing group and the group consisting of

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individuals not participating in any of the two sports obtained relatively similar scores with regard to both the mean and standard deviation, although the latter does show a greater range of scores.

5.2.1.1 State anger – feeling angry

Table 5.2 will present the results of state anger – feeling angry.

Table 5.2: *Descriptive statistics for state anger – feeling angry*

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	6.39	2.33	5	14	18
Rugby	5.74	1.48	5	11	23
No Sport	6.73	2.33	5	18	49

State anger – feeling angry, refers to the intensity of angry feelings that the person was experiencing at that moment (Spielberger & Reheiser, 2009). The results in table 5.2 show that the rugby group reported fewer current angry feelings than the kickboxing group and the group consisting of individuals not participating in any of the two sports. The rugby group also had the least variation in their scores. The kickboxing and no sport participation groups have both similar mean scores and variance. For all three groups, the results indicate levels of feeling angry below the midpoint.

5.2.1.2 State anger – feel like expressing anger

Table 5.3 will present the results of state anger – feel like expressing anger.

Table 5.3: Descriptive statistics for state anger – feel like expressing anger

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	7.28	3.16	5	15	18
Rugby	5.26	0.62	5	7	23
No Sport	5.82	1.35	5	12	49

State anger – feel like expressing anger, is the intensity of current feelings related to expressing anger (Spielberger & Reheiser, 2009). As was the case previously, all three groups had obtained mean scores below the midpoint of 20. The slightly higher mean score for the kickboxing group might potentially indicate that the need to express anger is higher for this group.

The following results will look at trait anger.

5.2.2 Trait anger

Table 5.4: Descriptive statistics for trait anger

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	22.33	4.64	15.00	31.00	18
Rugby	19.91	4.80	12.00	33.00	23
No Sport	20.35	5.38	11.00	34.00	49

Trait anger is the difference in the frequency that state anger is experienced over time (Spielberger & Reheiser, 2009). Table 5.4 indicates that the only group scoring below the midpoint for trait anger was the rugby group ($M=19.91$, $SD=4.80$). The group

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consisting of individuals not participating in the two sports, scored slightly above the midpoint ($M=20.35$, $SD=5.38$). The kickboxers, however, scored the highest mean score which was also higher than the midpoint of 20.

5.2.2.1 Trait anger – angry temperament

The results of trait anger – angry temperament, will be presented in table 5.5.

Table 5.5: Descriptive statistics for trait anger – angry temperament

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	8.06	2.88	4	14	18
Rugby	6.78	1.99	4	13	23
No Sport	6.53	2.48	2	14	49

Trait anger – angry temperament, measured individual differences in the disposition to experience anger without any specific provocation (Spielberger & Reheiser, 2009). Table 5.5 shows that the kickboxing group had the highest mean score ($M=8.06$, $SD=2.88$), albeit below the midpoint. The rugby group and the group consisting of individuals not participating in the sports obtained rather similar mean scores which were also below the midpoint.

5.2.2.2 Trait anger – angry reaction

The results of trait anger – angry reaction will be presented in table 5.6.

Table 5.6: Descriptive statistics for trait anger – angry reaction

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	9.44	1.54	7	13	18
Rugby	9.87	3.02	6	16	23
No Sport	10.16	2.98	4	16	49

Trait anger – angry reaction, measured the frequency that angry feelings are experienced in reaction to situations that involve negative evaluations or when being treated badly (Spielberger & Reheiser, 2009). Table 5.6 indicates that individuals in the kickboxing group have the lowest mean score ($M=9.44$, $SD=1.54$) which is considered below the midpoint. This might indicate that kickboxers have a greater degree of controlling angry responses compared to the other groups, as the group of individuals not participating in kickboxing or rugby obtained a score above the midpoint of 10.

These results provide an overview of state anger, state anger – feeling angry, state anger – feel like expressing anger, trait anger, trait anger – angry temperament, and trait anger – angry reaction, for the respective groups. Although the subscales of both state anger and trait anger were included here, future discussions and results will only make use of the full state and trait anger scales. The subscales of state anger and trait anger provide information that is encapsulated in the full scale scores, and therefore no information will be lost. To determine if there were significant differences in the

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experience of anger and aggression between the groups, the scores of state anger and trait anger were compared.

5.3 Comparison of state anger and trait anger scores between groups

After viewing the results of state anger and trait anger for the three groups in isolation, the next objective was to investigate if there were differences with regard to anger and aggression between kickboxers, rugby players, and individuals not participating in these sports. In view of this objective, the research hypothesis was stated as follows: there are significant differences in the scores of anger and aggression between kickboxers, rugby players, and individuals not participating in these sports.

Since the groups used in the study differed greatly in terms of size, a decision was made to conduct the Kruskal-Wallis test. It is a non-parametric test for the comparison of the median ranks of three or more groups (Greene & D'Oliveira, 2006; Pallant, 2013).

5.3.1 State anger

The Kruskal-Wallis test statistics for state anger will be presented in table 5.7.

Table 5.7: *Kruskal-Wallis test statistics for state anger*

	Diff_Score
Chi-Square	9.28
df	2
Asymp. Sig.	.010

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Table 5.8: Mean median rank for state anger

	n	Rank
Kickboxing	18	52.94
Rugby	23	31.89
No Sport	49	49.15

The results of the analysis indicate a significant difference in the means of state anger between the groups, $\chi^2(2, N = 90) = 9.28, p = .010$. Because the overall test is significant, pairwise comparisons amongst the three groups were computed for state anger. The results of the pairwise comparison of groups for state anger will be presented in table 5.9.

Table 5.9: Pairwise comparison of groups for state anger

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	17.06	6.38	2.68	.007
Rugby – Kickboxing	-21.27	7.94	-2.68	.007
No Sport - Kickboxing	-4.20	6.96	-0.60	.546

Table 5.9 indicates significant differences between the rugby group and the group consisting of individuals not participating in the sports, with a medium effect size

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($r=0.32$). Significant differences were also observed between the rugby and kickboxing groups, with a medium to large effect size ($r=-0.42$).

After the groups had been compared with regard to their scores on state anger, another comparison was done, this time on trait anger.

5.3.2 Trait anger

The test statistics of the Kruskal-Wallis test for trait anger will be presented in table 5.10.

Table 5.10: *Kruskal-Wallis test statistics for trait anger*

	Diff_Score
Chi-Square	2.81
df	2
Asymp. Sig.	.245

The results of the analysis indicate no significant differences between the three groups with regard to their median scores on trait anger, $\chi^2(2, N = 90) = 2.81, p = .245$. As a result, no pairwise comparison was done.

5.4 Relationship between anger, aggression, and psychophysiological wellbeing

The aim of this section is to explore whether a relationship exists between anger, aggression, and psychophysiological wellbeing and, if such a relationship exists, what the strength and direction of it is. In light of this aim, a hypothesis was formulated which stated the following: there is a significant relationship between anger, aggression, and

psychophysiological wellbeing. In Chapter Three (see 3.2), it was indicated that psychophysiological wellbeing is best understood when the constructs of psychological and physiological wellbeing are explored separately. It was further shown that psychological wellbeing referred to emotional and mental health, whilst physiological wellbeing was indicated by cardiovascular health.

Correlations were first computed for the relationship between anger and aggression, and psychological wellbeing. Before the results of the correlations are reported, the results for the descriptive statistics relating to psychological wellbeing will be presented.

5.4.1 Descriptive statistics for psychological wellbeing

As previously stated, psychological wellbeing was measured in accordance with the STPI-Y (see 4.5.1). It was furthermore indicated that psychological wellbeing was associated with the scales of the STPI-Y that consist of state anxiety, trait anxiety, state depression, trait depression, state curiosity, trait curiosity, state anger, and trait anger. Descriptive statistics have been calculated for each construct that forms part of psychological wellbeing, and are shown in tables 5.9 to 5.14. Since the descriptive statistics results for state and trait anger have been presented earlier in this chapter (see 5.2), it will not be repeated in this section.

5.4.1.1 State anxiety

Table 5.11: Descriptive statistics for state anxiety

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	21.50	3.28	16.00	29.00	18
Rugby	21.61	4.12	13.00	32.00	23
No Sport	18.35	4.85	10.00	29.00	49

With regard to state anxiety, both the kickboxing group ($M=21.50$, $SD=3.28$) and the rugby group ($M=21.61$, $SD=4.12$) obtained mean scores that are above the midpoint. The group consisting of individuals not participating in the sports had a mean score of 18.35 ($SD=4.85$) that is considered to be below the midpoint.

5.4.1.2 State curiosity

Table 5.12: Descriptive statistics for state curiosity

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	23.06	4.45	14.00	30.00	18
Rugby	24.09	3.99	15.00	33.00	23
No Sport	26.41	5.32	12.00	39.00	49

All three groups obtained mean scores above the midpoint for state curiosity. The group consisting of individuals not participating in sport scored the highest mean

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($M=26.41$, $SD=5.32$), followed by the rugby group ($M=24.09$, $SD=3.99$), and then the kickboxing group ($M=23.06$, $SD=4.45$).

5.4.1.3 State depression

Table 5.13: Descriptive statistics for state depression

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	22.72	2.24	20.00	27.00	18
Rugby	21.91	1.86	18.00	25.00	23
No Sport	16.70	4.90	10.00	31.00	49

The kickboxing and rugby groups obtained mean scores above the midpoint for state depression. Although the kickboxing group has the highest mean score ($M=22.72$, $SD=2.24$), the group consisting of individuals not participating in sport had the greatest degree of variance ($SD=4.90$) of all three groups, despite it being the only group to have a mean score (16.70) below the midpoint.

5.4.1.4 Trait anxiety

Table 5.14: Descriptive statistics for trait anxiety

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	21.06	2.86	17.00	30.00	18
Rugby	21.74	4.69	11.00	30.00	23
No Sport	19.76	5.24	10.00	32.00	49

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Table 5.14 indicates that the group consisting of individuals that do not participate in the two sports, has a mean score of 19.76 ($SD=5.24$). That is slightly below the midpoint for trait anxiety. The kickboxing and rugby groups obtained mean scores that are above the midpoint.

5.4.1.5 Trait curiosity

Table 5.15: Descriptive statistics for trait curiosity

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	25.17	4.03	18.00	33.00	18
Rugby	24.09	4.78	10.00	31.00	23
No Sport	27.57	4.33	18.00	36.00	49

For trait curiosity, all three groups obtained mean scores above the midpoint, with the group consisting of individuals not participating in the sports having the highest mean score ($M=27.57$, $SD=4.33$), followed by the kickboxing group ($M=25.17$, $SD=4.03$), and the rugby group ($M=24.09$, $SD= 4.78$).

5.4.1.6 Trait depression

Table 5.16: Descriptive statistics for trait depression

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	23.00	2.09	19.00	27.00	18
Rugby	23.09	4.54	09.00	32.00	23
No Sport	17.49	4.85	10.00	30.00	49

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Table 5.16 shows that the rugby group has the highest mean score ($M=23.09$, $SD=4.54$) for trait depression. The kickboxing group has a similar mean score ($M=23.00$, $SD=2.09$) to the rugby group, and both are considered to be above the midpoint. The group consisting of individuals not participating in the sports scored well below the midpoint.

Overall, the results for psychological wellbeing indicated that the kickboxing and rugby groups tend to obtain mean scores that fall above the midpoint for the constructs, the presence of which indicates an absence of psychological wellbeing. Curiosity, of which the presence indicates the presence of psychological wellbeing, was in general higher for the group not participating in either kickboxing or rugby.

After descriptive statistics had been calculated for the constructs related to psychological wellbeing, descriptive statistics were computed for the constructs related to physiological wellbeing. The results will be presented next.

5.4.2 Descriptive statistics for physiological wellbeing

It was previously stated that physiological wellbeing in this study focused on cardiovascular health (see 3.4). It was shown that cardiovascular health is measured in accordance with the cardiac stress index (CSI), heart frequency (HR), QRS duration (QRS), fluctuations in heart frequency (RRDS), systolic blood pressure, and diastolic blood pressure. The CSI, HR, QRS, and RRDS were measured using the Viport. The descriptive statistics for the Viport measures are presented in tables 5.17 to 5.20.

5.4.2.1 Cardiac stress index

Table 5.17: Descriptive statistics for cardiac stress index (%)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	28.72	18.01	09.00	71.00	18
Rugby	29.78	23.94	09.00	100.00	23
No Sport	33.36	24.28	09.00	100.00	50

The cardiac stress index (CSI) shows the capacity of the heart to respond to its internal and external environments, and describes the current stress load. Of the three groups, the kickboxing group had the lowest mean score ($M=28.72$, $SD=18.01$), followed by the rugby group ($M=29.78$, $SD=23.94$). The group consisting of individuals not participating in the sports obtained the highest mean score ($M=33.36$, $SD=24.28$) on CSI.

5.4.2.2 Heart frequency

Table 5.18: Descriptive statistics for heart frequency (beats per minute)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	70.00	12.47	50.00	94.00	18
Rugby	76.74	12.28	55.00	100.00	23
No Sport	82.22	16.38	47.00	138.00	50

Heart frequency specifies the number of heart beats per minute. Table 5.18 shows that all three groups have mean scores in the expected range of 55 to 95 beats per minute. The kickboxing group obtained the lowest mean score ($M=70.00$, $SD=12.47$), followed

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by the rugby group ($M=76.74$, $SD=12.28$). The group consisting of individuals not participating in the sports obtained the highest mean score ($M=82.22$, $SD=16.38$) for heart frequency.

5.4.2.3 QRS duration

Table 5.19: Descriptive statistics for QRS duration (ms)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	89.00	13.26	72.00	113.00	18
Rugby	87.39	9.85	68.00	104.00	23
No Sport	86.52	12.25	63.00	110.00	50

The QRS duration indicates the stimulus conduction through the ventricles of the heart. The QRS duration is measured in milliseconds (ms), where the expected range is 70ms to 110ms. All three groups fall within the expected range of normalcy. The group consisting of individuals not participating in sport obtained the lowest mean score ($M=86.52$, $SD=12.25$), followed by the rugby group ($M=87.39$, $SD=9.85$). The kickboxing group obtained the highest mean score ($M=89.00$, $SD=13.26$).

5.4.2.4 Heart frequency fluctuation

Table 5.20: Descriptive statistics for heart frequency fluctuation (ms)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	73.17	25.23	35.00	120.00	18
Rugby	71.26	43.54	26.00	213.00	23
No Sport	58.90	24.71	25.00	139.00	50

Heart frequency fluctuations are the changes in heart frequency as the heart adapts to internal and external environmental demands. The fluctuations in heart frequency (RRDS) play an important part in calculating the CSI. The expected range for RRDS is 30ms to 70ms (Energy-Lab Technologies, 2005). The group consisting of individuals not participating in sport had a mean score ($M=58.90$, $SD=24.71$) within the expected range. The kickboxing group obtained the highest mean score ($M=73.17$, $SD=25.23$), which falls outside the expected range.

Apart from the measures taken by the Viport, systolic and diastolic blood pressure was measured by using a digital sphygmomanometer. The results for systolic blood pressure will be presented first.

5.4.2.5 Systolic blood pressure

Table 5.21: Descriptive statistics for systolic blood pressure (mmHg)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	126.28	9.22	111.00	143.00	18
Rugby	137.39	14.22	120.00	172.00	23
No Sport	136.38	12.62	105.00	168.00	50

Table 5.21 shows that the rugby group obtained the highest mean score on systolic blood pressure, and the kickboxing group obtained the lowest mean score. Although there is a difference in scores between the groups, all scores fall within the expected values (100-139 mmHg).

5.4.2.6 Diastolic blood pressure

Descriptive statistics were also calculated for diastolic blood pressure. These results are set out in table 5.22.

Table 5.22: Descriptive statistics for diastolic blood pressure (mmHg)

Group	Mean	SD	Minimum	Maximum	n
Kickboxing	76.50	10.93	52.00	96.00	18
Rugby	78.30	6.53	70.00	90.00	23
No Sport	87.72	12.47	55.00	116.00	50

Similar to the mean scores for systolic blood pressure, the kickboxing group obtained the lowest mean score ($M=76.50$, $SD=10.93$). The group with the highest mean score

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for diastolic blood pressure is the group consisting of individuals not participating in sport, with a mean of 87.72 ($SD=12.47$). Again, all three groups obtained scores within the expected range (60-85 mmHg) of normalcy.

After the descriptive statistics for the physiological constructs were calculated, Spearman's correlation coefficient was computed to investigate if a relationship exists between anger, aggression, and the constructs that constitute psychophysiological wellbeing.

5.4.3 Results for Spearman's correlation coefficient

Spearman's correlation was used since the group sizes differed (Huck, 2012). The Spearman's correlation coefficient is a statistical measure of strength of a monotonic relationship between paired data. A correlation matrix was drawn up to investigate if a relationship existed between state anger, trait anger, and constructs of psychophysiological wellbeing, as utilised in this study.

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5.4.3.1 Relationship with regard to the psychophysiological wellbeing of kickboxers

Table 5.23: Spearman's Rho correlation coefficients for state anger and trait anger with psychophysiological wellbeing of kickboxers

		CSI	HR	QRS	RRDS	BP Syst	BP Dias	State Anxiety	Trait Anxiety	State Dep	Trait Dep	State Cur	Trait Cur	State Anger	Trait Anger
State Anger	Correlation	-.102	.599	.310	-.395	-.216	-.071	.121	.461	.376	.012	.295	-.116	1.000	
	Coefficient <i>p</i>	.688	.009	.210	.104	.390	.780	.632	.054	.125	.963	.234	.647	.	
	n	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Trait Anger	Correlation	.349	.248	-.138	.072	-.094	-.158	.191	.380	.027	-.086	-.141	-.033	.472	1.000
	Coefficient <i>p</i>	.156	.322	.584	.775	.710	.531	.447	.120	.915	.734	.576	.897	.048	.
	n	18	18	18	18	18	18	18	18	18	18	18	18	18	18

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5.4.3.2 Relationship with regard to the psychophysiological wellbeing of rugby players

Table 5.24: Spearman's Rho correlations for state anger and trait anger with psychophysiological wellbeing of rugby players

		CSI	HR	QRS	RRDS	BP Syst	BP Dias	State Anxiety	Trait Anxiety	State Dep	Trait Dep	State Cur	Trait Cur	State Anger	Trait Anger
State Anger	Correlation	.057	.309	.195	-.591	.282	-.060	.188	.183	-.027	-.228	-.233	-.348	1.000	
	Coefficient <i>p</i>	.797	.151	.374	.003	.192	.786	.390	.403	.903	.296	.284	.103	.	
	n	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Trait Anger	Correlation	-.152	.379	.303	-.591	.282	-.060	.458	.521	.036	-.243	.191	.046	.377	1.000
	Coefficient <i>p</i>	.489	.074	.160	.003	.192	.786	.028	.011	.871	.264	.383	.834	.076	.
	n	23	23	23	23	23	23	23	23	23	23	23	23	23	23

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5.4.3.3 Relationship with regards to the psychophysiological wellbeing of individuals not participating in kickboxing or rugby

Table 5.25: Spearman's Rhocorrelations for state anger and trait anger with psychophysiological wellbeing of individuals not participating in kickboxing or rugby

		CSI	HR	QRS	RRDS	BP Syst	BP Dias	State Anxiety	Trait Anxiety	State Dep	Trait Dep	State Cur	Trait Cur	State Anger	Trait Anger
State Anger	Correlation	-.027	-.112	.060	.099	-.089	-.038	.596	.358	.491	.441	-.160	-.291	1.000	
	Coefficient <i>p</i>	.852	.443	.681	.497	.542	.795	.000	.012	.000	.002	.273	.045	.	
	<i>n</i>	49	49	49	49	49	49	49	48	49	48	49	48	49	
Trait Anger	Correlation	.269	-.031	-.167	.187	.051	-.235	.372	.476	.238	.368	-.312	-.129	.315	1.000
	Coefficient <i>p</i>	.062	.833	.250	.198	.727	.104	.009	.001	.103	.009	.031	.379	.029	.
	<i>n</i>	49	49	49	49	49	49	48	49	48	49	48	49	48	49

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Looking at tables 5.23 to 5.25, the following significant relationships are evident:

- A positive relationship between state anger and heart frequency for the kickboxing group ($Rho=.599, p<0.05$).
- A positive relationship between trait anger and state anger for the kickboxing group ($Rho=.472, p<0.05$).
- A negative relationship between state anger and heart frequency fluctuations for the rugby group ($Rho=-.591, p<0.05$).
- A negative relationship between trait anger and heart frequency fluctuations for the rugby group ($Rho=-.591, p<0.05$).
- A positive relationship between trait anger and state anxiety for the rugby group ($Rho=.458, p<0.05$).
- A positive relationship between trait anger and trait anxiety for the rugby group ($Rho=.521, p<0.05$).
- A positive relationship between state anger and state anxiety for the group consisting of individuals not participating in kickboxing or rugby ($Rho=.596, p<0.05$).
- A positive relationship between state anger and trait anxiety for the group consisting of individuals not participating in kickboxing or rugby ($Rho=.358, p<0.05$).
- A positive relationship between state anger and state depression for the group consisting of individuals not participating in kickboxing or rugby ($Rho=.491, p<0.05$).
- A positive relationship between state anger and trait depression for the group consisting of individuals not participating in kickboxing or rugby ($Rho=.441, p<0.05$).

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- A negative relationship between state anger and trait curiosity for the group consisting of individuals not participating in kickboxing or rugby ($Rho = -.291, p < 0.05$).
- A positive relationship between trait anger and state anxiety for the group consisting of individuals not participating in kickboxing or rugby ($Rho = .372, p < 0.05$).
- A positive relationship between trait anger and trait anxiety for the group consisting of individuals not participating in kickboxing or rugby ($Rho = .476, p < 0.05$).
- A positive relationship between trait anger and trait depression for the group consisting of individuals not participating in kickboxing or rugby ($Rho = .368, p < 0.05$).
- A negative relationship between trait anger and state curiosity for the group consisting of individuals not participating in kickboxing or rugby ($Rho = -.312, p < 0.05$).
- A positive relationship between trait anger and state anger for the group consisting of individuals not participating in kickboxing or rugby ($Rho = .315, p < 0.05$).

5.5 Comparison of psychophysiological wellbeing between groups

The aim of this section is to report the results with regard to the objective that aimed to investigate whether there are significant differences between the three groups under investigation, and their scores on psychophysiological wellbeing. In view of this objective, a research hypothesis was formulated which affirmed that there are significant differences in the scores of psychophysiological wellbeing between kickboxers, rugby players, and individuals not participating in these sports.

Similar to the comparison of state anger and trait anger scores between groups (see 5.3), the Kruskal-Wallis test was conducted to test for differences of psychophysiological wellbeing between the groups. As was the case with 5.4.1 and

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5.4.2, the results were first obtained for psychological wellbeing, and then for physiological wellbeing.

5.5.1 Comparison of psychological wellbeing between groups

As discussed previously (see 4.5.1), psychological wellbeing was measured in accordance with the STPI-Y's scales on state depression, trait depression, state curiosity, trait curiosity, state anxiety, trait anxiety, state anger, and trait anger. Since the results for state anger and trait anger are reported in 5.3, it will not be expanded upon here. The first table shows results with regard to state depression.

5.5.1.1 State depression

Table 5.26: *Kruskal-Wallis test statistics for state depression*

	Diff_Score
Chi-Square	35.13
df	2
Asymp. Sig.	.000

Table 5.27: *Mean median rank for state depression*

	n	Rank
Kickboxing	18	65.42
Rugby	23	61.50
No Sport	49	30.67

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The results of the analysis indicated that significant differences occurred between the groups with regards to state depression, $X^2(2, N = 90) = 35.13, p = .000$. Subsequent to this result, pairwise comparisons were conducted to determine between which groups the difference occurred. The results of this pairwise comparison are presented in table 5.28.

Table 5.28: Pairwise comparison of groups for state depression

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
No Sport – Rugby	-30.83	6.58	-4.69	.000
Rugby – Kickboxing	-3.92	8.19	-0.48	.633
No Sport - Kickboxing	-34.74	7.17	-4.84	.000

Table 5.28 indicates a significant difference between the group consisting of individuals not participating in sport and the rugby group, with a large effect size ($r = -0.55$). Significant differences could also be observed in the group consisting of individuals not participating in rugby or kickboxing and the kickboxing group, with a large effect size ($r = -0.59$).

5.5.1.2 Trait depression

Table 5.29: *Kruskal-Wallis test statistics for trait depression*

	Diff_Score
Chi-Square	27.85
df	2
Asymp. Sig.	.000

Table 5.30: *Mean median rank for trait depression*

	n	Rank
Kickboxing	18	61.03
Rugby	23	61.58
No Sport	49	32.24

The results of the analysis indicate significant differences between the three groups with regard to trait depression, $\chi^2(2, N = 90) = 27.85, p = .000$. Because the overall test is significant, pairwise comparisons were calculated. The results of the pairwise comparison of groups for trait depression are presented in table 5.31.

Table 5.31: *Pairwise comparison of groups for trait depression*

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
No Sport – Rugby	-29.34	6.59	-4.46	.000
Rugby – Kickboxing	0.56	8.19	0.07	.946
No Sport - Kickboxing	-28.78	7.18	-4.01	.000

Table 5.31 shows a significant difference between the group consisting of individuals not participating in sport and the rugby group. A significant difference was also observed between the group consisting of individuals not participating in sport and the kickboxing group. For both these significant differences a relatively large effect size ($r=-0.53$ and $r=-0.49$) was calculated.

5.5.1.3 State curiosity

Table 5.32: *Kruskal-Wallis test statistics for state curiosity*

	Diff_Score
Chi-Square	7.31
df	2
Asymp. Sig.	.026

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Table 5.33: Mean median rank for state curiosity

	n	Rank
Kickboxing	18	34.28
Rugby	23	40.37
No Sport	49	52.03

Table 5.32 indicates significant differences between the three groups with regard to state curiosity, $\chi^2(2, N = 90) = 7.31, p = .026$. Subsequent to this analysis, pairwise comparisons were conducted to determine where the differences occurred. The results of the pairwise comparison are presented in table 5.34.

Table 5.34: Pairwise comparison of groups for state curiosity

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	11.66	6.59	1.77	.077
Kickboxing – Rugby	6.09	8.20	0.74	.458
Kickboxing – No Sport	17.75	7.18	2.47	.013

Table 5.34 shows a significant difference between the kickboxing group and the group consisting of individuals not participating in sport, with a medium effect size calculated ($r = 0.30$).

5.5.1.4 Trait curiosity

Table 5.35: *Kruskal-Wallis test statistics for trait curiosity*

	Diff_Score
Chi-Square	8.60
df	2
Asymp. Sig.	.014

Table 5.36: *Mean median rank for trait curiosity*

	n	Rank
Kickboxing	18	38.92
Rugby	23	35.15
No Sport	49	52.78

Table 5.35 indicates significant differences between the groups concerning trait curiosity, $\chi^2(2, N = 90) = 8.60$, $p = .014$. Pairwise comparisons were computed to determine the source of the difference. The results of this analysis are presented in table 5.37.

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Table 5.37: *Pairwise comparison of groups for trait curiosity*

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	17.62	6.58	2.67	.007
Rugby – Kickboxing	-3.76	8.19	-0.46	.646
Kickboxing – No sport	13.86	7.18	1.93	.054

Table 5.37 shows that only the rugby group differed significantly with regard to trait curiosity from the group consisting of individuals not participating in either kickboxing or rugby. For this significant difference, a medium effect size ($r=0.32$) was calculated.

5.5.1.5 State anxiety

Table 5.38: *Kruskal-Wallis test statistics for state anxiety*

	Diff_Score
Chi-Square	11.44
df	2
Asymp. Sig.	.003

Table 5.39: *Mean median rank for state anxiety*

	n	Rank
Kickboxing	18	56.25
Rugby	23	55.13
No Sport	49	37.03

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The results of the Kruskal-Wallis indicates a significant difference between the participating groups with regard to state anxiety, $X^2(2, N = 90) = 11.44, p = .003$. Pairwise comparisons were subsequently computed, and the results are presented in table 5.40.

Table 5.40: Pairwise comparison of groups for state anxiety

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
No Sport – Rugby	-18.10	6.57	-2.76	.006
Rugby – Kickboxing	-1.12	8.18	-0.14	.891
No Sport - Kickboxing	-19.22	7.16	-2.68	.007

The pairwise comparison indicated significant differences between the group consisting of individuals not participating in kickboxing or rugby and the rugby group, as well as between the former and the kickboxing group. For both these significant differences, a medium effect size of 0.32 was calculated.

5.5.1.6 Trait anxiety

Table 5.41: Kruskal-Wallis test statistics for trait anxiety

	Diff_Score
Chi-Square	2.66
df	2
Asymp. Sig.	.265

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Table 5.41 shows no significant differences between the groups under investigation with regard to trait anxiety, $X^2(2, N = 90) = 2.66, p = .265$. Because the overall test was not significant, no pairwise comparisons were needed.

5.5.2 Comparison of physiological wellbeing between groups

For the present study, the focus of physiological wellbeing was cardiovascular health as measured by the Viport device and a digital sphygmomanometer. It consists of the cardiac stress index, heart frequency, the QRS duration, heart frequency fluctuations, systolic blood pressure, and diastolic blood pressure. The results yielded by the Viport will be presented first.

5.5.2.1 Cardiac stress index

Table 5.42: *Kruskal-Wallis test statistics for CSI*

	Diff_Score
Chi-Square	0.41
df	2
Asymp. Sig.	.815

Table 5.42 indicates that no significant differences were observed on CSI scores between the groups under investigation, $X^2(2, N = 91) = 2.66, p = .815$. Because the overall test was not significant, no pairwise comparisons were computed.

5.5.2.2 Heart frequency

Table 5.43: *Kruskal-Wallis test statistics for HR*

	Diff_Score
Chi-Square	8.32
df	2
Asymp. Sig.	.016

Table 5.44: *Mean median rank for HR*

	n	Rank
Kickboxing	18	31.36
Rugby	23	44.17
No Sport	50	52.11

Table 5.43 shows significant differences in heart frequency measured for the three groups, $\chi^2(2, N = 91) = 8.32, p = .016$. The subsequent pairwise comparison was done to determine between which groups the differences occurred. Results of the pairwise comparison are shown in table 5.45.

Table 5.45: *Pairwise comparison of groups for heart frequency*

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	7.94	6.65	1.19	.233
Kickboxing – Rugby	12.81	8.31	1.54	.123
Kickboxing – No Sport	20.75	7.26	2.86	.004

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Table 5.45 shows that a statistically significant difference occurred between the kickboxing group and the group consisting of individuals not participating in kickboxing or rugby. A medium effect size ($r=0.35$) for the difference was calculated.

5.5.2.3 QRS duration

Table 5.46: *Kruskal-Wallis test statistics for QRS duration*

	Diff_Score
Chi-Square	0.49
df	2
Asymp. Sig.	.784

The results of the Kruskal-Wallis test indicate no significant differences for the three groups under investigation with regard to QRS duration, $X^2(2, N = 91) = 0.49$, $p=.784$. Because the overall test was not significant, no pairwise comparisons were calculated.

5.5.2.4 Heart frequency fluctuation

Table 5.47: *Kruskal-Wallis test statistics for RRDS*

	Diff_Score
Chi-Square	5.21
df	2
Asymp. Sig.	.074

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Table 5.47 indicates no significant differences with regard to RRDS, $X^2(2, N = 91) = 5.21, p = .074$. As a result, no pairwise comparisons were conducted.

Physiological wellbeing was also measured by using a digital sphygmomanometer. This provided scores for systolic and diastolic blood pressure. A comparison of these mean scores between groups will be presented next, with systolic blood pressure first.

5.5.2.5 Systolic blood pressure

Table 5.48: *Kruskal-Wallis test statistics for systolic blood pressure*

	Diff_Score
Chi-Square	10.03
df	2
Asymp. Sig.	.007

Table 5.49: *Mean median rank for systolic blood pressure*

	n	Rank
Kickboxing	18	28.44
Rugby	23	49.22
No Sport	50	50.84

Table 5.48 indicates significant differences between the groups under investigation with regard to systolic blood pressure, $X^2(2, N = 91) = 10.03, p = .007$. As a result, pairwise comparisons were computed. Results of the pairwise comparison are presented in table 5.50.

Table 5.50: *Pairwise comparison of groups for systolic blood pressure*

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	1.62	6.64	0.25	.807
Kickboxing – Rugby	20.77	8.29	2.51	.012
Kickboxing – No Sport	22.40	7.24	3.09	.002

A significant difference occurred between the kickboxing and rugby groups, with a medium to large effect size ($r=0.42$) calculated. A significant difference was also indicated between the kickboxing group and the group consisting of individuals not participating in kickboxing or rugby. For this difference, a medium to large effect size ($r=0.41$) was also calculated.

5.5.2.6 Diastolic blood pressure

Table 5.51: *Kruskal-Wallis test statistics for diastolic blood pressure*

	Diff_Score
Chi-Square	18.57
df	2
Asymp. Sig.	.000

Table 5.52: Mean median rank for diastolic blood pressure

	n	Rank
Kickboxing	18	31.78
Rugby	23	33.74
No Sport	50	56.76

The results of the Kruskal-Wallis test show significant differences between the groups under investigation with regard to diastolic blood pressure, $X^2(2, N = 91) = 18.57$, $p = .000$. Since a significant result was produced, pairwise comparisons were computed.

The results of the pairwise comparison are presented in table 5.53.

Table 5.53: Pairwise comparison of groups for diastolic blood pressure

Sample1-Sample2	Test statistic	Std. error	Std. test statistic	Sig.
Rugby – No Sport	23.02	6.64	3.47	.001
Kickboxing – Rugby	1.96	8.29	0.24	.813
Kickboxing – No Sport	24.98	7.24	3.45	.001

Table 5.53 indicates significant results between the rugby group and group consisting of individuals not participating in kickboxing or rugby, as well as the latter and the kickboxing groups. For both, a significant difference of a medium to large effect size ($r = 0.41$ and $r = 0.42$) was calculated.

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Revisiting the results above, the following seem to be evident:

- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding state depression.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding state depression.
- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding trait depression.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding trait depression.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding state curiosity.
- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding trait curiosity.
- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding state anxiety.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding state anxiety.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding heart frequency.
- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding systolic blood pressure.

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- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding systolic blood pressure.
- There is a significant difference between the rugby group and the group not participating in kickboxing or rugby regarding diastolic blood pressure.
- There is a significant difference between the kickboxing group and the group not participating in kickboxing or rugby regarding diastolic blood pressure.

5.6 Conclusion

This chapter provided an overview of the statistical methods applied during the course of the study, and the results that were subsequently obtained. A discussion of these results, and the implication thereof to the study, will be presented in the next chapter.

CHAPTER SIX

DISCUSSION AND CONCLUSION

6.1 Introduction

This study aimed to determine whether pro-social physical expression of anger and aggression has an effect on psychophysiological wellbeing. This was done by collecting data from measuring the psychophysiological wellbeing of three groups of individuals. Two of these groups participate in sport where the pro-social physical expression of anger and aggression is accepted. The two sports were kickboxing and rugby. The third group consisted of individuals not participating in these sports and were thus not expressing anger and aggression in a pro-social physical way. The psychological variables were collected via the STPI-Y, a self-report questionnaire that measures state and trait anger, state and trait anxiety, state and trait depression, as well as state and trait curiosity. The measurements of physiological wellbeing centred on the cardiovascular system. The Viport was used to measure the cardiac stress index, and a digital sphygmomanometer to measure blood pressure.

In the previous chapter, the results obtained from measurements taken during the study were provided. In this chapter, there will be an in-depth discussion of these results. Attention will also be paid to the limitations of the current study, and recommendations for future research will be made.

6.2 Pro-social physical expression of anger and aggression

In Chapter Two (see 2.4), it was postulated that kickboxing and rugby provided a context for the pro-social physical expression of anger and aggression. It was furthermore hypothesised that the group of individuals not participating in either of these sports lack the context for the pro-social physical expression of anger and aggression. In order to determine if this was indeed the case, anger was measured using the STPI-Y's subscales of state anger, state anger – feeling angry, state anger – feel like expressing anger, trait anger, trait anger – angry temperament, as well as trait anger – angry reaction.

6.2.1 State anger

With regard to state anger, the rugby group had the lowest mean score ($M=11.00$, $SD=1.93$), and the kickboxing group scored the highest ($M=13.67$, $SD=4.70$) (see table 5.1). The group not participating in any of these sports obtained a mean of 12.55 ($SD=3.20$). However, all the means were lower than the midpoint of 20, which suggests that the mean scores for state anger of all three groups are low-intensity experiences of angry feelings, irrespective of the degree of pro-social physical expression.

With regards to the experience of feeling angry and feeling like expressing anger, as measured by the subscales of state anger, the results indicated that the group consisting of individuals not participating in kickboxing or rugby feel angry more often ($M=6.73$, $SD=2.33$) compared to the other two groups, but that individuals in the kickboxing group are more likely to express their anger ($M=7.28$, $SD=3.16$) than the other two groups. The rugby group obtained the lowest mean score for both these

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measures ($M=5.74$, $SD=1.48$ and $M=5.26$, $SD=0.62$) (see tables 5.2 and 5.3). From these results it appears that rugby players are prone to the pro-social physical expression of aggression in the absence of anger, or at least to a lesser extent than the kickboxing group. This is similar to the results of Robazza and Bortoli (2007). The purpose of their study was to explore the perceptions of 197 Italian male rugby players as to how anger and anxiety impact their performance. They found that these rugby players were able to control their angry feelings, which contributed positively to their performance on the field.

It also appears that individuals in the kickboxing group are prone to feeling angry, and that they feel driven to express these feelings more often ($M=7.28$, $SD=3.16$) than the rugby group ($M=5.26$, $SD=0.62$) and the group of individuals not participating in these sports ($M=5.82$, $SD=1.35$) (see tables 5.2 and 5.3). This might indicate more frequent expressions of pro-social physical aggression in the presence of anger for the kickboxing group. Ruiz and Hanin (2011) studied the impact of anger on the performance of karate athletes. They found mixed results, with some athletes reporting that anger enhanced their performance, whilst others reported that anger decreased their performance.

Further investigation of the three groups would be needed regarding anger and aggression, as the GAM indicates that each episode of aggression is different and is influenced by many factors. Due to the multiple contributing factors to anger and aggression, measurement of the presence of anger when aggression is expressed is difficult. This notion is supported by Maxwell and Visek (2009). They researched the

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characteristics of rugby players, and identified past behaviour, coaching, and not being punished for transgressions, as major contributing factors to anger and unsanctioned aggression. They recommended that further research be undertaken which should focus on the motivation for aggressive action in sport, in accordance with the GAM.

6.2.2 Trait anger

With regards to trait anger, both the kickboxing group ($M=22.33$, $SD=4.64$) and the group of individuals not participating in kickboxing or rugby ($M=20.35$, $SD=5.38$) obtained mean scores above the midpoint of 20, whereas the rugby group did not ($M=19.91$, $SD=4.80$) (see table 5.4). This could suggest that individuals participating in rugby experience state anger less frequently than those participating in kickboxing or not participating in rugby or kickboxing.

The kickboxing group obtained the highest angry temperament mean score ($M=8.06$, $SD=2.88$), but the lowest angry reaction mean score ($M=9.44$, $SD=1.54$) (see tables 5.5 and 5.6). This could be indicative of the nature of the sport. In kickboxing, aggression is expected without any provocation (trait anger – angry temperament) such as a fighting situation during training or competition, while angry reactions with excessive aggression are punished. These limits of acceptance could potentially explain the lower mean scores relating to the angry reactions in kickboxers, as they are only allowed to respond in an angry manner accepted in accordance with the rules of the sport. Yet, the very nature of the sport creates an environment for the expression of unprovoked anger.

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The rugby group obtained relatively low mean scores for angry temperament ($M=6.78$ $SD=1.99$) and, similarly, low scores for angry reaction ($M=9.87$, $SD=3.02$) in comparison with the kickboxing group (see tables 5.5 and 5.6). Again, this might be indicative of the nature of the sport. In rugby, a lesser degree of physical expression of aggression and anger is expected and indeed accepted. For example, a punch would be expected and accepted within the context of kickboxing, but it is unacceptable in rugby. The slightly higher mean score on angry reaction might indicate that in rugby, angry responses take place more often in provoked or negatively evaluated situations. This is contrary to the results of Keeler (2000), who found no difference in the expression of aggression in accordance with the level of contact allowed in sports. Tucker and Parks (2001), however, suggested that the perceived legitimacy of aggression might differ according to sport type. Conroy, Silva, Newcomer, Walker, and Johnson (2001) found that individuals who compete at higher levels of sport exhibit a greater degree of acceptance towards aggression than those competing at lower levels. This perceived legitimacy of aggression might explain the results found in this study regarding the differences found in mean angry reaction, but further research would be required.

It is possible that the difference in mean scores for state and trait anger (see tables 5.1 and 5.4) can be explained by the level of competition that the kickboxing and rugby groups participate in. On the one hand, this would confirm the findings of Maxwell et al. (2009) that players at an advanced level have lower scores on anger than beginners and intermediate players. The kickboxing group consisted of amateurs whereas the rugby group consisted of semi-professional athletes. On the other hand, this result could be used to contradict another finding of Maxwell et al. (2009). When conducting

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research on anger and the aggressive emotions, beliefs, behaviour, and cognitions of competitive Chinese athletes of multiple sports, the researchers predicted that team sports would score higher on anger than individually based sports. This notion was confirmed by Mashhoodi, Mokhtari, and Tajik (2013), who found that adult athletes participating in a team sport are more aggressive than those competing in individual sports. Since the present study's findings – where the rugby players obtained a lower mean on both state ($M=11.00$, $SD=1.93$) and trait ($M=19.91$, $SD=4.80$) anger than the kickboxing group – do not concur with these results, more research on the topic is recommended.

6.2.3 Conclusion

From literature it is assumed that kickboxers and rugby players score high on aggression. Both sports are considered contact sports where aggression is accepted (see 2.4) within the limits of the rules of the sport (see 2.4.1 and 2.4.2). This assumption is difficult to accept or reject, as Kimble, Russo, Bergman, and Galindo (2010) also stated in their comprehensive review of literature on aggression and violent behaviour. Due to the nature of these sports, it is difficult to definitively define an act as the deliberate intent to do harm. It is thus based on the definition of aggression as utilised in the present study (see 2.2.2), and an understanding of kickboxing and rugby that these two sports allow for the pro-social physical expression of aggression. With this in mind, the following assumptions regarding the study can be made:

For the kickboxing group, high physical expression of pro-social aggression with low state anger and high trait anger is indicated. As the results did not indicate a high score

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for state anger, it is assumed that kickboxers do not score higher than the midpoint of 20 on the STPI-Y for anger and aggression.

The rugby players scored below the midpoint of 20 on both state anger and trait anger. This does not imply the absence of anger, but rather that it is present at a low intensity. It is assumed that this is due to the participation in rugby that allows for the pro-social physical expression of aggression. High pro-social physical expression of aggression with low state and trait anger is indicated for the rugby group. It is thus assumed that rugby players do not score higher than the midpoint of 20 on the STPI-Y for anger and aggression.

For the group consisting of individuals not participating in either of the sports, it is assumed that they have a low pro-social physical expression of aggression. This group also obtained a mean score below the midpoint of 20 on state anger ($M=12.55$, $SD=3.20$), but not on trait anger ($M=20.35$, $SD=5.38$) (see tables 5.1 and 5.4). This could indicate that individuals not participating in rugby or kickboxing do not experience intense anger during the time of the assessment, but frequently experience anger over time, although they do not physically express it in a pro-social context. It is thus assumed that individuals not participating in rugby or kickboxing do not score below the midpoint of 20 on anger and aggression.

6.3 Difference between groups in pro-social expression of anger and aggression

6.3.1 State anger

The Kruskal-Wallis and post-hoc test results indicated significant differences between the rugby and kickboxing groups (see tables 5.7 and 5.9) with regard to state anger. The kickboxing group obtained the highest mean rank of medians (see table 5.8), indicating greater consistency in higher state anger scores. As mentioned previously (see 6.2), the difference in results for these groups could be due to the level of competition (Maxwell et al., 2009) where the rugby players are semi-professional and the kickboxers compete as amateurs. Another possibility is that rugby is a team sport compared to kickboxing which is an individual sport (Mashhoodi et al., 2013; Maxwell et al., 2009), thus suggesting that different factors contribute to an episode of aggression, as proposed by the GAM. The difference in the sports as to what is acceptable anger and aggression (see 2.4.1 and 2.4.2), might also be a possible explanation for the significant difference regarding state anger between these two groups.

A significant difference was also found between the rugby group and the group of individuals not participating in the two sports with regard to state anger. When the results of table 5.1 are revisited, it shows that individuals participating in rugby have significantly lower mean scores for state anger compared to individuals not participating in rugby. This implies that participation in rugby contributes to a significantly lower state anger score, potentially suggesting a cathartic effect (see 2.3.2.1). Conflicting results regarding catharsis, however, suggests that further research would be required.

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In light of the above discussions, a decision was made to partially accept the research hypothesis, namely that significant differences will be observed with regard to anger and aggression between kickboxers, rugby players, and individuals not participating in these sports.

6.4 The effects of pro-social physical expression of anger and aggression on psychophysiological wellbeing

The results discussed in 6.2 indicated that all three groups obtained a mean score for state anger below the midpoint of 20. It furthermore showed that the rugby group obtained a mean trait anger score that fell below the midpoint of 20 (see table 5.4). Although these mean scores (see tables 5.1 and 5.4) were below the midpoint of 20, it still indicated the presence, and not the absence, of anger. As such, the assumption is made that the pro-social physical expression of aggression and anger is present in the kickboxing and rugby groups. The effect that this pro-social physical expression of anger and aggression has on psychological wellbeing is discussed in the next section.

6.4.1 Psychological wellbeing

6.4.1.1 Significant relationships between anger and anxiety

The results show a significant relationship between trait anger and trait anxiety for the rugby group and the group consisting of individuals not participating in rugby or kickboxing (see tables 5.24 and 5.25). This positive relationship between anger and anxiety is similar to what was concluded by Hawkins and Cogle (2011). The researchers examined the experience and expression of anger in individuals with anxiety disorders. They found a significant relationship between anger expression,

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anger experience, and anxiety disorders not clearly accounted for by other psychiatric problems. Trait anger accounted for 27.14% of the variance in trait anxiety for the rugby group. Trait anger explained 22.66% of the variance in trait anxiety for the group not participating in rugby or kickboxing.

From these results it is thus assumed that a positive relationship between trait anger and trait anxiety exists for the rugby group and for individuals not participating in the two sports. This implies that as the experience of anger over time increases, so too does the experience of anxiety, and vice versa, for individuals not participating in kickboxing or rugby and those that do participate in rugby. For the group not participating in kickboxing or rugby, it might indicate the normalcy of experiencing anger and anxiety in everyday life, specifically student life. The group of individuals not participating in kickboxing or rugby are all tertiary-level students. Pekrum, Goetz, Titz, and Perry (2002) reported that students experience a range of emotions, both negative and positive, and that more attention needs to be given to emotions other than anxiety in the education context.

For the rugby group, this might be indicative of the emotions required for competing at a higher than recreational level. Robazza and Bortoli (2007) studied the perception of anger and anxiety on the performance of elite and non-elite rugby players. Their results indicated that anxiety was predictive of anger but that anger was interpreted as enhancing performance. Rugby players did not differ with regard to interpreting anger as a facilitator of performance. The interpretation of anxiety, however, did differ between the elite and non-elite groups. This was also confirmed by Neil, Mellalieu, and Hanton

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(2006). Both studies indicate a difference in the experience of anxiety, specifically the cognitive component thereof, between elite and non-elite rugby players. Elite rugby players tend to maintain anxiety at a higher level in order to enhance performance compared to the non-elite players that reduce anxiety (Neil et al., 2006; Robazza & Bortoli, 2007).

A significant relationship was found between state anger and trait anxiety for the group not participating in kickboxing or rugby ($Rho=.358$, $p<0.05$) (see table 5.25). State anger accounted for 12.82% of the variance in trait anxiety for this group. Significant relationships between trait anger and state anxiety were found for the rugby group ($Rho=.458$, $p<0.05$) and for the group not participating in kickboxing or rugby ($Rho=.372$, $p<0.05$) (see tables 5.24 and 5.25).

The results discussed above potentially indicate that previous experiences of anxiety have an impact on the current experience of anger, much like the input factors of the GAM influencing an episode of anger and aggression (see 2.3.4.1). The GAM refers to an episode of anger and aggression as a cyclic structure, where current and past experiences influence future experiences. These results also suggest that previous experiences of anger might contribute to the current experience of anxiety in some way. The significant positive correlation ($Rho=.596$, $p<0.05$) between state anger and state anxiety for the group of individuals not participating in kickboxing or rugby (see table 5.25), also indicates some interplay between anxiety and anger as experienced in a current situation. This idea is similar to results found by Hanin (2010). He explored methods of coping with anxiety in sport. Hanin (2010) suggests that anxiety and

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negative emotions such as anger interact in a circular manner within the sporting context. These emotions interact and influence each other in current and future situations, based on previous experiences. Thus it could be said that an experience of anxiety or anger in past competitions can influence the current experience of anxiety or anger in a competition. This experience can then also influence future experiences.

6.4.1.2 Significant relationships between state anger and trait anger

A positive, significant correlation was observed between state and trait anger for the kickboxing group ($Rho=.472$, $p<0.05$) and for the group of individuals not participating in kickboxing or rugby ($Rho=.315$, $p<0.05$) (see tables 5.23 and 5.25). Trait anger accounted for 22.28% of the variance in state anger for the kickboxing group. For the group not participating in either of the two sports, trait anger accounted for only 9.92% of variance in state anger. This relationship between state and trait anger is similar to that found by Deffenbacher et al. (1996b). The researchers conducted multiple studies to explore the state-trait theory of anger. From these studies, they found that higher trait anger scores were related to higher state anger scores. State and trait anger are also related by definition, as trait anger is the difference in frequency that state anger is experienced over time by an individual (Spielberger & Reheiser, 2010).

The results discussed above further illustrate the idea that previous experiences of emotion influence current and future experiences, as proposed in 6.4.1.1.

The greater percentage of variance for trait anxiety compared to trait anger – in state anger for the group not participating in kickboxing or rugby – might indicate that anxiety plays a greater role in the current experience of anger than past experiences of anger.

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This is in accordance with the notion that anxiety is an adaptive response in the face of danger or threat (Hawkins & Cogle, 2011; Sadock & Sadock, 2007) where anxiety potentially activates one to become angry or act aggressively. Further research, however, would be required in order to better understand the interplay of anger and anxiety.

6.4.1.3 Significant relationships between anger and curiosity

For the group not participating in kickboxing or rugby, a significant negative correlation was found between trait anger and state curiosity ($Rho = -.312$, $p < 0.05$) (see table 5.25). This group consists of students (see 4.4.3) where curiosity is required to expand their knowledge base (Strong, 1995). This notion was furthermore confirmed by the significant, negative correlation observed between state anger and trait curiosity ($Rho = -.291$, $p < 0.05$) (see table 5.25) for this group.

The rugby group also obtained a significant negative correlation between state anger and trait curiosity ($Rho = -.291$, $p < 0.05$) (see table 5.24). Kashdan et al. (2013) found a similar inverse relationship between trait curiosity and aggression. However, state anger was not measured in their study. The research of Kashdan et al. (2013) made use of multiple studies exploring curiosity and aggression in various interpersonal relationships. They found that people measuring high on curiosity experience less aggression, suggesting a greater sensitivity to the context of situations by highly curious individuals. Few studies have explored the relationship of curiosity and anger, as they focused more on curiosity and aggression. Further research regarding the relationship and interplay of anger and curiosity is thus recommended.

6.4.1.4 Significant relationships between anger and depression

Anger and depression also seem to impact each other, as shown with the results obtained for the group not participating in kickboxing or rugby (see table 5.25), where a statistically significant correlation between state anger and state depression ($Rho=.491$, $p<0.05$), state anger and trait depression ($Rho=.441$, $p<0.05$), and trait anger and trait depression ($Rho=.368$, $p<0.05$) was found. In all cases a significant, positive relationship between the variables was obtained. This relationship was also found by Gilbert et al. (2004). In their exploration of unexpressed anger and entrapment in depression, 50 diagnosed depressed individuals formed the sample. The vast majority of participants in the study reported suppressing their anger before the onset of depression (Gilbert et al., 2004).

The results seem to confirm other research findings that exercise and participation in sport could be associated with a decrease in negative mood, especially depression (Austin et al., 1998; Taylor, 2006). These findings, however, contradict the results in tables 5.13 and 5.16, which indicated that the kickboxing and rugby groups obtained higher mean scores on both state and trait depression than the group not participating in these sports. It is thus assumed that depressive symptoms were evident amongst these two groups, but that these symptoms could not be associated with anger.

From the results obtained regarding anger, aggression, and psychological wellbeing, it can be assumed that the constructs constituting psychological wellbeing in this study are to some extent related to anger and aggression. Since the results indicated an inverse relationship between anger and curiosity, but positive correlations between the

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former and depression and anxiety, one could confirm that the results are in accordance with the definition of psychological wellbeing as being the absence of anger, anxiety and depression, with the presence of curiosity (Richman et. al, 2005; Spielberger & Reheiser, 2009) (see 3.3). The said correlations, however, were not evident between all three groups. It could thus be assumed that anger and aggression did not influence psychological wellbeing similarly in all three groups. The group of individuals not participating in kickboxing or rugby showed the most correlations with psychological wellbeing, potentially indicating that the influence of their experiences of anger on psychological wellbeing is greater compared to that of the other two groups.

6.4.2 Physiological wellbeing

6.4.2.1 Kickboxing group

For the kickboxing group, there was a significant, positive correlation between state anger and heart frequency ($Rho=.599$, $p<0.05$) (see table 5.23). Heart frequency is the number of heart beats per minute. Drummond and Quah (2001) found no changes in heart frequency in their study of the correlation between cardiovascular changes and the verbal expression of anger in Chinese and Caucasian men. This contradicts findings of the present study, where it is suggested that if anger increases, so does heart frequency. Drummond and Quah (2001), however, also found heart frequency to be lower when participants verbally expressed anger as opposed to neutral stimuli. In the present study, the kickboxers obtained the lowest mean score for heart frequency ($M=70.00$, $SD=12.47$) (see table 5.18), which is similar to the last-mentioned result. This indicates that the expression of anger and aggression in a kickboxing

context could potentially lower heart frequency, but when the experience of anger changes, so does heart frequency. Further research regarding this relationship is recommended, as it appears to be too complex to fully understand within the scope of the current study.

6.4.2.2 Rugby group

The rugby group obtained significant, negative correlations between fluctuations in heart frequency and state anger ($Rho = -.591$, $p < 0.05$) and trait anger ($Rho = -.591$, $p < 0.05$) (see table 5.24). For the rugby group, the 34.93% variance in heart frequency fluctuations can be explained by both state and trait anger. As discussed in 3.4.1, the heart must be able to adapt on a moment-to-moment basis to changes inside and outside the body (Guyton, 1971; Porges & Byrne, 1992; Pumpila et al., 2002). Cunniffe, Proctor, Baker, and Davies (2009) evaluated the physiological demands placed on elite rugby players during a game, using Global Positioning Tracking software. In their study, they found that individuals reached their maximum heart frequency during different stages of the game. They also found that players in different positions maintained varying levels of intensity for heart frequency. This study indicates that a rugby player's heart is capable of adapting to the various changes inside and outside the body. The results of the present study potentially indicate that the increased physical expression of pro-social anger and aggression decreases heart frequency fluctuations. It is assumed that this could decrease the ability of the heart to change to internal and external demands, potentially with the heart maintaining its frequency at a certain level. This

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could also be indicative of the interpretation of anger as enhancing the performance of rugby players (Robazza & Bortoli, 2007) (see 6.4.1.1).

As both the kickboxers and rugby players displayed significant correlations between anger and heart beats per minute, it is assumed that good cardiovascular health correlates with anger expression and anger suppression or control. It is therefore postulated that anger does have an impact on the physiological wellbeing of these two groups. For the group not participating in these sports, no significant correlations were found, potentially emphasising the physiological health benefits involved in sport participation or the physical expression of pro-social anger and aggression.

Since it was found that anger and aggression could also be linked with psychological wellbeing, it is concluded that the former does influence psychophysiological wellbeing. Based on all the measures used in the present study, it is clear that psychological and physiological wellbeing and anger and aggression do not correlate to the same extent in all three groups. The research hypothesis stating that significant relationships will be observed between anger, aggression, and psychophysiological wellbeing is therefore only partially accepted.

The next section will explore the results that were yielded when the Kruskal-Wallis tests were conducted to determine if the three groups displayed any significant differences with regard to psychophysiological wellbeing.

6.5 Differences in psychophysiological wellbeing between groups

The groups observed in the present study, differ with regard to two characteristics that could explain the differences found in the constructs of psychophysiological wellbeing. As was stated in 6.2, the pro-social physical expression of aggression and anger is a commonality for the kickboxing and rugby groups. It is therefore assumed that these two groups will differ from the group of individuals not participating in these two sports with regard to those constructs measuring psychophysiological wellbeing. The other characteristic evident in both the kickboxing and rugby groups is that both these groups engage in physical exercise. It is assumed that the individuals in the group not participating in kickboxing or rugby do not engage in similar physical exercise. The differences in psychological wellbeing will be discussed first.

6.5.1 Significant differences in psychological wellbeing between groups

6.5.1.1 Significant differences in depression between groups

The significant differences observed between the group not participating in kickboxing or rugby and the rugby group, as well as between the former and the kickboxing group on state depression (see tables 5.26, 5.27 and 5.28), are not only of statistical significance but also of clinical importance. The same could be said of the significant differences observed between the group not participating in kickboxing and rugby and the rugby group, as well as between the former and the kickboxing group on trait depression (see tables 5.29, 5.30 and 5.31). The reason for this is that both the kickboxing and rugby groups displayed mean scores above the midpoint of 20 on the STPI-Y for these two variables of depression (see table 5.13 and 5.16). In addition, it

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was found that only the group consisting of individuals not participating in either of the sports, showed significant positive correlations between anger and depression (see 6.4.1.4). In light of all this evidence, it is now assumed that the kickboxers and rugby players displayed depressive symptoms, but that the latter were not related to their expression of pro-social anger and aggression. This result contradicts the findings of Hassmen, Koivula and Uutela (2000). These researchers made use of a large sample (n=3403) in Finland to study the relationship between anger, depression, and frequency of exercise. Participants completed a survey consisting of multiple questionnaires that included measurements of depression, state and trait anger, and exercise habits. Hassmen et al. (2000) found a negative relationship between depression and the frequency of exercise per week, where individuals who exercised more frequently reported fewer depressive symptoms. The more individuals exercised weekly, the less depression was experienced.

Further research, however, would be needed to clarify the reason for the results obtained.

6.5.1.2 Significant difference on anxiety between groups

A significant difference was found between the three groups with regards to state anxiety (see tables 5.38, 5.39 and 5.40). The kickboxing group and rugby group both had higher mean scores regarding state anxiety than the group with individuals not participating in these sports (see table 5.11). However, when one looks at the correlation matrices (see tables 5.23, 5.24 and 5.25) it becomes clear that no significant relationship existed between state anxiety and any of the measures of anger for the

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kickboxers and rugby players. It thus appears that the significant differences between the three groups with regard to state anxiety do not relate to the physical expression of pro-social anger and aggression. This result contradicts the findings of Hawkins and Cogle (2011) who found a positive correlation between anger expression and anxiety disorders.

It could be deduced that the increased mean scores for state anxiety and the occurrence of significant differences related to this construct, could be explained by the intensity or duration of exercise for the kickboxing and rugby groups. Bartholomew and Linder (1998) conducted research on state anxiety following resistance training using an experimental design. They found that following 20 minutes of moderate to high intensity exercise, state anxiety increased in both men and women. Since kickboxing and rugby could be perceived as high-intensity exercise, one could now assume that participants in these sports would also display elevated state anxiety scores.

6.5.1.3 Significant difference on curiosity between groups

Significant differences in state curiosity were observed between the kickboxing group and the group not participating in kickboxing. Significant differences in trait curiosity were also observed between the rugby group and the group not participating in kickboxing or rugby (see 5.5.1.3 and 5.5.1.4). The statistically significant difference might indicate some inhibiting effect on curiosity when participating in kickboxing and rugby, as indicated firstly, by the negative correlation between anger and curiosity for those not participating in either of the sports (see 6.4.1.3, and tables 5.23 to 5.25) and secondly, by the lower mean scores of curiosity for both the kickboxing and rugby

groups (see tables 5.12 and 5.15). It could be assumed that the pro-social physical expression of anger and aggression indicates the presence of curiosity, even though it is to a lesser extent than those not participating in these sports. This would require further investigation because, as Kashdan et al. (2013) stated, curiosity is neglected in the understanding of aggression.

Now that the significant differences between the three groups on constructs related to psychological wellbeing have been discussed, the next section will focus on significant differences observed with regard to the measures of physiological wellbeing.

6.5.2 Significant differences in physiological wellbeing between groups

6.5.2.1 Significant differences in blood pressure between groups

Significant differences in systolic blood pressure (see tables 5.48, 5.49 and 5.50) were observed between the kickboxing and rugby groups, as well as the former and the group not participating in the two sports. Significant differences in diastolic blood pressure (see tables 5.51, 5.52 and 5.53) were also observed between the group not participating in kickboxing or rugby and the rugby group, as well as between the former and the kickboxing group. The differences could be explained by the benefits of exercise. Austin et al., (1998), Silverthorn (2007) and Taylor (2006), have all stated that exercise could assist in controlling and regulating blood pressure. Fagard (2001) made a comprehensive review of literature available on the effects of exercise on blood pressure, with specific attention given to the contribution of exercise intensity. The research concluded that although the differences in blood pressure between those who exercise and those who do not were small, it was nonetheless significant. Participation

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in exercise, no matter how intense, is sufficient to produce a significant reduction in blood pressure.

The differences in blood pressure observed between the kickboxing and rugby groups could be due to the different training regimes required in these sports. Rugby training requires more resistance training than kickboxing, as the sport requires greater physical dominance of an opponent (see 2.4.1 and 2.4.2). Fagard and Cornelissen (2007) conducted meta-analyses of studies involving aerobic endurance training and resistance training and how these impact blood pressure. In their analyses, they concluded that aerobic endurance training greatly decreases blood pressure. This was also the case for resistance training, although the decrease in blood pressure was to a lesser extent. There was, however, a lack of available data on the subject. Results of the present study confirmed these findings as the kickboxing group obtained lower mean scores for both diastolic and systolic blood pressure when compared to the rugby group.

The pro-social physical expression of anger and aggression could be another explanation for the differences found in blood pressure. Results of the present study are in line with those of Igna et al. (2009). In their study of the influence of anger expression styles on blood pressure, they found an inverse relationship between anger expression and blood pressure, thus indicating that the more anger is expressed the lower blood pressure becomes. The results of the present study contradict the findings of Everson, Goldberg, Kaplan, Julkunen, and Salonen (1998). In their longitudinal study of the relationship between anger expression and hypertension, Everson et al. (1998)

found that anger expression increases the risk of future hypertension. Results regarding the impact of expressing anger and aggression on blood pressure appear to remain contradictory, and further research would be required.

6.5.2.2 Significant differences in heart frequency between groups

A significant difference in heart frequency was found between the kickboxing group and the group not participating in either rugby or kickboxing (see tables 5.43, 5.44 and 5.45). The kickboxers scored lower on heart frequency than those not participating in either kickboxing or rugby. It is therefore assumed that participation in kickboxing would ensure better fitness levels. When Tulppo, Mäkikallio, Seppänen, Laukkanen, and Huikuri (1998) studied heart frequency variability and fitness, they discovered that good aerobic fitness had beneficial effects on heart frequency. The positive correlation observed between anger and heart frequency for kickboxers (see table 5.23) furthermore shows that kickboxing, as a form of the physical expression of pro-social anger and aggression, would impact heart frequency more positively than when playing rugby. This could be linked to the previous discussion (see 6.5.2.1) where it was shown that kickboxing, as a form of endurance sport, has a more positive impact on the cardiovascular system. More research, however, is needed in this regard.

With regard to physiological wellbeing, it appears that the pro-social physical expression of anger and aggression impacts blood pressure and heart frequency, to some extent, in a positive way. From the above discussions, the current study accepts the research hypothesis stating that there is a significant difference in the psychophysiological

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wellbeing between kickboxers, rugby players, and individuals not participating in these sports.

6.6 Limitations of the study

This research study, like all other research studies, has inherent limitations. The following limitations should be considered when evaluating the conclusions:

- Random sampling was not used, and as such the results cannot be generalised to the South African population. Due to this, only the characteristics of the individuals for the two clubs that participated in the study and the students of the University of Pretoria, could be commented on.
- Another limitation with regard to the sampling technique was that the group not participating in kickboxing and rugby might potentially participate in other sports where the pro-social expression of anger and aggression in a physical manner may be allowed.
- The different sizes of the groups might have influenced the results to some extent. Discrepancies in sample size could potentially lead to confounding, and Type I and Type II errors (Huck, 2012). All results should therefore be interpreted with caution.
- The demographic data of the sample used was not representative of the population at large. Age could have been a confounding variable as the three groups were of different mean ages.
- The study did not include any measurement for the experience or time of participation in rugby or kickboxing.

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- The use of the STPI-Y to measure all psychological wellbeing variables might have limited the understanding of anger. There was also no actual measurement of aggression, and this was only assumed from literature and an understanding of kickboxing and rugby.
- The study did not include any screening for previous or current issues of psychophysiological wellbeing that might have confounded findings.

6.7 Recommendations for future research

The following recommendations for future research are made, based on the findings and limitations of the study:

- The high incidence of potential confounding variables in this study indicated that a true experimental design might be required to better understand the relationship of pro-social physical expression of anger and aggression to psychophysiological wellbeing.
- A longitudinal study in future research could allow for a better understanding of the variables explored in this study.
- A measure of aggression should be included in future research, and should not merely be deduced from literature. Similarly, some qualitative data to better describe or understand an episode of aggression could be beneficial to future research.
- Future studies could make use of a larger overall sample, where all three groups should be of a similar size. It could also be beneficial for control purposes if

other confounding variables in the sample such as age, race, gender, level of competition, and years of experience in the sport, are included.

6.8 Conclusion

Although all three groups scored low on state anger, significant differences came to the fore when they were compared to other elements of the construct. All three groups scored close to the midpoint of 20 regarding trait anger, with no significant differences between the groups coming to the fore. This could illustrate that anger is a common emotion experienced by most individuals. Correlational analyses furthermore indicated some positive and negative relationships between psychological wellbeing, and the pro-social physical expression of anger and aggression. This was also true for constructs related to physiological wellbeing.

As was the case with the correlational analyses, significant differences were found between the groups regarding some forms of psychological and physiological wellbeing.

It is consequently concluded that the pro-social physical expression of anger and aggression would, to some extent, impact the psychophysiological wellbeing of an individual. Because the study displayed several limitations, it is recommended that its findings should be interpreted with caution, and that more research is needed on the subject.

References

- Abdolmanafi, A., Besharat, M. A., Farahani, H., & Khodaii, M. R. (2011). The moderating role of locus of control on the relationship between anger and depression in patients with major depression disorder. *Procedia-Social and Behavioral Sciences*, 30, 297-301.
- Aghamohamadi, D., Eidy, M., Pourfathi, H., Hoseinzadeh, H., Sharabiani, B. A., & Golzari, S. (2010). Comparison of cardiac stress index with rate pressure product in trans-abdominal prostatectomy. *Journal of Cardiovascular and Thoracic Research*, 2(1), 35-38.
- Ahmadi, S. S., Besharat, M. A., Azizi, K., & Larijani, R. (2011). The relationship between dimensions of anger and aggression in contact and non-contact sports. *Procedia-Social and Behavioral Sciences*, 30, 247-251.
- Allan, S., & Gilbert, P. (2002). Anger and anger expression in relation to perceptions of social rank, entrapment and depressive symptoms. *Personality and Individual Differences*, 32(3), 551-565.
- American Psychiatric Association. (2013). *Diagnostic and statistics manual of mental disorders* (DSM-5) (5th ed.). Washington, DC: American Psychiatric Association.
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Psychology*, 53(1), 27-51.
- Anderson, C. A., Carnagey, N. L., Flanagan, M., Benjamin, A. J., Eubanks, J., & Valentine, J. C. (2004). Violent video games: Specific effects of violent content on

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

aggressive thoughts and behavior. *Advances in Experimental Social Psychology*, 36, 200-251.

Anshel, M. H. (2012). *Sport psychology: from theory to practice* (5th ed.). San Francisco: Benjamin Cummings.

Austin, D., Bower, H., Creswell, J., Davies, T., Thomas, T., Walker, J., Whitworth, B., & Peters, D. (1998). *Total health: the essential guide to conventional and complementary medicine*. Barrington, IL: Marshal Publishing.

Bandura, A. (1973). Social learning theory of aggression. In J. F. Knutson (Ed.). *The control of aggression: implications from basic research* (pp. 201-250). Chicago: Aldine Publishing Company.

Barlow, D. H., & Durand, V. M. (2009). *Abnormal psychology: an integrative approach* (5th ed.). Belmont: Wadsworth Cengage Learning.

Baron, R. A., Branscombe, N. R., & Byrne, D. (2008). *Social Psychology* (12th ed.). Boston: Pearson.

Bartholomew, J. B., & Linder, D. E. (1998). State anxiety following resistance exercise: The role of gender and exercise intensity. *Journal of Behavioral Medicine*, 21(2), 205-219.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review*, 8, 77-100.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Berkowitz, L. (1973). Simple views of aggression. In A. Montagu (Ed.), *Man and aggression* (2nd ed.) (pp. 39-52). New York: Oxford University Press.
- Betensky, J. D., & Contrada, R. J. (2010). Depressive symptoms, trait aggression, and cardiovascular reactivity to a laboratory stressor. *Annals of Behavioral Medicine, 39*(2), 184-191.
- Bjork, J. M., Dougherty, D. M., & Moeller, F. G. (1997). A positive correlation between self-ratings of depression and laboratory-measured aggression. *Psychiatry Research, 69*(1), 33-38.
- Bongard, S., & Al'Absi, M. (2005). Domain-specific anger expression and blood pressure in an occupational setting. *Journal of Psychosomatic Research, 58*, 43-49.
- Bresin, K., & Gordon, K. H. (2013). Aggression as Affect Regulation: Extending Catharsis Theory to Evaluate Aggression and Experiential Anger in the Laboratory and Daily Life. *Journal of Social and Clinical Psychology, 32*(4), 400-423.
- Brown, T. J., & Suter, T. A. (2012). *MR* (student ed.). South-Western: Cengage Learning.
- Bushman, B. J. (2002). Does venting anger feed or extinguish the flame? Catharsis, rumination, distraction, anger, and aggressive responding. *Personality and Social Psychology Bulletin, 28*(6), 724-731.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Bushman, B. J., & Anderson, C. A. (2002). Violent video games and hostile expectations: A test of the general aggression model. *Personality and Social Psychology Bulletin, 28*(12), 1679-1686.
- Bushman, B. J., Baumeister, R. F., & Phillips, C. M. (2001). Do people aggress to improve their mood? Catharsis beliefs, affect regulation opportunity, and aggressive responding. *Journal of Personality and Social Psychology, 81*(1), 17-32.
- Bushman, B. J., Baumeister, R. F., & Stack, A. D. (1999). Catharsis, aggression, and persuasive influence: self-fulfilling or self-defeating prophecies? *Journal of Personality and Social Psychology, 76*(3), 367-376.
- Buss, A. H. (1961). *The psychology of aggression*. Oxford: Wiley.
- Buss, D. M., & Shackelford, T. K. (1997). Human aggression in evolutionary psychological perspective. *Clinical Psychology Review, 17*(6), 605-619.
- Conroy, D. E., Silva, J. M., Newcomer, R. R., Walker, B. W., & Johnson, M. S. (2001). Personal and participatory socializers of the perceived legitimacy of aggressive behavior in sport. *Aggressive Behavior, 27*, 405-418.
- Carré, J. M., Fisher, P. M., Manuck, S. B., & Hariri, A. R. (2012). Interaction between trait anxiety and trait anger predict amygdala reactivity to angry facial expressions in men but not women. *Social Cognitive and Affective Neuroscience, 7*(2), 213-221.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Cox, D. E., & Harrison, D. W. (2008). Models of anger: contributions from psychophysiology, neuropsychology and the cognitive behavioral perspective. *Brain Structure and Function*, 212(5), 371-385.
- Cunniffe, B., Proctor, W., Baker, J. S., & Davies, B. (2009). An evaluation of the physiological demands of elite rugby union using global positioning system tracking software. *The Journal of Strength & Conditioning Research*, 23(4), 1195-1203.
- Deffenbacher, J. L., Oetting, E. R., Lynch, R. S., & Morris, C. D. (1996a). The expression of anger and its consequences. *Behaviour Research and Therapy*, 34(7), 575-590.
- Deffenbacher, J. L., Oetting, E. R., Thwaites, G. A., Lynch, R. S., Baker, D. A., Stark, R. S., ... & Eiswerth-Cox, L. (1996b). State-Trait Anger Theory and the utility of the trait anger scale. *Journal of Counselling Psychology*, 43(2), 131-148.
- Denollet, J., Gidron, Y., Vrints, C. J., & Conraads, V. M. (2010). Anger, suppressed anger, and risk of adverse events in patients with coronary artery disease. *The American Journal of Cardiology*, 105(11), 1555-1560.
- DeWall, C. N., Buckner, J. D., Lambert, N. M., Cohen, A. S., & Fincham, F. D. (2010). Bracing for the worst, but behaving the best: Social anxiety, hostility, and behavioral aggression. *Journal of Anxiety Disorders*, 24(2), 260-268.
- Diener, E. (2000). Subjective well-being: the science of happiness and a proposal for a National Index. *American Psychologist*, 55(1), 34-43.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: three decades of progress. *Psychological Bulletin*, *125*(2), 276-302.
- Dollard, J., Miller, N., Doob, L., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven: Yale University Press.
- Dorr, N., Brosschot, J. F., Sollers III, J. J., & Thayer, J. F. (2007). Damned if you do, damned if you don't: The differential effect of expression and inhibition of anger on cardiovascular recovery in Black and White males. *International Journal of Psychophysiology*, *66*(2), 125-134.
- Drummond, P. D., & Quah, S. H. (2001). The effect of expressing anger on cardiovascular reactivity and facial blood flow in Chinese and Caucasians. *Psychophysiology*, *38*, 190-196.
- Du Plessis, K. E. (2013). An evaluation of the psychometric properties of the STPI (Form Y) for South African students (Master's mini-dissertation). University of Pretoria, South Africa.
- Du Toit, P. J., Kruger, E., Govender, C., Henning, E., Kleynhans, M., Wood, P. S., De Villiers, N., Van Rooyen, J. M., Fletcher, L., & Grant, C. C. (2012). Cardiovascular health screening among South African students. *African Journal of Physical, Health Education, Recreation and Dance*, March (Supplement), 159-168.
- Eime, R., Payne, W., & Harvey, J. (2009). Trends in organised sport membership: Impact on sustainability. *Journal of Science and Medicine in Sport*, *12*(1), 123-129.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

Energy-Lab Technologies (2005). *Innovative heart and stress screening technologies* [pamphlet]. Energy-Lab Technologies GmbH.

Estlander, A. M., Knaster, P., Karlsson, H., Kaprio, J., & Kalso, E. (2008). Pain intensity influences the relationship between anger management style and depression. *Pain, 140*(2), 387-392.

Everson, S. A., Goldberg, D. E., Kaplan, G. A., Julkunen, J., & Salonen, J. T. (1998). Anger expression and incident hypertension. *Psychosomatic Medicine, 60*(6), 730-735.

Fagard, R. H. (2001). Exercise characteristics and the blood pressure response to dynamic physical training. *Medicine and Science in Sports and Exercise, 33*(6; SUPP), S484-S492.

Fagard, R. H., & Cornelissen, V. A. (2007). Effect of exercise on blood pressure control in hypertensive patients. *European Journal of Cardiovascular Prevention & Rehabilitation, 14*(1), 12-17.

Fayyaz, F., & Besharat, M. A. (2011). Comparison of anger control in clinical depressed, non-clinical depressed and normal people. *Procedia-Social and Behavioral Sciences, 30*, 94-97.

Ferguson, C. J., & Dyck, D. (2012). Paradigm change in aggression research: The time has come to retire the General Aggression Model. *Aggression and Violent Behavior, 17*(3), 220-228.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Fernandez, E., & Wasan, A. (2010). Chapter 26. The anger of pain sufferers: attributions to agents and appraisals of wrongdoings. In M. Potegal, G. Stemmler, & C. Spielberger (Eds.). *International handbook of anger: constituent and concomitant biological, psychological, and social processes* (pp. 449-464). New York: Springer.
- Feshbach, S. (1984). The catharsis hypothesis, aggressive drive, and the reduction of aggression. *Aggressive Behavior*, *10*(2), 91-101.
- Fink, M., & Taylor, M. A. (2001). The many varieties of catatonia. *European Archives of Psychiatry and Clinical Neuroscience*, *251*(1), 18-113.
- Fischer, A. H., & Evers, C. (2010). Chapter 20. Anger in the context of gender. In M. Potegal, G. Stemmler, and C. Spielberger. (Eds.). *International handbook of anger: constituent and concomitant biological, psychological, and social processes* (pp. 349-360). New York: Springer.
- Frances, A., Manning, D., Marin, D., Kocsis, J., McKinney, K., Hall, W., & Kline, M. (1992). Relationship of anxiety and depression. *Psychopharmacology*, *106*(1), S82-S86.
- Freud, S. (1973). *New introductory lectures on psychoanalysis*. Middlesex: Penguin
- Gallagher, M. W., & Lopez, S. J. (2007). Curiosity and well-being. *The Journal of Positive Psychology*, *2*(4), 236-248.
- Geen, R. G. (2001). *Human aggression* (2nd ed.). Philadelphia: Open University Press.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Gilbert, P., Gilbert, J., & Irons, C. (2004). Life events, entrapments and arrested anger in depression. *Journal of Affective Disorders*, 79(1), 149-160.
- Gravetter, F. J., & Forzano, L. B. (2009). *Research methods for the behavioral sciences* (3rd ed.). Wadsworth: Cengage Learning.
- Greene, J., & D'Oliveira, M. (2006). *Learning to use statistical tests in psychology* (3rd ed.). New York: Open University Press.
- Guyton, A. C. (1971). *Textbook of medical physiology* (4th ed. Illustrated). Philadelphia: W. B. Saunders Company.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery & Psychiatry*, 23, 56-62.
- Hanin, Y. L. (2010). Coping with anxiety in sport. In A. R. Nicholls (Ed.). *Coping in sport: theory, methods, and related constructs* (pp. 159-175): Nova Science Publishers, Inc.
- Hassmen, P., Koivula, N., & Uutela, A. (2000). Physical exercise and psychological well-being: a population study in Finland. *Preventive Medicine*, 30, 17-25.
- Haukkala, A., Kontinen, H., Laatikainen, T., Kawachi, I., & Uutela, A. (2010). Hostility, anger control, and anger expression as predictors of cardiovascular disease. *Psychosomatic Medicine*, 72(6), 556-562.
- Hawkins, K. A., & Coughle, J. R. (2011). Anger problems across the anxiety disorders: findings from a population-based study. *Depression and Anxiety*, 28(2), 145-152.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Honk, J. V., Tuiten, A., de Haan, E., van de Hout, M., & Stam, H. (2001). Attentional biases for angry faces: Relationships to trait anger and anxiety. *Cognition & Emotion, 15*(3), 279-297.
- Howell, C. C., Rice, M. H., Carmon, M., & Hauber, R. P. (2007). The relationships among anxiety, anger, and blood pressure in children. *Applied Nursing Research, 20*(1), 17-23.
- Huck, S. W. (2012). *Reading statistics and research* (6th ed.). Boston: Pearson Education.
- Igna, C. V., Julkunen, J., & Vanhanen, H. (2009). Anger expression styles and blood pressure: evidence for different pathways. *Journal of Hypertension, 27*, 1972-1979.
- International Rugby Board. (2013). *Laws of the game rugby union: incorporating the playing charter*. Retrieved from www.irb.com/laws
- Jansson-Fröjmark, M., & Lindblom, K. (2008). A bidirectional relationship between anxiety and depression, and insomnia? A prospective study in the general population. *Journal of Psychosomatic Research, 64*(4), 443-449.
- Kang, M. J., Hsu, M., Krajbich, I. M., Loewenstein, G., McClure, S. M., Wang, J. T. Y., & Camerer, C. F. (2009). The wick in the candle of learning epistemic curiosity activates reward circuitry and enhances memory. *Psychological Science, 20*(8), 963-973.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Kashdan, T. B., & Collins, R. L. (2010). Social anxiety and the experience of positive emotion and anger in everyday life: An ecological momentary assessment approach. *Anxiety, Stress, & Coping, 23*(3), 259-272.
- Kashdan, T. B., DeWall, C. N., Pond, R. S., Silvia, P. J., Lambert, N. M., Fincham, F. D., ... & Keller, P. S. (2013). Curiosity Protects Against Interpersonal Aggression: Cross-Sectional, Daily Process, and Behavioral Evidence. *Journal of Personality, 81*(1), 87-102.
- Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: An analysis of curiosity and social rank appraisals, approach–avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders, 22*(6), 925-939.
- Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality, 43*(6), 987-998.
- Kashdan, T. B., & McKnight, P. E. (2010). The darker side of social anxiety when aggressive impulsivity prevails over shy inhibition. *Current Directions in Psychological Science, 19*(1), 47-50.
- Kashdan, T. B., & Roberts, J. E. (2004). Social anxiety's impact on affect, curiosity, and social self-efficacy during a high self-focus social threat situation. *Cognitive Therapy and Research, 28*(1), 119-141.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Kashdan, T. B., & Silvia, P. J. (2009). Curiosity and interest: the benefits of thriving novelty and challenge. In S. J. Lopez (Ed.), *The Oxford handbook of positive psychology* (2nd Ed.) (pp. 367-374). Oxford: Oxford University Press.
- Kaufmann, H. (1970). *Aggression and altruism: a psychological analysis*. New York: Holt, Rinehart and Winston, Inc.
- Keeler, L. A. (2000). *The differences in sport aggression, life aggression, and life assertion among adult male and female collision, contact, and non-contact sport athletes* (Doctoral dissertation, University of Maryland, College Park).
- Kimble, N. B., Russo, S. A., Bergman, B. G., & Galindo, V. H. (2010). Revealing an empirical understanding of aggression and violent behavior in athletics. *Aggression and Violent Behavior, 15*(6), 446-462.
- László, K. D., Janszky, I., & Ahnve, S. (2010). Anger expression and prognosis after a coronary event in women. *International Journal of Cardiology, 140*(1), 60-65.
- Lewis, M. (2010). Chapter 11. The Development of Anger. In M. Potegal, G. Stemmler, & C. Spielberger (Eds.), *International handbook of anger: constituent and concomitant biological, psychological, and social processes* (pp. 177-191). New York: Springer.
- Licht, C. M., de Geus, E. J., Seldenrijk, A., van Hout, H. P., Zitman, F. G., van Dyck, R., & Penninx, B. W. (2009). Depression is associated with decreased blood pressure, but antidepressant use increases the risk for hypertension. *Hypertension, 53*(4), 631-638.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

Lorenz, K. (1966). *On aggression*. New York: Harcourt, Brace & World.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33(3), 335-343.

Mashhoodi, S., Mokhtari, P., & Tajik, H. (2013). The comparison of the aggression of young and adult athletes in individual or team sports. *European Journal of Experimental Biology*, 3(1), 661-663.

Maxwell, J. P., & Visek, A. J. (2009). Unsanctioned aggression in rugby union: relationships among aggressiveness, anger, athletic identity, and professionalization. *Aggressive Behavior*, 35, 237-243.

Maxwell, J. P., Visek, A. J., & Moores, E. (2009). Anger and perceived legitimacy of aggression in male Hong Kong Chinese athletes: Effects of type of sport and level of competition. *Psychology of Sport and Exercise*, 10(2), 289-296.

Montagu, A. (1973). The new litany of "innate depravity," or original sin revisited. In A. Montagu (Ed.). *Man and aggression* (2nd ed.) (pp. 3-18). New York: Oxford University Press.

Moore, K. L., & Dalley, A. F. (2006). *Clinically oriented anatomy* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Neil, R., Mellalieu, S. D., & Hanton, S. (2006). Psychological skills usage and the competitive anxiety response as a function of skill level in rugby union. *Journal of Sports Science and Medicine*, 5, 415-423.
- Nichols, K. H., Rice, M., & Howell, C. (2011). Anger, stress and blood pressure in overweight children. *Journal of Paediatric Nursing*, 26, 446-455.
- Novaco, R. W. (2010). Chapter 27. Anger and Psychopathology. In M. Potegal, G. Stemmler, & C. Spielberger (Eds.). *International handbook of anger: constituent and concomitant biological, psychological, and social processes* (pp. 465-498). New York: Springer.
- Overseas Security Advisory Council. (2012). *South Africa 2012 OSAC crime and safety report*. Retrieved from <https://www.osac.gov/pages/ContentReportDetails.aspx?cid=12014>
- Pallant, J. (2013). *SPSS survival manual: a step-by-step guide to data analysis using IBM SPSS* (5th ed.). New York: McGraw-Hill.
- Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: a program of qualitative and quantitative research. *Educational Psychologist*, 37(2), 91-106.
- Penney, R. K. (1965). Reactive curiosity and manifest anxiety in children. *Child Development*, 36(3), 697-702.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Perloff, D., Grim, C., Flack, J., Frohlich, E. D., Hill, M., McDonald, M., & Morgenstern, B. Z. (1993). Human blood pressure determination by hygmomanometry. *Circulation*, *88*(5), 2460-2470.
- Persad, L.B., Govender, C., Soma, P., Du Toit, P.J., Krüger, P.E., M., Grant, C.C., & Wood, P.S. (2012). Postural variations in cardio stress index scores. *African Journal for Physical, Health Education, Recreation and Dance*, March (Supplement), 90-98.
- Peters, R. A. (1978). Effects of anxiety, curiosity, and perceived instructor threat on student verbal behavior in the college classroom. *Journal of Educational Psychology*, *70*(3), 388-395.
- Pilgrim, J. A., Stansfeld, S., & Marmot, M. (1992). Low blood pressure, low mood?, *BMJ: British Medical Journal*, *304*(6819), 75-78.
- Pinel, J. P. (2011). *Biopsychology* (8th ed.). Boston: Pearson.
- Porges, S. W. (1995). Cardiac vagal tone: a physiological index of stress. *Neuroscience & Biobehavioral Reviews*, *19*(2), 225-233.
- Porges, S. W., & Byrne, E. A. (1992). Research methods for measurement of heart rate and respiration. *Biological Psychology*, *34*(2), 93-130.
- Pratt, T. C., Cullen, F. T., Sellers, C. S., Thomas Winfree Jr. L., Madensen, T. D., Daigle, L. E., ... & Gau, J. M. (2010). The empirical status of social learning theory: A meta-analysis. *Justice Quarterly*, *27*(6), 765-802.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Pumppla, J., Howorka, K., Groves, D., Chester, M., & Nolan, J. (2002). Functional assessment of heart rate variability: physiological basis and practical applications. *International Journal of Cardiology*, *84*(1), 1-14.
- Rabadi, M. H., & Jordan, B. D. (2001). The cumulative effect of repetitive concussion in sports. *Clinical Journal of Sport Medicine*, *11*(3), 194-198.
- Rahimizadeh, M., Arabnarmi, B., Mizany, M., & Shahbazi, M. (2011). Determining the difference of aggression in male & female, athlete and non-athlete students. *Procedia-Social and Behavioral Sciences*, *30*, 2264-2267.
- Ramírez, J. M., & Andreu, J. M. (2006). Aggression and some related psychological constructs (anger, hostility, and impulsivity): Some comments from a research project. *Neuroscience & Biobehavioral Reviews*, *30*(3), 276-291.
- Reed, M., Evely, A. C., Cundill, G., Fazey, I. R. A., Glass, J., Laing, A., ... & Stringer, L. (2010). What is social learning? *Ecology and Society*, *15*(4): r1. [online] URL: <http://www.ecologyandsociety.org/vol15/iss4/resp1/>
- Richman, L. S., Kubzansky, L., Maselko, J., Kawachi, I., Choo, P., & Bauer, M. (2005). Positive emotion and health: going beyond the negative. *Health Psychology*, *24*(4), 422-429.
- Robazza, C., & Bortoli, L. (2007). Perceived impact of anger and anxiety on sporting performance in rugby players. *Psychology of Sport and Exercise*, *8*, 875-896.
- Roberton, T., Daffern, M., & Bucks, R. S. (2012). Emotion regulation and aggression. *Aggression and Violent Behavior*, *17*(1), 72-82.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Ruiz, M. C., & Hanin, Y. L. (2011). Perceived impact of anger on performance of skilled karate athletes. *Psychology of Sport and Exercise, 12*, 242-249.
- Sadock, B. J., & Sadock, V. A. (2007). *Kaplan & Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry* (10th ed.). Philadelphia: Lippincot Williams & Wilkens.
- Saxe, R. M., & Stollak, G. E. (1971). Curiosity and the parent-child relationship. *Child Development, 42*(2), 373-384.
- Schneirla, T. C. (1973). Instinct and Aggression. In A. Montagu (Ed.), *Man and aggression* (2nd ed.) (pp. 144-149). New York: Oxford University Press.
- Scully, D., Kremer, J., Meade, M. M., Graham, R., & Dudgeon, K. (1998). Physical exercise and psychological well being: a critical review. *British journal of sports medicine, 32*(2), 111-120.
- Silverthorn, D. U. (2007). *Human physiology: an integrated approach* (4th ed.). San Francisco: Benjamin Cummings.
- Sharp, L. K., & Lipsky, M. S. (2002). Screening for depression across the lifespan: a review of measures for use in primary care settings. *American Family Physician, 66*(6), 1001-1008.
- Spielberger, C. D., Jacobs, G., Crane, R., Russell, S., Westberry, L., Barker, L., Johnson, E., Knights, J., & Marks, E. (2003). *Preliminary Manual for the State Trait Personality Inventory*. Center for Reasearch in Behavioral Medicine and Health Psychology: University of South Florida, Tampa.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

Spielberger, C. D., & Reheiser, E. C. (2010). Chapter 23. The Nature and Measurement of Anger. In M. Potegal, G. Stemmler, & C. Spielberger (Eds.), *International handbook of anger: constituent and concomitant biological, psychological, and social processes* (pp. 403-412). New York: Springer.

Spielberger, C. D., & Reheiser, E. C. (2009). Assessment of emotions: Anxiety, anger, depression, and curiosity. *Applied Psychology: Health and Well-Being*, 1(3), 271-302.

Spielberger, C. D., & Reheiser, E. C. (2003). Measuring anxiety, anger, depression, and curiosity as emotional states and personality traits with the STAI, STAXI, and STPI. In M. Hersen, M. J. Hilsenroth and D. L. Segal (Eds.). *Comprehensive Handbook of Psychological Assessment, Vol. 2, Personality assessment*. Hoboken, New Jersey: John Wiley & Sons.

Spielberger, C. D., Sydeman, J. D., Owen, A. E., & Marsh, B. D. (1999). Chapter 32 Measuring anxiety and anger with the state-trait anxiety inventory (STAI) and the state-trait anger expression inventory (STAXI). In M. E. Maruish (Ed.). *The use of psychological testing for treatment planning and outcomes assessment* (2nd ed.) (pp. 993-1021). Mahwah: Lawrence Erlbaum Associates.

South African Amateur Kickboxing Association. (2013). *Fighting modes*. Retrieved from www.kickboxer.co.za/index.php?p=fightingmodes

Stephens, A. S., & Butler, N. (1996). Sports participation and emotional well-being in adolescents. *The Lancet*, 347(9018), 1789-1792.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

- Suls, J., & Bunde, J. (2005). Anger, anxiety, and depression as risk factors for cardiovascular disease: the problems and implications of overlapping affective dispositions. *Psychological Bulletin*, *131*(2), 260-300.
- Taylor, S. E. (2006). *Health psychology* (6th ed.). New York: McGraw-Hill.
- Taylor, M. A., & Fink, M. (2003). Catatonia in psychiatric classification: a home of its own. *American Journal of Psychiatry*, *160*(7), 1233-1241.
- Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research & Applications*, *5*, 147-158.
- Townsend, M., Moore, J., & Mahoney, M. (2002). Playing their part: the role of physical activity and sport in sustaining the health and well-being of small rural communities. *Rural and Remote Health*, *2*(109), 1-7.
- Troisi, A., & D'Argenio, A. (2004). The relationship between anger and depression in a clinical sample of young men: the role of insecure attachment. *Journal of Affective Disorders*, *79*(1), 269-272.
- Tucker, L. W., & Parks, J. B. (2001). Effects of gender and sport type on intercollegiate athletes' perceptions of the legitimacy of aggressive behaviors in sport. *Sociology of Sport Journal*, *18*, 403-413.
- Tulppo, M. P., Mäkikallio, T. H., Seppänen, T., Laukkanen, R. T., & Huikuri, H. V. (1998). Vagal modulation of heart rate during exercise: effects of age and physical fitness. *American Journal of Physiology-Heart and Circulatory Physiology*, *274*(2), H424-H429.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

U.S. National Library of Medicine. (2013). *Vital signs*. Retrieved from <http://www.nlm.nih.gov/medlineplus/ency/article/002341.htm>

Weinberg, R. S., & Gould, D. (2003). *Foundations of sport and exercise psychology* (4th ed.). Human Kinetics.

Wessely, S., Nickson, J., & Cox, B. (1990). Symptoms of low blood pressure: a population study. *BMJ: British Medical Journal*, *301*(6748), 362-365.

World Association of Kickboxing Organizations. (2013). *Rules*. Retrieved from www.wakoweb.com/en/page/download-the-wako-rules-and-regulations/f4fd3fbd-938b-4bbe-bebe-48fdf157a02b

World Health Organisation. (2011). *Mental health: a state of well-being*. Retrieved from http://www.who.int/features/factfiles/mental_health/en/

Wright, L. B., Gregoski, M. J., Tinggen, M. S., Barnes, V. A., & Treiber, F. A. (2011). Impact of stress reduction interventions on hostility and ambulatory systolic blood pressure in African American adolescents. *Journal of Black Psychology*, *37*(2), 210-233.

Zuckerman, M., & Litle, P. (1986). Personality and curiosity about morbid and sexual events. *Personality and Individual Differences*, *7*(1), 49-56.

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

APPENDIX A

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION

APPENDIX B

SOUTH AFRICAN AMATEUR KICK-BOXING ASSOCIATION

38 Kew Road, Valhalla, Pretoria, 0185, South Africa

Tel/Fax: +27 (0)12 651 0328 • Cell: +27 (0)83 770 6022

E-mail: pcarney@mweb.co.za • Web Page: www.kickboxer.co.za



To Whom It May Concern

25 June 2013

RESEARCH ICW MARTIAL ART CLINICAL PSYCHOLOGY

I the President of the South African Amateur Kickboxing Association give Renardo Treunich permission to do research and obtain participants for the research.

Should there be any enquiries please contact me at the above contact details.

Yours Sincerely,

Pat Carney

CHAIRPERSON

South African
Amateur
Kick Boxing Association

National



Affiliations

International





Faculty of Humanities
Department of Psychology

THE EFFECTS OF PRO-SOCIAL PHYSICAL EXPRESSIONS OF ANGER AND AGGRESSION ON PSYCHOPHYSIOLOGICAL WELLBEING

INFORMED CONSENT

You are invited to participate in the study conducted by Renardo Treurnich in part fulfilment of the degree MA Clinical Psychology at the Department of Psychology, University of Pretoria. We hope to learn what the effects of expression aggression within a sporting context have on one's psychological and physical wellbeing.

If you decide to participate, you will fill in a self report questionnaire to measure your psychological wellbeing and undergo non-invasive physical assessments to measure your physical wellbeing. All measures are non-invasive, with no time-limit and no risks are known.

Any information that is gathered during this study that can be linked to you will remain confidential and will not be disclosed without permission or outside requirements of the law. If you give permission by signing this document, my supervisors and I plan to use the data for research purposes only.

Your decision to participate or not is completely voluntary, and will not influence any future relations with the University of Pretoria or researchers involved. If you decide to participate, you are free to withdraw your consent and discontinue participation in this study at any time without penalty.

For any additional information or queries, please contact Renardo Treurnich at 072 786 0868 or e-mail him at renardo.treurnich@gmail.com.

I, _____, have read and understood this form.
By signing this form, I choose to participate in this research project.

Participant Name & Surname: _____

Date: dd / mm / yyyy

Participant Signature: _____

Witness Name & Surname: _____

Date: dd / mm / yyyy

Witness Signature: _____

Researcher Name & Surname: _____

Date: dd / mm / yyyy

Researcher Signature: _____