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**RELATIONSHIPS BETWEEN
EXERCISE, ANGER, HOSTILITY AND
RESTING BLOOD PRESSURE IN WOMEN**

A thesis presented in partial fulfilment
of the requirements for the degree of
Master of Arts in Psychology
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Abstract

The present study investigated relationships between exercise, emotions of anger and hostility, and resting blood pressure. The investigation was based on a notion of 'physicality' which suggests exercise may be a source of physical and emotional empowerment for women. Recent studies reveal significant associations between exercise, components of anger, and blood pressure. The aim of the present study was to examine the possible relationship between exercise and emotions, and the possible roles of exercise as a mediating, confounding, and moderating variable in relationships between anger, hostility and resting blood pressure. One hundred and four female university students completed a questionnaire which included a measure of exercise, the Spielberger Trait Anger Scale and Anger Expression Scale, and the Cook-Medley Hostility Scale. Frequency of informal exercise was positively related to trait anger and anger temperament. Multiple regressions showed that exercise was not a mediating or confounding variable in relationships between anger, hostility and blood pressure. It did appear however, to moderate the relationship between anger expression and diastolic blood pressure. The effects of anger expression on blood pressure were also moderated by anger frequency and hostility. Blood pressure was not related to anger suppression or trait anger. It appeared that women who were more hostile were more likely to suppress their anger, as well as perceive situations as anger-provoking. Women who experienced anger frequently were more likely to use both modes of anger expression, while those women who perceived situations as anger provoking were more likely to suppress their anger only. The theoretical and methodological implications of the findings are discussed.

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Table of Contents

Abstract	ii
Acknowledgements	iii
Table of Contents	v
List of Tables	vii
Chapter 1	
Introduction	1
Physicality	3
Emotions of Anger and Hostility	6
Trait Anger	8
Anger Expression	10
Hostility	12
Association between Anger and Hostility	15
Exercise, Anger and Hostility	16
Chapter 2	20
Blood Pressure, Anger and Hostility	20
Exercise and Blood Pressure	21
The effects of Anger and Hostility on Blood Pressure	22
Trait Anger and Resting Blood Pressure	24
Anger Expression and Resting Blood Pressure	25
Hostility and Resting Blood Pressure	28
Interactive influence of Anger and Hostility on Blood Pressure	30
Exercise, Anger, Hostility and Blood Pressure	31
Hypotheses	32
Method	34
Participants	34
Procedure	34
Equipment	35
Measures	35
Psychological Questionnaire Measures	35
Trait Anger	35
Anger Temperament	37
Anger Expression	37
Hostility	40
Health Measure	41
Exercise Measure	42
Results	43
Descriptive Analysis	43
Bivariate Analysis	46
Multivariate Analysis	49

Discussion	54
Relationships of Exercise with Anger and Hostility	54
The influence of Anger and Hostility on Blood Pressure whilst controlling for Exercise	60
The interactive effects of Exercise, Anger and Hostility on Blood Pressure	63
Associations among Anger and Hostility	66
Limitations of the Present Study	68
Conclusions	69
References	71
Appendix A: Information Sheet	79
Appendix B: Consent Form	80
Appendix C: The Research Questionnaire	82

List of Tables**Table**

1	Descriptive statistics for study variables	44
2	Simple correlations among Anger, Hostility, Age, Body Mass Index (BMI), Exercise, Systolic (SBP) Blood Pressure and Diastolic (DBP) Blood Pressure	47
3	Multiple Regressions of Systolic and Diastolic Blood Pressure on psychological variables, exercise variables and covariates	50

Chapter 1

Introduction

The empirical focus of this thesis is the effects of exercise on aspects of women's emotions and cardiovascular health. According to feminist and social theorists Lisa McDermott (1996) and Katherine MacKinnon (1987), exercise may be a source of physical and emotional empowerment for women. McDermott (1996) offers a theoretical account of 'physicality', suggesting that if women gain control and strength over their bodies through exercise, they reject the common stereotype that their bodies are simply objects of sexual pleasure and desire. Instead the physical control gained through exercise enables women to enjoy a sense of physical mastery and they become active agents in their physical lives. Through the notion of physicality women may benefit from exercise mentally and physically.

Among the psychological characteristics that may benefit from exercise are women's emotions of anger and hostility. It is through the effects on emotions of anger and hostility that exercise may also affect cardiovascular health. Physicality provides the link for studying all of these factors together. It does this by explaining a possible relationship between exercise and emotions, then it provides a rationale to study the joint impact of exercise and emotions on cardiovascular health. There are several reasons why the research focus of this thesis is on anger and the attitude of hostility. Anger is about power and control embedded within the social context; it arises from a judgment that one has been wronged (Parrott & Harre, 1996). Women's social lives are not immune to the feeling of powerlessness. However, there are social restraints on their experience and expression of angry feelings which may have important health implications. This makes anger problematic.

Based on the notion of physicality the present study will investigate the interplay of exercise behaviour, anger, and hostility, and the impact these variables have on cardiovascular health, as represented by resting blood pressure. The reason for studying these factors together is that exercise may play several different roles within the equation. Exercise is already known to affect blood pressure (Hagberg, 1990). If it is

true that exercise and emotions are related then this relationship may influence the association between blood pressure and exercise. The first role exercise may play is that of a mediating variable. If exercise is associated with anger and hostility, via physicality, then this association may be part of the pathway through which exercise affects blood pressure.

If it is true that exercise is playing a mediating role then anger and hostility must actually be related to blood pressure. However the research examining this association reveal inconsistencies. These inconsistencies may be partly due to the possibility that exercise may also be a confounding variable (Schwenkmezger & Hank, 1996). One reason to propose that exercise is a confound comes from recent research indicating that exercise is related to both blood pressure and anger suppression. Norris, Carroll and Cochrane (1992) found that resting blood pressure decreased significantly in adolescent females and males after a 10 week exercise training programme. Buchman, Sallis, Criqui and Dimsdale (1991) found that women who engaged in more exercise were less likely to suppress their anger. It is apparent from this example that exercise is related to both resting blood pressure and anger suppression. For this reason exercise may act as a confounding variable.

The third reason to examine these variables together is the possibility that exercise acts as a moderating variable. In this role exercise may act as a buffer against the effects of emotions of anger and hostility. For example the relationship between anger and blood pressure may depend on the amount of time women spend exercising. Investigating exercise as a moderator is another way of explaining the inconsistencies that exist in the blood pressure literature. To investigate exercise in the three different roles, mediator, confound, or moderator, the present study must examine the joint effects of the variables.

The notion of interaction effects can also be found within the psychological constructs of anger and hostility themselves. Empirical research shows that anger and hostility are related but that they are also distinct (Spicer & Chamberlain, 1996; Williams, Barefoot, & Shekelle, 1985), meaning that the nature of the constructs is complex and possibly interactive. For example, Gentry (1985) found that the highest blood pressure readings in a sample of Black Americans were those who had high levels of both interracial

hostility and suppressed anger. The present study will also examine the potential joint effects of the anger and hostility variables. By examining these constructs together our understanding of their influence on blood pressure may be advanced.

The present chapter continues with a theoretical account drawn from social, feminist theory on 'physicality', a framework within which women's exercise behaviour and their emotional experiences can be studied. Secondly, the complex nature of anger and hostility is described using recent conceptual definitions which differentiate between the proneness to anger, its expression, and the attitude of hostility. Finally, the possible associations between the different components of anger and hostility and physicality are examined theoretical and empirically.

Chapter two will begin with a brief review of the association between exercise and blood pressure. This is followed by a literature review on the influence of proneness to anger, its expression and the attitude of hostility on resting blood pressure. To conclude, the three possible mediating, confounding, moderating roles that exercise may play in the relationship between anger, hostility and blood pressure are discussed and from this discussion the hypotheses are derived.

Physicality

In a patriarchal culture, one of the primary mechanisms of power is the control of women through the control of their bodies (Birrell & Theberge, 1994)

Traditionally the term 'physicality' has been associated with masculinity and power (McDermott, 1996), however sport feminists use 'physicality' as a conceptual tool to understand the relationship between women, their bodies and exercise (Birrell & Theberger, 1994). Physicality explores how women engage in life through their bodily experiences, or physicality can be understood as the 'physical expression of agency' (McDermott, 1996, p. 19). Agency refers to "the power of actors to operate independently of the determining constraints of social structure" Jary and Jary (1991, p. 9). McDermott approaches this notion of agency in terms of positive expression of the

embodied self. This expression includes experiences of control, power, capability, personal change and knowledgeability. If this positive expression is a consequence of engaging in exercise, then for women physicality may impact on the way they live the rest of their lives, including their social lives.

The theoretical importance of physicality for women's oppression is expressed by MacKinnon (1987), 'by engaging in physical activity a women must gain a relationship to her own body as though it is her own'. MacKinnon suggests that women who become physically strong and powerful can 'act upon' instead of being acted upon. The consequences of this may mean that women will use their own bodies as active agents instead of their bodies being objectified for the pleasure of others.

This notion of physicality creates an alternative view of women's bodies, as a means of enjoyment, health, and as a source of power and control. This view takes the place of the traditional image which reflects fragility, weakness and powerlessness (White & Vagi, 1990). The traditional image is dictated by dominant male-defined standards of female beauty and it can leave women open to physical and verbal attack in the form of rape, domestic violence, sexual harassment and pornography. Women may resist this social control over their bodies by becoming physically active agents and thereby gain back power in their physical lives.

In regard to exercise, there are two ways of approaching women's physicality. The first approach is reflected in writings from Iris Young (1990), the author of 'Throwing like a girl' and from Susan Bordo (1989). Young advocates understanding physicality in terms of men's ideas and images. These ideas set standards to which women seek to conform. In order to conform women engage in practices which tie their physical body to their sexuality. These practices objectify women's bodies and in doing so dictate a way of 'looking female', but they also dictate women's experiences of physical activity. Similarly, Susan Bordo suggests a woman's body is the site of struggle and that daily practices such as exercise are a form of body management that only serves to generate the acceptance of these male defined images. What Young and Bordo mean by their arguments is that women's physical body even during exercise are still restricted by male defined standards, and that the process of exercise itself is a process of social control.

On the other hand, physicality can be understood as a subjective construction that women both understand and control, that is constructed through their own lived bodily experiences of physical activity (McDermott, 1996). This notion has been taken from Guthrie and Castelnovo (1994) who draw on Foucault's notion of the "care of the self ethic". The 'ethic' denotes that women define their own identity in terms of self-mastery instead of sexual identity. This ethic is illustrated by Guthrie and Castelnovo (1992) in their study of elite female body builders. The researchers advocate that female body builders resist the dominant standards of female beauty instead of complying with them, arguing that exercise enables women to be active agents in the determination and construction of their bodies.

The present thesis is grounded in the latter approach to physicality. This approach suggests that the process of self-mastery and control of the body through exercise leads to physical experiences that enhance personal agency. It is potentially through this physical agency that a woman learns to cope with the constraints that may have dictated the way she is physically active and how she experiences her body. By engaging in exercise women are able to create subjectively meaningful experiences of their bodies even within the usual gendered constraints that already exist (McDermott, 1996).

These meaningful physical experiences may have direct implications for women's emotions. Among the emotions, anger and hostility are particularly salient to the study of women's physicality, because gendered constraints also encompass the experience and expression of anger and hostility. These constraints are typically embedded in social contexts, as emotions are social practices (Rosaldo, 1984). If women break the traditional bodily constraints via physicality what is the impact of physical agency on the existing social constraints of women's emotional lives? What kind of social agents do women become if they have positive experiences of physical agency?

One example of the psychological implications of exercise from a physicality perspective is from Whitson (1990). He suggests that for men 'assertiveness and confidence as ways of relating to others, have become embodied through development of strength, skill and through prevailing over opponents in competitive situations' (p. 24). He also suggests

that if our sense of who we are is firmly rooted in our experiences of embodiment then boys experiencing their bodies, and therefore themselves, in forceful, space-occupying, even dominating ways is integral to the reproduction of gender relations. This example reflects how the experience of one's world is learnt and influenced by how one learns to live their bodies.

In the present study the focus is on the association of exercise and emotions viewed from a physicality perspective. Theoretical support for the relationship between emotions and the physical body comes from Merleau-Ponty (1962) who argues that our experiences of our bodies are central to our senses of who we are, how we relate to the world and thereby to other people. How we relate to others and the world is embedded in our experience of emotions. If the notion of physicality is applied in this context, the experience of exercise is one of control and power over our bodies. If Merleau-Ponty's conviction is true, then it is not unreasonable to expect some connection between the experience of exercising the body, and the experience and expression of emotions. If hostility involves an attitude towards the world, and anger experience and expression involves social exchanges that reflect how individuals relate to other people, then physicality, via exercise may have implications for the way women experience and express their emotions.

To explore this idea further the complex concepts within the phenomena of anger and hostility need to be defined. Once defined, these concepts are then discussed in relation to physicality.

Emotions of Anger and Hostility

Emotions are thoughts somehow "felt" in flushes, pulses, "movements" of our livers, minds, hearts, stomachs, skin. They are embodied thoughts, thoughts seeped with the apprehension that "I am involved" (Rosaldo, 1984)

The meaning of emotions is shaped and constructed by society for our understanding. They are essentially social practices which are learnt through cultural terms and

conditions (Jagger & Bordo, 1989, p. 150). This is reflected in the way children learn appropriate ways of experiencing and expressing emotions and feelings. 'They are social practices which are organised by stories that we enact and tell' (Rosaldo, 1984). Essentially what this means is that we are actors or agents in our social lives. The way we tell our story, or experience and express our emotions, depends on our place in society and how we have learnt and perceived our place (Landman, 1996).

There are few empirical studies on anger (Averill, 1983; Spielberger, Jacobs, Russell & Crane, 1983). The lack of agreement over the definitions of anger and hostility and the multitude of assessment methods for these constructs have made it difficult for researchers to draw conclusions from the existing studies. In 1983 Spielberger, Jacobs, Russell, & Crane proposed a conceptual framework of anger and hostility. The conceptual definitions were developed in order to prevent writers from using anger and hostility constructs interchangeably. The framework defines three aspects which are central to the study of anger, called the AHA syndrome. The first is anger, which refers to the emotional state consisting of increased arousal with negative feelings which may vary in intensity from mild irritation to rage. The second is hostility which refers to a complex set of negative attitudes about social relations which may lead to aggressive behaviour. Finally, aggression, this implies destructive behaviour directed at either other people or at objects.

Although theorists have proposed other definitions for anger and hostility, there are several reasons why the present study will use the Spielberger conceptual framework. First, Spielberger makes clear conceptual distinctions between the different components of anger and hostility. Second, the conceptual framework has led to well validated measures of the various aspects of anger. Third, these measures have already demonstrated that anger and hostility are associated to resting blood pressure in some studies. Finally, previous New Zealand research that has looked at the relationship between anger, hostility and resting blood pressure has used the Spielberger measures of anger (Knight, Chisholm, Paulin & Waal-Manning, 1988; Spicer & Chamberlain, 1996). To enable direct comparisons of the results, and based on the points outlined above, the Spielberger framework is used in the present thesis.

Trait Anger

'One is judged to be good or bad, virtuous or vicious, according to the more settled states and dispositions one has; Dispositions that determine how one judges a situation and then acts when one is angry or fearful in that situation. The question or consequence, then, has to do with what one is disposed to be angry or fearful about' (Robinson, 1996, p. 22)

Within anger there are several different components which relate to women's physicality differently and affect health differently (Brody, 1997). The experience of anger can be defined as "an emotional state that consists of feelings that vary in intensity, from mild irritation or annoyance to fury and rage" (Spielberger, Johnson, Russell, Crane, Jacobs & Worden, 1985, p. 7). The experience of anger is also commonly known as angry affect, subjective or experiential anger. Angry feelings are combined with heightened activation of the autonomic nervous system, characteristic facial patterns, antagonistic thought patterns, and aggressive behaviours (Johnson & Greene, 1992). Thus the experience of anger elicits psychological and a physiological response.

It is important to distinguish between the experiential state of anger and the disposition of anger. State anger is the experience described above, it is an emotional state which involves feelings from mild irritation to rage which may fluctuate in intensity and duration. Trait anger is a personality trait that individuals may possess: it is a disposition to experience angry states. Trait anger is the tendency to evaluate situations as anger-evoking and to respond to such situations with increased state anger (Spielberger et al., 1985).

Spielberger et al. (1985) suggests that anger is induced by social situations wherein the individual perceives (1) a loss or threat of loss of (2) something felt to be possessed (rights, job, marriage or physical objects), through (3) perceived arbitrary and unfair and unjustifiable acts by others (person, group, or society). This means that anger occurs when individuals perceive that they or others: e.g. a child, partner, or another woman, are being subjected to unfair interference or harm. Aristotle suggests that angry feelings come about when individuals are required to make a judgment that one has been

wronged (Parrott & Harre, 1996, p.2). These threatening situations are embedded in social contexts where interpersonal relationships are involved (Johnson & Greene, 1992; Spielberg et al., 1985). It is apparent then that anger is deeply embedded and reliant upon interactions with other people.

The belief that anger is fueled by perceived unfairness, and that individuals perceive these situations in social contexts, has particular implications for women's social agency. To recall, agency refers to "the power of actors to operate independently of the determining constraints of social structure" Jary and Jary (1991, p. 9). Because women do not share the same economic, political and social power as men, they are often recipients of unjust decisions made by others within the public realm and their personal lives, causing loss of independence and decreased decision making power. The social context then becomes a realm in which potential anger-provoking situations can be fueled by daily interactions with other people that are perceived to be unfair. This is noted by Lutz (1996), 'the emotions especially anger, involve the identification of problems in women's lives. Talk about anger can be interpreted as an attempt to identify the existence of inappropriate restraint or injustice' (p. 166). The social context then becomes a potent source of anger for women.

Tavris (1982) also makes the link between women's subordinate position and their experiences of anger, suggesting that the lack of control in making choices would be a source of anger for anyone in a secondary position. Similarly, Brody (1997, p.386) suggests "It is not unreasonable to hypothesize that the experience and expression of anger may be related to their relatively low status and power, and the limitations it imposes on choices in their lives". Sandra Thomas (1995) provides support for this notion of powerlessness in her study which investigated women's anger in their everyday home and work situations. The qualitative study revealed that the most pervasive theme was the role of power, or lack of, in women's arousal of anger. Thomas (1995) notes that the 'epitome of powerlessness was not being listened to i.e. views, preferences, and ideas are ignored as if she were invisible' (p. 60). If it is true that women are experiencing this feeling of being powerless in their everyday lives then they may become 'disposed' to being angry. They may perceive social situations as anger-provoking and may become angry more frequently.

One way some women may cope with the anger derived from living in a powerless position, and the social constraints of female experience of anger, is to gain power and control over the physical aspect of their lives, their own bodies. By becoming a physically active agent, engaging in exercise may act as a coping mechanism or as a buffer to power and status inequities and consequently alleviate angry experiences. This may occur by changing women's perceptions of potentially anger-provoking situations, or by changing the way women act in the social context, they may become socially active agents. If it is true that individuals may come to understand their place in the world through the experience of their body, then women's perceptions of anger-provoking situations may differ according to their physical agency. The association between physicality and trait anger is discussed at the end of this chapter. But first the other components of anger and the attitude of hostility are defined.

Anger Expression

During the 1900's the psychoanalytic view that repression of anger was pathogenic led to the widespread belief that expression of anger was beneficial to mental and physical health (Siegman, 1994). This belief is still commonplace (Thomas, 1989), even though recent research shows that the outward expression of anger increases anger and aggressive outbursts (Tavris, 1982). Other misconceptions have obscured the true nature of anger expression. Emotion theorists, Johnson & Greene (1992) suggest that anger expression is a response to provocations that serve to regulate the emotional discomforts associated with problematic interpersonal relationships. This means that anger expression is the behavioural response to experiencing anger within personal relationships.

Spielberger et al. (1985) provide definitions for the different modes of anger expression. The first mode of anger expression is anger suppression, which refers to individuals who when they experience intense feelings of anger tend to do certain things with it such as 'harbour grudges and don't tell anyone about them', 'boil inside and don't show it', 'keep things in' (Spielberger et al., 1985). Anger suppression is a conscious decision to

deal with anger in this way. It must be distinguished from the psychoanalytical term *anger turned inward against oneself*, which is an unconscious process often resulting from feelings of guilt or severe depression (Julkunen, 1996).

The second style of expression is anger expression, this is anger verbally or physically expressed toward other people or objects (Johnson & Greene, 1992). Examples of anger expression include slamming doors, making sarcastic remarks, striking out at anything that is infuriating (Spielberger et al., 1985). Both modes of expression are considered personality traits, i.e. the individual normally reacts in this way to an angry situation. These anger expression dispositions can coexist, meaning an individual can use both modes of expressing their anger.

There are powerful social processes which influence women's expression of anger, such as dissimilar gender roles (Johnson, 1990), status and power imbalances, and differing socialization histories of males and females (Brody 1997; Landman, 1996). These processes may predispose some males and females to express emotions differently in some cultures and in some contexts. Individuals who do not conform to the local rules may be penalised, whereas people who do conform may be encouraged or rewarded for such behaviour in the form of social approval (Fiske & Stevens, 1993, cited in Brody, 1997). It is apparent that individuals may be controlled by these social norms that govern emotions.

An example of these emotion rules is that men are expected to be more aggressive and to openly express intense feelings of anger (Briton & Hall, 1995; Body, 1997; Stoney & Engebretson, 1994), while women's outward display of anger is disapproved (Lerner, 1992). This is because the expression of anger is not considered feminine. Appropriate female qualities include agreeing, complying, passively accepting and 'keeping the peace' so expressing anger is inconsistent with these qualities (Thomas, 1995). So what are the consequences of this emotions rule for women? Due to their economic and social dependence on men, defying the social rules of anger expression could be detrimental to herself and her children. It appears that women are in a double bind because if they express anger some women may risk economic or physical harm, while on the other hand if they suppress their anger some women may continue to undergo hardship or be blamed

for being passive or weak (Tavis, 1982). Although these are extreme consequences of anger expression there are often more subtle forces that exist in women's everyday lives which may also impinge on their health.

Although emotion rules exist on the expression of anger, it is important to note the inconsistencies in the empirical research regarding how women do express anger. One study showed that women do inhibit their anger, especially those whose lack of education or occupational mobility keep them in positions of low status and power (Thomas, 1995). In contrast, Frost & Averill (1982) studies indicate that women actually verbalise intense anger and for longer periods of time than do men. Similarly, Harburg, Blakelock, & Roeper (1979) found that women were more inclined to discuss their anger than men. Thomas (1989) found that women were more likely to express their anger via physical symptoms than to express it outwardly or suppress it. So how do women react to their anger or how do they cope with the restrictions of anger expression? The few studies that investigate how women cope with their anger leaves the reader unclear on the preferred mode of anger expression in women.

The aim of the present study is to investigate the impact of exercise on anger expression, and whether two different expression modes, anger suppression and anger expression are associated to resting blood pressure. Based on the discussion of physicality, if women are active agents in their physical lives they may become more active agents in the way they react to angry experiences within their social world. If women express themselves physically through exercise does this positive expression influence the way they express their anger? The association between physicality and anger expression is discussed later in this chapter.

Hostility

Recent interest in hostility has been driven from the behavioural medicine and health psychology fields. This increasing interest is based on studies that have found an association between hostility and physical health, in particular cardiovascular health. These studies have revitalised a centuries-old psychosomatic hypothesis that chronic hostility and anger may contribute to development of coronary heart disease (CHD)

(Smith, 1992). Despite the burgeoning amount of research on hostility and health inconsistencies have appeared. At least some of these inconsistencies may be due to the conceptual confusion over defining hostility (Smith, 1992).

The word hostility is derived from the Latin word *hostis*, meaning enemy. The meaning of hostility often implies the possibility that rage or anger is involved. For this reason anger and hostility have often been used interchangeably. Recently, the development of Spielberger's AHA syndrome has helped prevent researchers from using the two constructs interchangeably by distinguishing between anger and hostility. Within this conceptual framework hostility is defined as a complex set of negative attitudes towards others, such as distrust (Spielberger et al., 1985). These attitudes are intertwined with emotions such as cynicism, resentment, vengeance, and alienation, which tend to have complex cognitive features. Spielberger's definition suggests that hostility is an attitude which is centred around social relationships (Spielberger, 1996), and it is characterised by antagonism, distrust and vengeance towards others (Cook & Medley, 1954; Johnson, 1990).

While Spielberger defines hostility as an attitude, Chaplin (1982) defines hostility as the tendency to wish to inflict harm on others or the tendency to feel anger toward others. The lack of agreement over what hostility is has been discussed by Smith (1992, p. 139) in a review of recent research on the relationship between hostility and health. This review includes a conceptual definition by Barefoot who suggests that often but not always hostility involves affect, behavioural, and cognition, and that these different aspects should be articulated and assessed separately. In Barefoot's conceptual approach, the affective component of hostility includes a variety of related emotions, including anger, annoyance, resentment, and contempt. The cognitive component includes negative beliefs about human nature in general (i.e. cynicism) and the belief that disagreeable behaviour of others is intentionally directed at the self (i.e. hostile attributions). Finally, the behavioral component includes aggression and a variety of often subtle forms of antagonism, insult, and uncooperativeness.

On the theoretical level, Spielberger's conceptualisation of hostility is used. Attitudinal hostility rather than behavioural or affective hostility, is also used for empirical reasons. Some recent studies have shown that attitudinal hostility (measured by the Cook-Medley Hostility Scale) is linked to cardiovascular disease. This attitude may impact on the way individuals construe their social lives, how they evaluate and react to social exchanges. It is regarded as a stable personality trait, meaning it is enduring in nature (Julkunen, 1996). Attitudinal aspects of hostility encompass cognitions of resentment, suspiciousness, guilt, and mistrust. Hostility connotes a devaluation of the worth and motives of others, an expectation that others are likely sources of wrong doing, a relational view of being in opposition toward others.

Despite the large number of studies on hostility and health, there are notably few that investigate women's hostility. The majority of the research is based on male samples. This may be due to the lower prevalence of cardiovascular disease in women and the common misconception that hostility is an attitude considered common in men but not in women. The few studies that have investigated hostility in women have found that some women do display hostile attitudes and that these attitudes are characterised by a high level of suspiciousness and a disparaging view of others (Suarez, Harlan, Peoples, & Williams, 1993). Women with hostile attitudes also have the expectancy that people are unlikely to fulfill obligations and are frequent sources of mistreatment, provocation and harm, despite the fact that they might appear to be friendly and cooperative.

It appears that hostility is an attitude which tends to make women distrustful of and isolated from others. In the past it was believed that women's social role was that of a family caretaker because of this role there has been a lot of importance placed on the successfulness of women's interpersonal relationships (Brody, 1997; Johnson, 1990). If women display hostile attitudes in their relationships they may oppose the social norms which govern female behaviour. Spicer and Chamberlain (1996) suggest that there is a chronic mismatch for women between the negative attitude of hostility and the socially accepted attitudes. This mismatch may have health implications for women with attitudinal hostility. In this context it is interesting to speculate about the impact exercise may have on attitudinal hostility. If the experience of the lived body does influence the way we see the world, then exercise may influence attitudinal hostility in women.

Association between Anger and Hostility

It is important at this stage to recognise the close association between the proneness to anger, its expression and attitudinal hostility. Greenglass & Julkunen (1989) investigated the relationship between these constructs. They found that hostility was related to mode of anger expression. Female hostility was correlated with suppressed anger while for men hostility was associated with a tendency to express anger. These findings indicate that cynical distrustful women tend to suppress anger, while men openly express them. Greenglass & Julkunen (1989) suggest that cynical women are less likely to express anger openly because of sociocultural constraints on women's outward expression of anger. These constraints are a joint function of her subordinate position in society and of her socialisation which stresses the maintenance of interpersonal relationships. Men however are socialized into a gender role that stresses action and asserting oneself. On the other hand, recent New Zealand research has shown that there is a correlation between anger suppression and hostility in both men and women (Spicer & Chamberlain, 1996).

Associations among the anger constructs reveals that suppressed anger and expressed anger are two different dimensions (Spicer & Chamberlain, 1996; Spielberger et al., 1985). This means that individuals may use both modes of expressing anger. The implications for health research is that both of these modes may be unhealthy, both may be positively related to elevated blood pressure. The positive relationship between both modes of anger expression and blood pressure was found by Harburg, Blakelock & Roeper (1979). They concluded that both extremes of anger expression may be risks for hypertension. Regarding the relationship between mode of anger expression and trait anger women who experience anger frequently and who are prone to perceiving situations as anger provoking are more likely to express their anger outwardly than to suppress their anger (Spielberger, 1996; Spicer & Chamberlain, 1996).

The findings reported above are simple correlation relationships, therefore causal effects cannot be determined. Thus it may be that women who express their anger outwardly more frequently may perceive themselves as experiencing angry feelings more frequently. Despite the limited explanatory power of correlation the evidence appears to support a

significant association between trait anger, the frequency of anger experience, the outward expression of anger and hostility. The analytical implication of the correlational nature of the constructs is that when studying the relationships of these constructs to other health variables, such as exercise, the influence of each variable should be statistically controlled.

Exercise, Anger and Hostility

The focus of the present study is an examination of the influence of exercise on women's emotions of anger and hostility. A brief review of physicality suggests that women who possess physical agency will experience physical mastery over their bodies which is enhanced by feelings of power, control, capacity. The present study proposes that exercise experience, as a measure of physicality, may impact on women's social agency. Agency being "the power of actors to operate independently of the determining constraints of social structure." Jary and Jary (1991, p. 9). The effects will be reflected in women's experiences of anger and hostility. These emotions are affected in particular because they are embedded in social relationships which depend on women's perceptions of power and control within their social lives.

Regarding trait anger, women who are usually prone to perceiving situations as potentially anger provoking, or who are disposed to anger, may be frequently subjected to loss of control in their social lives. By increasing physical agency, spending time engaging in exercise may alter women's impression of the amount of social control they possess. For this to be true there should be a negative relationship between trait anger and the time spent exercising.

Empirically, two studies examining the association of trait anger and exercise have revealed contrasting results. Czajkowski, Hinderlang, Dembroski, Mayerson, Parks, Holland (1990) studied the relationship between aerobic fitness, psychological characteristics, and cardiovascular reactivity in a sample of 62 men. Fitness was measured by a maximal treadmill exercise test using the Bruce protocol. A subscale (the Anger Temperament Scale), of the Spielberger Trait Anger Scale (Spielberger, Jacobs,

Russell, & Crane, 1983) was used to measure the general propensity to experience anger. They found that highly fit individuals reported themselves to be less anxious and less angry than less fit subjects. Interestingly, they found that controlling for subject's angry temperament scores reduced the relationship between fitness and blood pressure to non significant levels. Czajkowski et al. suggest that the degree of trait anger, which covaries with increased fitness, may contribute to the apparent relationship between fitness and blood pressure. These findings support the hypothesis that trait anger is negatively related to exercise in men.

In contrast, Buchworth, Dishman and Cureton (1994) divided a sample of 67 young female adults into two groups. One group consisted of highly fit women and the other of moderately fit women. Using Spielberger's Trait Anger Scale they compared the two groups and found no differences. Unfortunately Buckworth et al. (1994) do not compare the two groups to women who do no exercise.

The present study aims to re-examine the relationship between exercise and women's trait anger. Based on the notion of physicality, the experience of engaging in physical exercise may impact on women's perceptions of anger-provoking situations. By exercising, women may increase the amount of control they have in their physical lives and this may alter their perceptions of social situations. The present study expects to find that women who exercise more often are less likely to perceive situations as anger-provoking and to experience anger frequently.

Engaging in exercise may alter one's disposition to express anger. If it is true that women have positive experiences of control, knowledge, and self mastery during exercise then maybe this experience increases the amount of control women have over their expression of emotions. This may happen because women who experience more physical agency may react to feelings of powerlessness, vulnerability and essentially anger less often. If they frequently experience control and power over their physical lives they may feel less threatened by the consequences of expressing their anger or they may feel more power over their emotional expression.

One significant piece of empirical research reveals a significant negative relationship between exercise and anger suppression in women. Buchman, Sallis, Criqui, Dimsdale, & Kaplan, (1991) assessed 200 men and women entering medical school. They used a submaximal 5 minute step test adapted from Sharkey to measure fitness. To measure the level of exercise they used a self-report questionnaire on the frequency and duration of exercise, and a rating of their relative exercise level compared to others. The Anger Expression Self-Analysis Questionnaire was used to assess the subject's propensity to express or suppress angry feelings. For women, there was a negative association between anger suppression and exercise frequency and exercise rating. There was a significant positive relationship between anger expression and exercise frequency. These results indicate that women who exercise more frequently are less likely to suppress their anger, and more likely to express anger.

In contrast, Brown, Wang, Ward, Ebbeling, Fortlage, Puleo, Benson & Rippe (1995) studied the psychological changes associated with a 16 week programme of moderate and low intensity exercise on healthy sedentary adults (69 women, 66 men). They assessed the respondents anger expression with the Spielberger Anger Expression Inventory. The results revealed no significant changes in anger expression.

The present study aims to clarify the relationship between exercise and the mode of anger expression in women. It is expected that women who spend more time exercising may be more likely to express their anger outwardly. In addition, it is expected that engaging in exercise will decrease the likelihood of suppressing anger in women.

Theoretically, Merleau-Ponty (1962) suggested that our lived bodily experiences are central to our senses of who we are, how we relate to the world and to other people. If individuals possess negative attitudes towards other people, what influence will exercise have on attitudinal hostility? Norris, Carroll and Cochrane (1992) studied the effects of a 10 week training programme on hostility, anxiety and depression in 147 adolescent male and females. They divided the participants into high, moderate and low exercise intensity groups which engaged in exercise twice a week for 25 - 30 minutes. Although hostility was measured by the Multiple Affect Adjective Checklist which is a mood checklist hostility decreased after 10 weeks for the high intensity exercise group.

Youth & Topeka (1989) studied the relationship of moderate physical exercise to scores on hostility in 100 males. Hostility was assessed using the Buss Durkee Inventory which measures experiential and expressive hostility rather than cognitive hostility. The participants were categorised into 5 jogging groups, advanced, intermediate, beginning, dropout and non exercisers. Youth and Topeka (1989) found that the non exercisers had higher hostility scores than the dropout group and the other jogging groups.

One empirical study investigating the relationship between attitudinal hostility and physical activity is by Musante, Treiber, Davis and Strong (1992). Their study focused on the relationship of hostility to lifestyle behaviors and physical risk factors in 81 women and 57 men. Hostility was measured by the Cook-Medley Hostility Scale. The participants provided self-reports of physical activity. Musante et al. found that in both men and women hostility was positively associated with vigorous exercise.

From the studies described above, only Musante et al. investigated attitudinal hostility. Their findings suggest that vigorous activity is related to higher scores of hostility. However, if the notion of physicality is true and women have positive experiences when they engage in exercise, these physical experiences may affect the way they construe their social world. The present study aims to re-examine the association between women's attitudinal hostility and exercise. It is proposed that women who experience physical agency, via physical exercise, are less likely to possess negative attitudes towards social relationships.

To conclude, there are possible links between exercise and trait anger, its expression and attitudinal hostility. Through exercise women may increase self mastery and control of the physical body. This experience may influence; the way women perceive anger-provoking situations, the way women express their anger, and women's attitudes of hostility.

Chapter 2

Blood Pressure, Anger and Hostility

Having outlined the relationship between physicality, anger and hostility, chapter 2 explores the relationship of these variables to blood pressure. The importance of studying blood pressure (BP) in women is first briefly discussed. Then the links between blood pressure, trait anger, anger expression and attitudinal hostility are examined. This is followed by a brief account of the interactive nature of anger and hostility on blood pressure. The chapter concludes with a list of hypotheses that was derived from this discussion.

The importance of establishing psychosocial risk factors of elevated blood pressure for women as well as men is illustrated by medical knowledge that indicates in New Zealand 29% women and 24% men over the age of 45 years old are hypertensive (Nye, Paulin & Russell, 1992). Hypertension has become the most common reason to start lifetime medication (Rose, 1985). A sustained high resting blood pressure is a major risk factor for cerebrovascular disease and coronary heart disease (Johnson, Gentry & Julius, 1992). The aetiology of cardiovascular diseases is known to be multifactorial (Schwenkmezger & Hank, 1996; Suls, Wan & Costa, 1995) and there is evidence indicating that psychosocial factors are part of the multifaceted nature of the disease. The gravity of the disease highlights the importance of studying these potential psychosocial risk factors of high blood pressure.

Although research in this area is growing rapidly very few studies include women. There is a distinct underrepresentation of women not only in psychological health studies (Rodin & Ickovics, 1990), but also in cardiovascular exercise research (Mitchell, Tate, Raven, Cobb, Kraus, Moreadith, O'Toole, Saltin, & Wenger, 1992). Many studies often exclude women from the sample altogether, and those that include women and men often pool the results together without testing for sex differences. This highlights and reinforces the importance of studying women's cardiovascular health.

Exercise and Blood Pressure

Medical and health researchers recognise physical exercise as a factor in the primary and secondary prevention of cardiovascular diseases (Fletcher, Blair, Blumenthal, Caspersen, Chaitman, Epstein, Falls, Froelicher, Froelicher and Pina, 1992). Despite the lack of research on women's cardiovascular health several studies have shown that resting blood pressure in normotensive and hypertensive women has been lowered after engaging in regular exercise.

Cox, Puddey, Burke, Beilin, Morton & Bettridge (1996) studied the effects of initiating and maintaining a regular exercise programme in sedentary older women (40-65 years old). They assessed determinants of change in resting BP after 6 and 12 months. The results revealed that continuing in any regular exercise was related to a decrease in blood pressure. Cox et al. conclude that the small effects of exercise on resting BP in older women are predominantly related to continuing participation in lower intensity exercise.

Norris, Carroll and Cochrane (1992) studied the effects of a 10 week exercise training programme on physiological and psychological factors. They assigned 147 female and male adolescents to high exercise intensity, moderate exercise intensity and low exercise intensity groups. Resting blood pressure was measured before the training programme and again afterwards. Norris et al. found that resting BP decreased significantly in the high intensity group. Blood pressure also decreased in the moderate and low intensity group's although the decrease was not significant. The control groups resting BP increased slightly.

Tanaka, Bassatt, Howley, Thompson, Ashraf and Rawson (1997) studied the effects of swimming on resting BP. The study involved 18 female and male hypertensives. Tanaka divided the participants into two groups, one group followed a swim programme for 10 weeks while the other did not. The findings revealed a significant decrease in systolic blood pressure (SBP) for the group that engaged in the swimming programme.

Braith, Pollock, Lowenthal and Graves (1994) investigated the effects of moderate and high intensity exercise on resting blood pressure in 44 normotensive subjects between the ages of 60 to 79. The 6 month training programme involved the participants exercising three times a week for 40 minutes at either 70% or 80% of their maximal heart rate. Braith et al. found significant decreases in SBP for both groups after 6 months training.

In a meta-analytic study Kelley (1995) found that small aerobic exercise-induced reductions occur in resting SBP and DBP of normotensive adults. He suggests that longer duration of training per session is more appropriate for reducing resting blood pressure levels. However more than 90% of the subjects included in his meta-analysis were male. It is apparent that exercise is related to blood pressure levels. These studies reveal significant decreases in blood pressure following exercise programmes in a range of groups, including adolescents, elderly, middle-aged, men, women, normotensives and hypertensives.

The effects of Anger and Hostility on Blood pressure

During the first half of the Twentieth Century Franz Alexander hypothesised that the suppression or inhibition of angry feelings, alongside hostile and aggressive impulses were major contributors to the etiology of hypertension and coronary heart disease (CHD) (Gold & Johnston, 1990). He postulated that attempts to suppress anger led to intense and prolonged blood pressure (BP) elevations, with chronic activation of the autonomic nervous and cardiovascular system resulting in stable hypertension (Suls, Wan, & Costa, 1995). In 1932 Cannon proposed a theory on how psychological events are translated into physical disease processes. The theory is called the fight-flight response theory (Siegman, 1994). This phenomenon involves a number of adaptive physiological responses, such as increased blood pressure, the release of epinephrine, and corticosteroids. Although adaptive in the short term, in that these physiological changes prepare the body to engage in the intense motor activity that is required for the fight-flight response, their chronic activation can cause tissue damage and disease. Furthermore, the threats faced by modern man, such as loss of job, divorce, and chronic disease are not resolved by intense physical activity.

Since then, many studies have investigated the relationship between the disposition of anger, its expression, attitudes of hostility and either heart disease or blood pressure. The import of studying anger and hostility in relation to blood pressure levels is to establish valid risk factors that predict high BP and subsequently heart disease. Harburg, Gleiberman, Russell & Cooper (1991) say 'It is well documented that high blood pressure is linearly related to higher rates of certain forms of coronary heart disease and stroke'. Although there is some support for the association between anger, hostility and BP, the findings demonstrate inconsistencies. Different assessment methods and the different definitions of anger and hostility have contributed to the inconsistencies making it difficult to integrate and draw conclusions from the research. While some studies have demonstrated links between anger, hostility and blood pressure other studies haven't.

For example, Spielberger, Johnson, Russell, Crane, and Worden (1985) found that anger suppression was related to elevated blood pressure, and anger expression was associated with lower blood pressure. In contrast, Spicer & Chamberlain (1996) found that anger suppressers display lower blood pressure. Studies by Knight, Chisholm, Paulin, & Waal-Manning (1988) and Julius, Harburg, Cottington and Johnson (1986) report no significant association for both modes of expression anger expression. Regarding hostility, -Spicer & Chamberlain (1996) found that women who exhibited attitudinal hostility also displayed higher resting blood pressure. On the other hand, Goldberg, Comstock and Graves (1980) found no relationship between hostility scores and blood pressure levels measured in a community-wide screening programme of 2762 men and women.

It is apparent that while the relationship between BP, anger and hostility has been a major focus of psychosomatic research for much of the Twentieth Century the nature of the relationships remains unclear. While some studies find no significant associations, others reveal significant relationships in both directions. For a review of the major studies see Gold and Johnson (1990). The following section attempts to outline the studies and reveal the inconsistencies.

Trait Anger and Resting Blood Pressure

As Averill (1983) pointed out the 'individual episodes of anger may not be particularly dramatic or noteworthy, but the cumulative effects of many bursts of anger are significant, especially in terms of health consequences and interpersonal relationships' (p. 1156). One purpose of the present study is to examine whether women who are disposed to becoming angry are more likely to display elevated resting blood pressure levels.

Empirically, Suls, Wan, & Costa (1995) assessed the relationship between trait anger and resting blood pressure by reviewing relevant quantitative research. They used meta-analytic techniques to assess the overall strength of the relationship between trait anger and blood pressure. They found a positive relationship which was statistically significant but quite small, meaning that women who did possess the personality characteristic of trait anger were more likely to display slightly higher blood pressure levels. The study also investigated methodological problems associated with testing anger and blood pressure. One issue that Suls concludes and that is worth noting is that the single occasion BP measurement may identify individuals who react to BP measurement but not those that have chronic elevation of BP.

Further empirical support for the positive relationship between trait anger and blood pressure comes from the Markovitz, Matthews, Wing, Kuller & Meilahn (1991) prospective study. They studied biological and psychological predictors of blood pressure in women during a 3 year period. The study included 468 middle-aged women who were all normotensive and premenopausal at the baseline period of the study. Trait anger (measured by Spielberger Trait Anger Scale), resting blood pressure and alcohol, smoking and dietary factors were measured in the baseline period and then again 3 years later following the same procedure. The univariate analyses revealed that an increase in trait anger was significantly related to increases in both SBP and diastolic blood pressure (DBP). The regression analysis found that an increase in trait anger scores remained a significant predictor of SBP and DBP change after controlling for significant biological variables. This means that the increase of trait anger was significantly associated to an increase of blood pressure over time. Both the Suls et al. (1995) meta-analysis and the

Markovitz et al. (1991) study provide support for the expectation in the present study that women who are disposed to anger may be more likely to display higher levels of resting blood pressure.

Two recent New Zealand studies found no support for the association between anger proneness and blood pressure. Spicer & Chamberlain (1996) studied the association between anger temperament and resting blood pressure in 104 men and women. Anger was measured by the Anger Temperament Subscale from the Spielberger Trait Anger Scale. Similarly, Knight, Paulin & Waal-Manning (1987) failed to find an association between the intensity of anger and blood pressure in a sample of New Zealand men and women. Anger was assessed by the Subjective Anger Scales. The present study aims to re-examine the relationship between trait anger and blood pressure in a sample of New Zealand women whilst controlling for the influence of exercise. It is expected that trait anger is positively associated to resting blood pressure in women.

Anger Expression and Resting Blood Pressure

It is unclear from empirical studies what mode of anger expression is healthy in regard to blood pressure. For example the Framingham study (Haynes, Feinleib, & Kannel, 1980) revealed that women who talked about their anger actually displayed higher blood pressure levels. This finding is inconsistent with the common belief that anger expressed in a communicative way (i.e. talking about it) is healthier than suppressing or expressing anger. Carol Tavris (1982) also suggests that by talking about anger, individuals may actually increase the level of anger.

Regarding the suppression and expression of anger, Spielberger et al. (1985) found that both modes of anger expression were significantly related to blood pressure in women. They found that those who suppressed their anger were likely to have high blood pressure indicated by a significant positive correlation. Women who expressed their anger displayed lower blood pressure levels. Johnson (1984, cited in Spielberger, 1996) conducted the Tampa study, which included 500 black and white, male and female adolescents. Their psychological measurements included Harburg's and Spielbergers

Anger Scales. For females there was a positive relationship between anger suppression and BP, and anger expression and BP. While for males only suppressed anger was related to elevated blood pressure. In this study girls use both modes of expression, and both are related to BP. Johnson's results contradict Spielberger's findings that women who express their anger are more likely to display lower blood pressure levels.

In the Michigan Statewide BP Survey, Cottington, Brock, House and Hawthorne, 1985, found that suppressed anger was positively related to diastolic blood pressure in a sample of 402 white men and women normotensives and hypertensives. They used their own 8 point scale to measure emotional expression, suppression of anger included the tendency to harbour grudges and aggressive impulses. Further support for the relationship between suppressed anger and blood pressure comes from Goldstein, Edelberg, Meier and Davis's (1988) study. Their subjects were asked to rate the degree of expressed anger (the extent to which others would be aware of their anger) and family expressed anger (the degree to which anger was expressed in the family when they were growing up). They found that for normotensive subjects systolic blood pressure was higher in subjects who were from families who did not express their anger.

Using the Spielberger Anger Scales, Schneider, Egan, Johnson, Drobny and Julius (1986) compared two groups of borderline hypertensive students, those whose BP levels remained high outside the clinic, and those whose BP levels returned to normal at home. Those with sustained high BP levels at home were characterised by greater suppression of anger. The evidence from these studies clearly suggests there is a positive relationship between suppressed anger and blood pressure.

In contrast, several studies have found no relationship between anger expression and blood pressure. Haynes, Feinleib, Levine, Scotch and Kannel (1978) in their study of over 1600 middle aged community volunteers in Framingham found no relationship between brief measures of expression of anger and hypertension. The following four studies that are described below all used the Spielberger Anger Expression Scale. Knight, Chisholm, Paulin, & Waal-Manning (1988), in their study of over 1000 New Zealand men and women found no relationship between the mode of anger expression and resting blood pressure. Markovitz et al. (1991) investigated the relationship in 468

middle-aged women. In their prospective study they found no association between anger expression and resting blood pressure. Harburg, Gliberman, Russell, & Cooper (1991) found no significant associations between the mode of anger expression and resting blood pressure in 720 men. Interestingly, Spicer & Chamberlain (1996) found in their study of 104 men and women that those individuals who suppressed their anger were also more likely to display *lower* BP levels. This contradicts earlier studies that suggest suppressed anger is unhealthy for blood pressure levels.

From this brief review of the literature it seems that the direction of the relationship between anger suppression and blood pressure remains unclear. Despite some studies finding significant positive relationships, one has found a negative association and yet others have found no significant effects. It is unclear whether women who suppress or express their anger display higher BP levels. If social norms dictate that women should not outwardly display anger, then suppressing anger will not jeopardise interpersonal relationships. However some studies show that this may be associated to high blood pressure indicating that women who do maintain harmony in their relationships may do so at the expense of their cardiovascular health.

The direction of the relationship between anger expressed outwardly and blood pressure is also unclear. While Spielberger et al. (1985) found a significant negative relationship, Johnson (1984, cited in Spielberger, 1996) found a significant positive relationship, and some studies have found no significant associations. As discussed above, the social rules that govern emotional expression in western cultures dictate to women that the outward expression of anger is not feminine. For some women expressing anger may be detrimental to relationships which they rely on for economic and social security. If women cope with their anger in this manner they may be more likely to display elevated blood pressure levels.

The present study will re-examine the relationship between anger expression, anger suppression and resting blood pressure. However, this study will also control for the possible influence of exercise on these relationships. It is expected that women who suppress their anger and express their anger are more likely to display higher blood pressure levels.

Hostility and Resting Blood Pressure

Researchers, in their attempt to revitalise the centuries-old psychosomatic hypothesis that chronic anger and hostility contribute to the development of coronary heart disease, have recently produced a thorough and rigorous evaluation of the association between hostility and health (Smith, 1992, p.139). On the whole there is some support for the psychosomatic hypothesis that hostility is related to cardiovascular health and blood pressure. However, the literature on this hypothesis demonstrates inconsistencies which may be partly due to methodological and conceptual problems (Smith, 1992). Blood pressure is linearly related to higher rates of certain forms of coronary heart disease and stroke, meaning that individuals display higher resting blood pressures (or hypertension) prior to the development of heart disease (Harburg, Gleiberman, Russell & Cooper, 1991). Because there are very few studies that investigate the relationship between resting blood pressure and hostility, the following literature review will highlight the inconsistencies in the hostility-heart disease research first. It will then proceed to review the few studies that investigate the relationship between attitudinal hostility and resting blood pressure.

In a widely quoted study Williams, Haney, Lee, Kong, Blumenthal and Whalen (1980) found that the Cook-Medley Hostility Scale (Ho) and angiographically determined CAD were related in over 400 men and women. Williams et al. demonstrated that patients scoring above 10 on the Ho scale are more likely to have occluded coronary arteries. Following this study other studies have examined the power of the Ho scale to predict future coronary heart disease. One of the first studies to follow was from Barefoot et al (1983). They studied 255 medical students over 25 years and found that students who exhibited hostility had a five fold increase in the risk of angina, MI and CHD related death. Recently, Barefoot, Dodge, Peterson, Dahlstrom and Williams (1989) confirmed the relationship between hostility and mortality in a sample of 119 law students followed for almost 20 years. Shekelle, Gale, Ostfeld and Paul (1983) describe a 20 year follow up of 1877 middle aged men who completed the MMPI as part of a large epidemiological study started in the late 1950's. The study showed a modest relationship between CHD and hostility. These studies indicate that hostility is a predictor of cardiovascular disease.

In contrast, several prospective studies reveal no relationship between hostility and heart disease. McCranie, Watkins, Bradbsma and Sisson (1986) followed up 447 medical students for 25 years and found no relationship with any CHD related morbidity or mortality. A recent study by Hearn, Murray and Luepker (1989) failed to show prospective links between hostility and either total mortality or the incidence of CHD in 1399 men after 33 years.

Regarding the relationship between resting blood pressure and hostility, Spicer & Chamberlain (1996) found in their cross-sectional study of 104 New Zealand men and women that hostile women were likely to display higher resting blood pressure, but hostile men were not. Research by Christensen & Smith (1993) reports higher BP in those men who possessed hostile attitudes during the baseline phase of their experiment. Koskenvou, Kapiro, Rose, Kesaniemi, Sarna, Heikkila and Langinvianio (1988) found that the prevalence of hypertension increased with increased hostility. They measured hostility on a Likert-type scale assessing irritability, ease of anger arousal, and argumentativeness in a sample of 3750 Finnish men. In contrast, a study by Goldberg, Comstock, & Graves (1980) found no relationship between hostility scores and BP levels measured in a community-wide screening program of 2762 men and women in USA. However their scale only consisted of three questions asking about aggressive behaviour.

From this review it is apparent that there is some support for the association between resting blood pressure and hostility. Despite the vast number of studies in the hostility-cardiovascular health field very few investigate women's attitudinal hostility. As discussed earlier, women who possess attitudinal hostility defy the social norms within a society which stresses the importance of interpersonal relationships. As Spicer & Chamberlain (1996) have shown women who exhibit attitudinal hostility also display higher resting blood pressure. This may mean that being a women who possesses attitudinal hostility opposes the social norms, and possessing this attitude may impinge on their health, in particular their blood pressure levels.

The ability of the Cook-Medley Hostility Scale to predict cardiovascular disease highlights the importance of studying hostility and its impact on resting blood pressure. The ambiguous results highlight the need to re-examine the relationship while adopting a

broader approach to the study of both hostility and anger in relation to blood pressure. For this reason, coupled with the lack of research on women's cardiovascular health, the impact of exercise (via physicality) on resting blood pressure is examined. Few studies have recognised the potential roles that exercise may play in the psychosomatic hypothesis (Schwenkmezger & Hank, 1996). By considering other potential factors, such as exercise, health research takes on a more interdisciplinary approach which may advance knowledge on the way risk factors of cardiovascular disease interact.

Interactive influence of Anger and Hostility on Blood Pressure

The relationships between each single construct and BP have been discussed above. The present study aims to examine whether there are independent relationships among these variables. Researchers have recently recognised the need to study the interactive effects of anger and hostility on blood pressure (Greenglass, 1996; Siegman, 1994; Spicer & Chamberlain, 1996). This is because the health consequence of anger experience and anger expression may vary according to the extent of hostile attitudes.

Researchers have proposed that blood pressure levels may be associated with both hostility and particular strategies for dealing with anger (Greenglass, 1996). For example, blood pressure may be elevated only in people whose anger is constantly fueled by a chronically hostile attitude towards others (Spicer & Chamberlain, 1996). There is empirical support for this proposition, Gentry (1985) found that the highest BP readings in a sample of Black Americans were those who had high levels of both interracial hostility and suppressed anger. Similarly, Julkunen and Korhonen (1993, cited in Spielberger, 1996) found that women who suppressed their anger were more likely to have elevated blood pressure, but only those women who reported their work environment as hostile and tense. Another possibility is that having a cynical attitude towards others may affect blood pressure levels only if the individual experiences angry feelings frequently.

The interactive effects of the anger constructs among themselves should also be examined (Helmers, Posluszny & Krantz, 1994; Spicer & Chamberlain, 1996). One

possibility is that the effect of anger expression on blood pressure may be moderated by the frequency with which anger occurs. This means that perhaps anger expression or anger suppression affects BP in women only if they experience anger frequently or possess the disposition to perceive situations as anger provoking. One purpose of the present study is to investigate the possible interactive effects of anger and hostility on BP.

Exercise, Anger, Hostility and Blood Pressure

To conclude this chapter, several points need to be revisited. From the review of the literature it is clear that inconsistencies exist in the research on the relationship between blood pressure, anger and hostility. Exercise may contribute to the inconsistencies and the present study proposes to examine three possible ways exercise may influence the previously ambiguous results. The study of exercise is grounded within a theoretical notion of physicality. This notion holds implications for the impact of exercise on anger and hostility, and consequently their joint association on women's resting blood pressure.

The three different ways exercise may relate to emotions and physical health are as a mediating variable, confounding variable and moderating variable. The first role of mediating variable means that exercise may influence resting blood pressure via the impact it has on anger and hostility. However for this to be true anger and hostility must be related to blood pressure. It is apparent from the literature review above that it is unclear whether this relationship exists. Thus it is proposed that exercise may act as a confounding variable. As a confounding variable, the impact of exercise may have hindered previous research in this area.

The third role exercise may play is that of a moderating variable. As a moderating variable exercise may act as a buffer to the impact of anger and hostility on resting blood pressure. This means that by engaging in exercise, via the notion of physicality, the impact of trait anger, anger expression and attitudinal hostility on blood pressure may be lessened. For example, attitudinal hostility in women will be related to elevated blood pressure depending on the amount of women spend exercising. The present study aims

to investigate these three potential roles exercise may have in the association between blood pressure, anger and hostility.

Hypotheses

There are several hypotheses that can be derived from the theoretical account discussed above.

Associations between Anger, Hostility and Exercise

1. The more frequently and the longer women have spent engaging in exercise the less likely they are to experience anger frequently, and the less likely they are to perceive situations as anger-provoking.
2. The more frequently and the longer women have spent engaging in exercise the less likely they are to suppress anger and the more likely they are to express anger.
3. The more frequently and the longer women have spent engaging in exercise the less likely they are to exhibit hostile attitudes.

Exercise as a confounding variable

4. Women who perceive situations as anger provoking and who experience anger frequently will display higher blood pressure levels when the frequency and duration of exercise is controlled.
5. Women who express their anger outwardly and who suppress their anger will display higher blood pressure levels when the frequency and duration of exercise is controlled.
6. Women who display hostile attitudes will display higher blood pressure levels when the frequency and duration of exercise is controlled.

Interaction effects on Blood Pressure

7. The above pathogenic relationships outlined in hypothesis 2 will depend on the frequency and the amount of time women have spent engaging in exercise. The association between the psychological variables and resting blood pressure may be attenuated by exercise.
8. The positive association between the frequency of angry experiences and blood pressure, and trait anger and blood pressure will be stronger in more hostile women.
9. The positive association between anger expression and blood pressure, and anger suppression and blood pressure will be stronger in more hostile women.
10. The positive association between anger expression and blood pressure, and anger suppression and blood pressure will be stronger in women who frequently experience anger or who possess an angry disposition.

Associations among the psychological variables

Although not expressed as formal hypothesis it was expected that the association among psychological variables is such that;

- Hostility will be positively related to anger expression.
- The tendency to perceive situations as anger provoking will be associated with the expression of anger outwardly.
- The two modes of anger expression are independent.

Method

Participants

Potential participants were given details of the study in graduate Psychology classes, and those women who were interested in taking part provided their name and telephone number. These people were contacted by phone and an appointment time was made. The vast majority of the 103 females were psychology students. Ages ranged from 18 to 53 years, with a mean age of 24.1 years ($sd = 7.6$). Eighty percent were under 24 years old. All but one were normotensive. Since this was a convenience sample it was not possible to estimate the response rate.

Procedure

Participants were requested to refrain from smoking cigarettes, drinking caffeine and engaging in heavy physical exercise for one hour before appointment time. On arrival, participants were shown through to a quiet experimental room, seated and asked to read the information sheet if they had not already done so. The researcher explained the procedure of the session and asked the participant to sign a consent form. All of the participants agreed to sign the consent form (see Appendix A and B for copies of the information sheet and the consent form).

Blood pressure for all participants was recorded by the same researcher following a standard WHO-approved procedure (WHO Monica Project Principal Investigators, 1988). The researcher asked the participant to rest quietly for 5 minutes before placing the Blood Pressure cuff on the participant's right arm. After approximately 5 minutes rest a first blood pressure was taken, then 30 seconds later a second resting blood pressure was taken. All measures were obtained while the subjects were seated with their arm at heart level and resting on the table. The average of the two blood pressure readings was used in the analysis.

The researcher then asked the participant for their estimated weight and height, age, and the day of their menstrual cycle. The weight and height were subsequently combined to form Quetelet's index of body mass (kg/m^2) (see appendix C for the questionnaire). The participant then completed a questionnaire that contained measures of hostility, anger-in, anger-out, anger frequency, and recent exercise behaviour, and some background questions about their health. Once they had completed the questionnaire the researcher told the participant their blood pressure readings, and then gave the participant an opportunity to ask questions.

Equipment

A Critikon Dinamap 8100 portable BP monitor was used to measure systolic blood pressure and diastolic blood pressure. Internal calibration of the Dinamap was performed immediately prior to the investigation. Calibration against a standard sphygmomanometer (Trimline, PyMaH Corp.) was conducted in an earlier study (Lyons, 1996) which showed accurate pressure readings within 2mmHg.

Measures

Psychological measures

Trait Anger

In 1983 Spielberger, Jacobs, Russell, & Crane developed the State-Trait Anger Scale (STAS) to assess anger. The scale is unique because it distinguishes between State Anger (S-Anger) and Trait anger (T-Anger). S-Anger is an emotional state involving feelings of irritation, tension, annoyance and rage, while T-Anger is defined as the frequency that participants experience S-Anger. The T-Anger scale measures individual differences in anger proneness as a personality trait. Persons high in T-Anger are expected to perceive a wider range of situations as anger provoking (e.g. annoying, and irritating) than persons low in T-Anger, they also respond to situations with elevations in

S-Anger. In this study only the Trait Anger Scale was used to assess individuals disposition to experience angry feelings.

Although there are other measures of anger, the advantage of Spielberger's scale is that the different dimensions of anger are clearly defined (Gold & Johnston, 1990). Spielberger not only differentiates state anger from trait anger, but also distinguishes between the experience of anger and the expression of anger (see next section). In addition, other studies have used the T-Anger scale to examine the contribution of trait anger to elevated blood pressure. To enable direct comparisons of the results with other studies this standard measure of anger was used.

The items in the T-Anger scale indicate how often, in the last month, descriptions such as "It makes me furious when I am criticised in front of others" apply to the respondent. The participant responded on a 4 point rating scale, from 1, almost never, to 4, almost always. The respondents receive a total score by summing the 15 items, this gives a total range of scores from 15 - 60.

Regarding internal reliability of the T-Anger scale Spielberger (1996) reports high Cronbach alpha coefficients from a large study he completed in the United States. For a sample of 1,182 female adults the alpha coefficient was .82 and for 1,385 female college students the coefficient was .83, suggesting the T-Anger scale has good internal reliability.

Spielberger's (1996) current manual also reports the construct validity of the T-anger scale. He reports Pearson correlation coefficient of $r = .66$ with the Buss-Durkee Hostility Inventory (BDHI), and $r = .43$ with the Hostility (Ho) scales, suggesting that trait anger is moderately associated to hostility. This is expected as hostility and trait anger are believed to be distinct constructs but also related. Regarding discriminant validity Spielberger found low correlations of $r = .25$ and $r = .38$ with the State and Trait anxiety scales (State-Trait Personality Inventory). This means that anger is only slightly correlated to anxiety. These coefficients reflect a sufficient pattern of construct validity.

Angry Temperament (Anger Frequency)

Within the Trait Anger scale there is a 6 item subscale called the Angry Temperament scale (Spielberger et al, 1983). This scale measures the frequency of angry experiences. The other 9 items on the Trait Anger Scale refer to specific situations that may provoke anger and therefore do not provide a pure measure of frequency. Spicer & Chamberlain (1996) used this subscale to assess how frequently anger is experienced, to enable direct comparisons between the different samples the present study will also use the Angry Temperament scale.

The items in the subscale indicate how often descriptions such as "I have a fiery temper" apply to the respondent. The participant responded on a 4 point rating scale, from 1, almost never, to 4, almost always. The respondents receive a total score by summing the 6 items which gives a total range of scores from 6 to 24.

Regarding the internal reliability of the subscale, Spielberger (1996) reports a cronbach alpha of .89, while New Zealand psychometric data (Spicer & Chamberlain, 1996) shows a alpha coefficient of .78. These coefficients reflect good internal reliability of the Anger Temperament scale.

Anger expression

In 1985 Spielberger, Johnson, Russell, Crane, Jacobe & Worden published the Anger Expression Scale (AX) in order to distinguish between the experience of anger, (measured by STAS), and the behaviours that people engage in when they feel angry, (measured by the AX). The STAS and the AX together form the State Trait Anger Expression Inventory (STAXI) (Spielberger, 1996). The AX assesses individual differences in anger expression as a personality trait rather than the intensity of the expression of anger at a particular moment in time (Spielberger et al., 1985). Suls, Wan, & Costa (1995), in their meta-analysis of the association of anger to blood pressure, found that the AX scale shows the strongest support for the psychosomatic hypothesis. The present study assesses anger expression with the AX scale.

The scale comprises two subscales, Anger/In and Anger/Out. These scales are independent of each other (Spielberger, 1996). New Zealand data supports this with insignificant correlations of $r = .17$ (Knight, Chisholm, Paulin & Waal-Manning, 1988) and $r = -.16$ (Spicer & Chamberlain, 1996). The reliability and validity of the two scales are discussed separately.

Anger In

The Ang/In subscale assesses suppressed angry feelings. It measures anger that is directed inward. The scale has 8 items including statements such as 'I pout or sulk' and 'I keep things in'. Participants rate each item on how well it describes their angry feelings and behaviour in the last month. The rating scale is on a 4 point scale, from 1, almost never, to 4, almost always. The scores were summed to give the participants a total Anger In score between 8 and 32.

The internal reliability of the Anger In scale was reported by Spielberger (1996). He found a Cronbach alpha coefficient of .74. for female college students in the United States. New Zealand psychometric data on the Anger In scale shows slightly lower internal reliability with alpha coefficients of .70 (Knight et al, 1988) and .60 (Spicer & Chamberlain, 1996). So for New Zealand participants the Anger In scale's internal reliability is slightly less than for the United States.

Regarding construct validity, Spielberger (1996) examined the convergent validity of the Anger In scale with Harburg et al.'s (1979) measure of anger expression. In Harburg's study students were dichotomised into Ang In and Ang Out depending on their response to anger provoking situations in teacher and movie vignettes. Spielberger correlated students Ang In scores from each vignette with his Ang In scale. The significant Pearson's r for Ang In and the teacher vignette was $r = -.31$, and for Ang In and the movie line situations was $r = -.26$. Both correlations are low and negative indicating that they are not measuring the same construct.

In regard to discriminant validity Spielberger reports correlations between his anxiety measure and the Anger In scale. For state anxiety and Ang In the Pearson $r = .28$, and for trait anxiety the Pearson $r = .30$. These correlations indicate that the Anger In scale

is only slightly related to anxiety, this is expected as individuals who suppress anger may also be anxious.

It is interesting to note that correlations between the Ang In scale and Anger Temperament scale reveal that those who frequently experience anger are not very likely to suppress their anger (Pearsons $r = .16$) (Spielberger, 1996). The same is true for New Zealand participants, Pearsons $r = .13$ (Spicer & Chamberlain, 1996). A slightly higher correlation was reported for the Trait Anger and Ang In scales, Pearson $r = .29$ (Spielberger, 1996). This suggests that those who are prone to experiencing anger are more likely to suppress their anger. New Zealand research on the relationship between anger suppression and hostility (measured by the Cook-Medley Hostility Scale) reveals a correlation of $r = .41$ (Spicer & Chamberlain, 1996). This means that people with hostile attitudes are more likely to suppress their anger.

Anger Out

The Anger Out Scale involves the expression of anger by aggressive behaviours directed outwardly toward other people or objects in the environment (Spielberger, 1996). The scale has 8 items including statements such as 'I do things like slam doors' and 'I say nasty things'. Participants rate each item on how well it describes their angry feelings and behaviour in the last month. The rating scale is on a 4 point scale, from 1, almost never, to 4, almost always. The scores were summed to give the participants a total Anger Out score between 8 and 32.

Internal reliability of the Ang Out scale was reported by Spielberger (1996). The Cronbach alpha coefficient for female college students on the Ang Out scale was .77. This is similar to recent New Zealand psychometric data which revealed alpha coefficient of .73 (Knight et al, 1988) and .78 (Spicer & Chamberlain, 1996). These high coefficients mean that all of the items in the Ang Out scale are measuring the same construct.

Regarding construct validity, Spielberger (1996) examined the convergent validity of the Ang Out scale with Harburg et al.'s (1979) measure of anger expression. Again Spielberger correlated the Ang Out scores from Harburgs students with his on Ang Out

scale. The significant Pearson's r for Ang Out and the teacher vignette was $r = .36$, and for Ang Out and the movie line situations was $r = .29$. These positive correlations mean that the two scales are related but not very strongly.

In regard to discriminant validity Spielberger (1996) reports correlations between state anxiety and Ang Out $r = .07$, for trait anxiety $r = .26$. These correlations suggest that individuals in anxious states are not likely to express their anger outwardly, while those who are prone to experiencing anxiety are slightly more likely to express anger outwardly. These correlations discriminate between anxiety and the Anger Out scale sufficiently.

There is a notable relationship between Ang Out and Anger Temperament. Spielberger (1996) reports a correlation of $r = .50$ and Spicer & Chamberlain (1996) report a correlation of $r = .47$, suggesting that those who frequently experience anger are more likely to express their anger outwardly. Similarly, Spielberger (1996) found that those who were prone to experiencing anger were also likely to express their anger outwardly (Pearson's $r = .58$). New Zealand research on the relationship between the Anger Out scale and hostility reveals a correlation of $r = .07$ (Spicer & Chamberlain, 1996), suggesting that hostile people are not likely to express their anger outwardly.

Hostility

The Cook-Medley Hostility Scale (Ho Scale) (Cook & Medley, 1954) was employed to measure hostility. The relationship between hostility and blood pressure has been a major focus in behavioural medicine since Barefoot, Dahlstrom & Williams (1983) found a predictive relationship between high ho scores and the incidence of CHD in 255 male medical students. Since then the Ho scale has been used frequently as a hostility measure in health research, especially in studies on psychological determinants of blood pressure.

The Ho consists of 50 items to which the respondents answer either true or false to questions such as 'someone has it in for me' and 'I have often felt that strangers were looking at me critically'. The scale was originally devised to identify teachers who had difficulty getting along with their students. Cook & Medley (1954) describe the scale as

one that reveals an individual who is characterised by a dislike for and dislike of others. Researchers, Hardy & Smith (1988) have described the measure as one of cynical hostility.

Cook & Medley (1954) report that the scale has high internal consistency with Cronbach alpha coefficient of .86. Similarly, New Zealand data on the Ho reflects good internal reliability with an alpha coefficient of .83 (Spicer & Chamberlain, 1996). Barefoot, Dahlstrom, & R. B. Williams (1983) suggest the Ho has good predictive validity after they found good stability over a period of 1 to 4 years with a test-retest reliability of .80. They also found that hostility scores were significant predictors of early mortality in a group of 118 lawyers from 1956 to 1985. However, Ho scores were considerably less stable over a 22 year period in a recent study of college students (Siegler, Zonderman, Barefoot, Williams, Costa & McCrae, 1990). The test-retest correlation was $r = .39$, suggesting that the predictive utility may not be as effective in younger samples that are studied over time.

There are several subscales within the Ho, such as cynicism, social avoidance, hostile attributions. The Ho subscales have been successfully used in determining specific health predictors, however the present study does not use investigate the subscales.

Health

The participants health was recorded using a standardised health measure (Wang, Eddy, & Fitzhugh, 1992) used by Spicer & Chamberlain (1996). The information that was collected included the history, current status, and medication, in respect to hypertension and coronary heart disease. The presence of a family history for either of these diseases was also recorded. The participant was asked to list any other medical problems and any other medication they were taking at the time of the study. Participants were asked whether they were past or present smokers, and what the frequency and amount of their alcohol consumption had been in the preceding 1 month. Frequency of consumption was assessed on a 6-point scale ranging from not at all to every day. Amount of alcohol consumed was also assessed on a 6-point scale ranging from 1 to 12 or more drinks on

an average day. This health section enabled the researcher to include a number of possible confounding factors such as alcohol and smoking in the analysis.

Exercise

Since existing exercise measures were not suitable for this research, the following measure was developed. Other existing measures were not suitable because they did not query the type of exercise the participant engaged in and secondly, whether the individual engaged in the exercise on their own or with others. These questions were considered important for an overall view of the participants exercise environment.

Every participant was asked to complete up to 6 sections on exercise. The sections were split into two categories, formal and informal. If the participant had set aside time during the day and week to partake in the exercise it was considered formal exercise. Informal exercise was any exercise that was not formal but that did contribute to fitness in some way (i.e. biking and walking as a mode of transport, housework, gardening, farming). The reason for creating the two categories was to gain an overall view of the total amount of exercise of each individual and to include any exercise that may not have been considered formal exercise by the participant. Regardless of the category each section contained 4 standard questions. The participant was asked to; name the exercise they had been engaged in for the last month, the number of hours per week they performed that exercise, how long (years/months) they had been involved in the exercise, and if they exercised on their own, with others or both. Thirty three different types of exercises were reported.

Results

The statistical analyses in the present study were performed using SPSSPC+ (Norusis, 1992). To describe the nature of the sample descriptive analyses were conducted. Bivariate correlations were then used to examine simple relationships among the variables. In all of the analyses 2 tailed hypotheses with an alpha of .05 were used.

Descriptive Analysis

Psychological Variables

Table 1 contains means, standard deviations, or percentages where appropriate, for the study variables. The distributions for each variable were normal with a couple of exceptions. Whilst there is nothing notable about the means for trait anger, anger suppression or anger out, i.e. the means were around the middle of the range, the low mean for anger temperament suggests that the participants did not experience anger very frequently. The distribution for anger temperament was positively skewed. The hostility mean was also notably low, suggesting that the sample displayed a low level of hostile attitude. These figures are very similar to Spicer & Chamberlain's (1996). The Cronbach alpha for each scale in the present study suggests good internal reliability; T-Anger = .77, Angry Temperament = .70, Anger/in = .81, Anger/out = .53 and Hostility = .76. The low Anger Out coefficient may indicate that the scale items may not be measuring the same construct.

Exercise Variables

As can be seen in Table 2 on average very few hours were spent engaging in informal exercise. The distribution for informal exercise was positively skewed. Some women reported engaging in as much as 24 hours of informal exercise per week. This may be due to the nature of informal exercise, i.e. women reported activities such as laborious work (farming, packing) or exercise as a mode of transport (walking, biking). Seventy four percent of the sample engaged in less than 3 hours of informal exercise per week. Only ten percent engaged in more than 7 hours of informal exercise per week.

Table 1. - Descriptive Statistics for Study Variables (N = 104)

Variable	Mean	Standard Deviation	%
Trait Anger (TA)	27.26	5.38	
Angry Temperament (AT)	9.95	2.39	
Anger In (AI)	15.84	4.42	
Anger Out (AO)	13.86	2.81	
Hostility (Ho)	17.16	6.22	
Age (years)	24.11	7.63	
Body Mass (kg/m ²)	23.04	3.48	
Systolic Blood Pressure (mmHg)	117.51	9.62	
Diastolic Blood Pressure (mmHg)	65.01	8.83	
Total Exercise Frequency (hours per wk)	7.75	5.51	
Formal Exercise Frequency (hrs/wk)	4.78	3.92	
Informal Exercise Frequency (hrs/wk)	2.97	4.20	
Duration of Exercise (yrs)	7.80	6.95	
Current Smoker			7.7
Alcohol: at least 1-2 times/wk			24.0
Alcohol: at least 2 drinks per day			14.4

The mean for formal exercise is slightly higher than the informal exercise mean. The shape of the distribution for formal exercise was also positively skewed. Some women reported engaging in as much as 16 hours of planned exercise per week. Fifty two percent of the women engaged in less than the mean amount of formal exercise which was 4 hours per week.

The total amount of exercise is the sum of informal and formal exercise. On average women engaged in a total of 7 hours of exercise per week. The distribution of the total exercise variable was also positively skewed. Some women reported engaging in as much as 26 hours per week of total exercise. This large number may be due to the nature of the informal exercise variable. Sixty two percent of the women did less than 8 hours of total exercise per week, while 11 % engaged in more than 15 hours per week.

On average women had spent the last 7-8 years participating in exercise according to the duration mean. The distribution curve for duration was positively skewed. Women reported they had participated in exercise for as long as the last 39 years. However 99% reported they spent under 23 years engaging in exercise while fifty three percent had spent less than the past seven years participating in exercise.

Blood Pressure

The mean for systolic blood pressure (SBP) indicates that participants displayed low to normal SBP. The range of SBP was from 96mmHg to 152mmHg with sixty percent of the sample displayed levels below 120mmHg. The sample mean for diastolic blood pressure (DBP) indicates that the women displayed low to normal DBP. The range was from 38.50mmHg to 94.00mmHg with ninety seven percent below 80.00mmHg. Almost all of the present sample displayed low DBP measurements. The distribution curves for each blood pressure variable reflected normality. The blood pressure means in the present sample were lower than Spicer & Chamberlain's (1996). This may be due to the different characteristics of the two samples i.e. Spicer & Chamberlain's sample included males and their mean age was higher.

Body Mass Index, Smoking and Alcohol

The distribution for BMI is normal. In comparison to Spicer & Chamberlain's study, the present study BMI mean and standard deviation were slightly lower than Spicer & Chamberlain's. Again age and sex characteristics may account for these differences.

In the present sample very few women were smokers. Only one quarter of the women drank alcohol at least 1-2 times per week. Nearly half of the women drank only 1-3 times a month. Thirty percent had 3-4 drinks on an average day. The women in the present study drank less alcohol and drank less often than the women in Spicer & Chamberlain's (1996) study.

Bivariate Analysis

Simple correlations among psychological variables, exercise, blood pressure, age and body mass index (BMI) are shown in Table 2.

Associations between Exercise and the Psychological Variables

Trait anger was significantly related to informal exercise, suggesting that women who were prone to perceiving situations as anger-provoking were more likely to engage in informal exercise. Anger temperament was also significantly related to informal exercise, suggesting that those women who experience anger more frequently were more likely to engage in informal exercise. Neither trait anger or anger temperament were significantly correlated to total exercise, formal exercise or the amount of time women had spent engaging in exercise. None of the exercise variables were related to anger suppression, anger expression or hostility, indicating very little initial support for hypothesis 2 and 3.

Associations between Exercise and Blood Pressure

There was a significant negative correlation between duration and SBP, indicating that women who had a longer history of spending time exercising also displayed lower SBP levels. There was also a negative significant correlation between formal exercise and DBP, suggesting that women who engage in formal exercise were more likely to display lower DBP levels. Body Mass Index was significantly associated to SBP, indicating that women who had a lower BMI also displayed lower SBP.

Table 2. - Simple Correlations Among Anger, Hostility, Age, Body Mass Index (BMI), Exercise, Systolic (SBP) Blood Pressure and Diastolic (DBP) Blood Pressure (N = 104)

	AT	AI	AO	Ho	Age	BMI	TE	IE	FE	D	SBP	DBP
Trait Anger (TA)	75**	46**	-04	38**	-13	-02	14	25*	-07	-08	04	-08
Anger Temperament (AT)		32**	46**	17	-07	12	05	24*	-02	-09	03	-07
Anger In (AI)			-06	52**	-10	-02	13	08	09	00	05	-08
Anger Out (AO)				19	-08	-04	02	09	-07	01	-09	-02
Hostility (Ho)					-12	-12	09	06	07	-03	-07	-18
Age						24*	-24*	-09	-24*	11	04	23
BMI							-09	-02	-10	-01	31**	13
Total Exercise (TE)								70**	65**	29*	-01	-17
Informal Exercise (IE)									-08	14	11	04
Formal Exercise (FE)										26*	-13	-28*
Duration (D)											-26*	-08
SBP												50**

Note: Leading decimal point omitted for clarity.

*p<0.05; **p<0.01; ***p<0.001.

Associations between the Psychological Variables and Blood Pressure

As can be seen in Table 2, there was a notable absence of relationships between the psychological variables and blood pressure. The correlations are small and insignificant, consistent with previous research by Spicer & Chamberlain (1996).

Associations among the Psychological Variables

Trait anger was significantly related to anger suppression but not anger expression, meaning that women who perceive situations as anger-provoking were more likely to suppress their anger and less likely to express it. These correlations are inconsistent to Spielberger's (1996) who found that women who perceive situations as anger provoking were more likely to express their anger ($r = .58$), and less likely to suppress it ($r = .29$).

Trait anger was significantly correlated with hostility, suggesting that women who perceived situations as anger-provoking were more likely to exhibit attitudinal hostility. This is consistent with Spielberger's (1996) correlation of $r = .43$. The high significant correlation between trait anger and anger temperament was expected as anger temperament is a subscale of the Trait Anger Scale.

Anger temperament was significantly related to both modes of anger expression. The association was stronger for anger temperament and anger expression, indicating that women who experience anger frequently are more likely to express their anger outwardly, but also likely to suppress their anger as well. This contrasts with findings from Spicer & Chamberlain (1996) and Spielberger (1996) who report that individuals who experienced anger frequently were more likely to express their anger outwardly than to suppress it. There was no significant association between anger temperament and hostility which is inconsistent with Spicer & Chamberlain (1996) who found that hostile individuals were more likely to experience anger more frequently. Interestingly, in the present study hostile women are more likely to be prone to perceiving situations as anger-provoking, but less likely to experience anger frequently.

The association between mode of anger expression and hostility revealed significant associations between anger suppression and hostility, but not anger expression and hostility. The pattern which suggests that women who possess cynical attitudes are more likely to suppress their anger and less likely to express their anger is consistent with Spicer & Chamberlain (1996) and Greenglass & Julkunen (1989).

The correlation between anger expression and anger suppression is weak and insignificant, consistent with Spicer and Chamberlain (1996) and Knight, Chisholm, Paulin, & Waal-Manning, (1988). This provides support for Spielberger's suggestion that the two modes of expression are independent.

Summary

In summary, the correlations described above provide little support for hypotheses 1 to 3. Apart from the relationship between trait anger, anger temperament and informal exercise, there are no other significant associations to support these hypotheses. However, a more rigorous test of the hypotheses requires multivariate analysis which is described in the next section.

Multivariate Analysis

Exercise as a Mediating or Confounding Variable

To examine hypothesis four, that exercise is a mediating or confounding variable in the relationship between the psychological variables and blood pressure, multiple regression analysis was used. Two separate standard multiple regressions were run for SBP and DBP. In total 13 variables were entered in the regression equation including, hostility, anger/in, anger/out, anger frequency, trait anger, age, alcohol frequency, alcohol amount, body mass, smoking, informal exercise, formal exercise and duration. Residual analysis indicated that all of the assumptions required for multiple regression were met. Results, including beta coefficients, their *t* values, the total variance explained by the equation (adjusted R^2), and the *F* values, are presented in Table 3.

Table 3. - Multiple Regressions of Systolic (SBP) and Diastolic (DBP) Blood Pressure on Psychological Variables, Exercise Variables and Covariates (N = 104)

	SBP		DBP	
	Beta	<i>t</i>	Beta	<i>t</i>
Trait Anger	0.14	0.93	0.03	0.17
Anger Frequency	- 0.16	- 1.08	- 0.21	- 1.31
Anger In	0.07	0.56	0.12	0.88
Anger Out	- 0.08	- 0.63	0.08	0.62
Hostility	- 0.08	- 0.68	- 0.20	- 1.61
Age	- 0.02	0.83	0.15	1.40
Alcohol Frequency	- 0.19	- 1.73	- 0.03	- 0.29
Alcohol Amount	- 0.04	- 0.36	- 0.10	- 0.85
BMI	0.32	3.24**	0.09	0.87
Smoking	0.08	0.87	0.08	0.77
Informal Exercise	0.14	1.40	0.07	0.71
Formal Exercise	- 0.04	0.41	- 0.25	- 2.31*
Duration	- 0.28	- 2.77**	- 0.80	- 0.70
Adjusted R ² =	0.13	Adjusted R ² =	0.05	
F =	2.21*	F =	1.38	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The regression equation provides no support for hypothesis four, that anger and hostility are related to blood pressure whilst controlling the influence of exercise. The only two variables that were contributing to the variance of systolic blood pressure were body mass index with a beta coefficient of .32, $p < .01$, and duration of exercise with a beta coefficient of -.28, $p < .01$. For the regression on DBP the only variable that contributed to the variance was formal exercise with a beta coefficient of -.25, $p < .01$. The regression analysis on SBP which suggested R was significantly different from zero, $F(13,89) = 2.21$, $p < 0.05$ confirmed the significant correlations between BMI, Duration and SBP found in Table 2. Similarly, the regression on DBP where R was not

significantly different from zero also confirmed the significant correlation between formal exercise and DBP. Therefore when controlling for these significant associations between exercise and blood pressure, the regression analysis does not reveal any relationship between the psychological variables and BP. The equations only explained 13% for SBP and possibly 5% for DBP.

Interaction Effects on Blood Pressure.

To investigate hypotheses 7 to 10, that there would be interaction effects of exercise, anger, and hostility on blood pressure, all two-way interactions of the psychological variables with exercise and with each other were entered. Age and BMI were also included in these regression equations. Interaction effects were modelled using product terms (Jaccard, Turrisi, & Wan, 1990). Prior to the regressions, all continuous variables that appeared in product terms were centred around their mean to avoid multicollinearity problems. Of the two-way interactions that were entered, three interactions were statistically significant. Where two-way interactions were found, their form was explored using subgroup regressions. The three significant interactions are described below.

Interaction between Anger Out and Exercise on DBP

Hypothesis 7, that exercise would act as a moderating variable in the association between the psychological variables and blood pressure was partially supported. The regression containing anger out, formal exercise and their interaction on DBP explained 10% of the variance, $F(5,97) = 3.06, p < .05$. Within this regression, the interaction explained 3% of the variance with a beta coefficient of $-.18, p < .05$. The interaction between anger out and formal exercise on DBP indicates that exercise is acting as a moderating variable on the association between anger expression and DBP. To explore the shape of the interaction, separate regressions were undertaken for women who engaged in less than the median amount of formal and women who engaged in more than the median amount of formal exercise whilst controlling for age and BMI. The regression coefficients for women who reported more formal exercise were $A = 36.9, B = -0.66, t = -1.50$, whilst the coefficients for women who reported less than the median amount of formal exercise were $A = 63.0, B = 0.28, t = 0.69$. Although the t values were insignificant this is of less

interest than the fact that the two B coefficients were significantly different from each other as indicated by the significant interaction effect.

Interaction between Anger Out and Hostility on SBP

Hypothesis nine, that the positive association between the expression of anger and blood pressure will be stronger in more hostile women was not supported. The regression containing anger out, hostility and their interaction on systolic blood pressure explained 11% of the variance, $F(5,98) = 3.59$, $p < .01$. Within this regression, the interaction explained 4% of the variance with a beta coefficient of $-.23$, $p < .01$. The interaction between anger out and hostility on systolic blood pressure indicates that hostility is acting as a moderating variable on the association between anger expression and systolic blood pressure. To explore the shape of the interaction separate regressions were undertaken for women with low hostility scores and women with high hostility scores, whilst controlling for age and body mass index. The regression coefficients for women high in hostility were $A = 96.72$, $B = -0.82$, $t = -1.17$, whilst for women low in hostility the coefficients were $A = 100.75$, $B = 0.35$, $t = 0.73$.

Interaction between Anger Out and Anger Temperament on SBP

Hypothesis 10, that the positive association between anger expression and blood pressure will be stronger in women who frequently experience anger was not supported. The regression containing anger out, anger frequency and their interaction on SBP explained 9% of the variance, $F(5,98) = 3.26$, $p < .01$. Within this regression, the interaction explained 3% of the variance with a beta coefficient of $-.20$, $p < .05$. The interaction between anger out and anger temperament on systolic blood pressure indicates that anger temperament is acting as a moderating variable on the association between anger expression and systolic blood pressure. To explore the shape of the interaction separate regressions were undertaken for women with low anger temperament scores and women with high anger temperament scores, whilst controlling for age and body mass index. The regression coefficients for women high in anger

temperament were $A = 97.0$, $B = -0.92$, $t = -1.59$, whilst for women low in anger temperament the coefficients were $A = 105.0$, $B = 0.61$, $t = 1.17$.

Because anger out appeared in the first two interactions on SBP a regression was re-run including the interaction of anger out by hostility and anger out by anger frequency. This was done to examine the effects more closely with increased power. The regression explained 13% of the variance, $F(7,96) = 3.15$, $p < .01$. Within this regression, the interactions explained 7% of the variance. Both beta coefficients remained significant, but the coefficient for the anger out by hostility interaction which was $-.21$, $p < .05$, was larger than the anger out by anger frequency coefficient which was $-.18$, $p < .05$.

Discussion

The results revealed significant associations between exercise and anger such that women who tend to perceive situations as anger-provoking or who experience anger more frequently are likely to spend more time engaging in informal exercise. Exercise was not related to anger expression, anger suppression or hostility. The present study did not support the hypothesis that exercise would act as a mediating or confounding variable in the relationship between anger, hostility and resting blood pressure. However, the results provide a little support for the hypothesis that exercise may act as a moderating variable in the relationship between anger expression and BP. It also appeared that the effects of anger expression on BP were moderated by angry temperament and hostility. BP was not related to anger suppression or trait anger. Bivariate correlations indicated that women who were more hostile were more likely to suppress their anger, as well as perceive situations as anger-provoking. Women who experienced anger more frequently were more likely to use both modes of anger expression, while those women who perceived situations as anger provoking were more likely to suppress their anger only.

Relationships of Exercise with Anger and Hostility

The hypothesis that the more frequently and the longer women have spent engaging in exercise the less likely they are to experience anger frequently, and the less likely they are to perceive situations as anger-provoking was not supported. Instead findings of the present study suggest that women who experience anger frequently and tend to perceive situations as anger-provoking are actually *more* likely to spend time engaging in informal exercise. The direction of this association was unexpected.

Although contrary to the original hypothesis, this finding may still reflect the possibility that exercise empowers women. Despite changes, the current social climate often views women's anger as problematic and unacceptable. However, if anger arises from individuals' perceptions of unfair circumstances then even though anger is viewed negatively it appears to be an inevitable emotion for individuals who live in subordinate positions i.e. women. As Lutz (1996) suggests 'anger involves the identification of

problems in women's lives. Talk about anger can be interpreted as an attempt to identify the existence of inappropriate restraint or injustice' (p. 166). In this context anger is not problematic but it is a natural response to unfair situations, which if women truly do live as secondary citizens then would be expected to be a prominent emotion in women's lives.

With this view of anger the positive correlation between exercise and trait anger may support McDermott's notion of physicality. The original hypothesis outlined in chapter one was that by exercising, women become empowered and are less likely to become angry. However, an alternative interpretation of the finding is that the physicality experienced through exercise has empowered women emotionally and socially by enabling them the freedom to become angry about unjust situations. If women engage in exercise the reality of their position in society does not change (i.e. they are still subjected to unfair situations), however the consequence of physicality may be that some women will perceive a wider range of situations as anger-provoking. For example, some of the items on the Trait Anger Scale include 'I feel infuriated when I do a good job and get a poor evaluation' or 'It makes me furious when I am criticised in front of others'. Women who do less exercise may not experience the social and emotional freedom to identify these types of situations as anger-provoking.

Another interpretation of the positive correlation between exercise and anger concerns the process of self reporting. Physical empowerment may contribute to the way women talk about their angry experiences. They may admit or report more freely their experiences of anger. The questionnaire asked the respondent to indicate how often they felt angry in situations such as 'When I get frustrated, I feel like hitting someone' or 'When I get mad, I say nasty things'. Social rules portray to women that these feelings are not acceptable female feelings and place subtle pressures on women not to admit to having them. However, exercise may empower women emotionally such that they feel more relaxed about admitting that sometimes they do feel like hitting someone or saying nasty things. Perhaps more importantly individuals might recognise that having these feelings is a natural response to an anger-provoking situation.

The nature of correlations does not permit any conclusions regarding the cause and effect of the relationship between exercise and anger, but it is possible that the correlation reflects the impact of anger on exercise. The influence of exercise on anger has been discussed above, now the impact of anger on exercise is discussed. Women who perceive situations as anger-provoking and who experience anger frequently were more likely to engage in exercise. Trait anger is a disposition to perceive situations as anger-provoking with scale items such as 'It makes my blood boil when I am pressured' and 'I get annoyed when I am singled out for correction'. If women perceive their control over events is being frequently threatened they may react to these angry experiences by engaging in exercise. Exercise may act as a release to angry feelings.

The significant correlation was between anger and informal exercise which was defined as exercise that had not been previously planned. Individuals cannot predict when they are going to be placed in an anger-provoking situation or when their control is going to be threatened, so the sporadic nature of informal exercise means they might react to angry feelings immediately following unfair circumstances. For example, a woman may have spent the whole day at home with her children, her husband comes home and makes a remark which makes her angry. As a consequence she may react to the remark, and her angry feelings by going out for a walk or a run. The process of exercising may aid in venting or releasing her angry feelings. The sporadic nature of unplanned exercise may explain why the significant relationship between anger and exercise appeared for informal exercise and not formal exercise.

The significant relationship appeared for informal exercise and anger, but not formal exercise and anger. This may be due to the characteristics of women who take part in planned exercise. Because there are often reasons behind planned exercise programmes, such as fitness or performance related goals, women who plan their exercise are more likely to consider themselves fit, healthy individuals. These women may want to portray the characteristics they see as belonging to fit healthy people, therefore responding to the anger scales in a biased way. They may not perceive themselves as having a fiery temper, or being hot headed, or feel like hitting someone. This might be the reason why no significant correlations appeared between formal exercise and any of the anger and hostility variables.

The correlations do not support Guthrie & Custelnuvo's (1994) theory that exercise involves a care of the self ethic. The finding may instead support Bordo (1989) and Young's (1990) argument that exercise is another process of social control. If this is true, then whilst women are exercising they may do so within the dominant constraints that dictate how women should experience their bodies and how they should experience exercise. The exercise process may therefore add to the feelings of powerlessness in their lives.

There was no support for hypotheses two and three that the more frequently and the longer women have spent engaging in exercise the less likely they are to suppress anger, the more likely they are to express anger, and the less likely they are to exhibit the attitude of hostility. Neither mode of anger expression was associated to exercise, indicating that exercise had no impact on the way women express their emotions of anger or vice versa. The results do not support Buchman, Sallis, Criqui, Dimsdale, & Kaplan's (1991) finding that women who exercised frequently were less likely to suppress their anger. Instead the findings were consistent with Brown, Wang, Ward, Ebbeling, Fortlage, Puleo, Benson & Rippe (1995) who found that exercise programs did not lead to significant changes in mode of anger expression or anger control. Attitudinal hostility was not associated to exercise either, suggesting that the experience of exercise had no relation to hostility. There are several possible reasons why these hypotheses were not supported.

Although the links between emotions and exercise were based in the notion of physicality, the present study did not actually measure the construct of physicality directly. Instead, the study requested women's self-reports of exercise activity. These reports do not include measures of physicality that seek information on control, power, capability, personal change and knowledgeable. The exercise measure does not account for the type of experience the women had while they were exercising. Although this places limits on the interpretation of the results, it does not prevent the researcher from drawing inferences regarding physicality.

The present study investigated the exercise behaviour of 100 female university students. The majority of these students engaged in a mild amount of exercise. i.e. 74% engaged

in less than 3 hours of informal exercise per week, 52% of the sample engaged in less than 4 hours per week of formal exercise, and 62% engaged in less than 8 hours total exercise per week. Guthrie and Castelnvuo's (1994) example of the 'care of the self ethic' involved elite female body builders. Body building represents one extreme of exercise training which also includes a complex diet and beauty regime. Body builders spend hours weightlifting, designing programmes, designing a diet, and tanning and waxing their bodies. Body builders may display quite different psychological characteristics from the present group of women who may do less intense exercise, less often. In comparison the mild amount of exercise in the present study may be insufficient to detect the phenomena that Guthrie and Castenuvou (1994) expected. Therefore different groups experience of exercise may encompass different aspects of McDermott's notion of physicality.

Furthermore, different exercise activities may have different effects on emotions, for example women's rugby and walking may relate differently to anger and hostility. Some sports involve different elements which may contribute to the exercise experience. These elements may include; the amount of personal contact, the level of physical aggression, mental concentration, psychomotor skills, anaerobic versus aerobic exercise, and team versus individual sports. These aspects of exercise may provide different experiences encompassing the notion of physicality. The present study has lumped different forms of exercise together, while other studies may find significant differences between the different types of exercise. Given the range of different types of exercises that were reported in the present study i.e. 30, there weren't sufficient numbers in each subgroup to run such analysis.

The nature of the self-report scales may have contributed to the lack of significant results. There are three issues to be addressed concerning self-reporting, social desirability, recall, and generalisability. Firstly, with self-report measures there is frequently an element of social desirability. For the exercise measure, some women may want to portray themselves as fit healthy individuals, and thus overstated the amount of exercise that they did actually engage in. The Spielberger Anger Expression Scale required participants to indicate how most like them statements of angry situations were. Because the self-report questions were regarding situations that result in unpleasant

consequences it is possible that some of the women may not have wanted to be depicted as angry women. Self-report measures may underestimate the extent of women's anger, since women may be reluctant to violate the stereotype that they should not express anger. Similarly, if a hostile individual views others with distrust and cynicism, it is not unreasonable to expect a hostile attitude to influence the way women answer a self-report questionnaire. It may even influence the nature of the sample of women who volunteered for the research study. For example, a very hostile woman may view a research study such as the present one with cynicism therefore preventing her from volunteering to take part in the research. However, the mean of the hostility measure in the present study is similar to other studies with female student samples.

The second issue concerning the self-report measures is that of recall. The exercise measure may not have accurately determined the amount of exercise women have been engaged in for the last month. The women may have difficulties remembering how much exercise they had done. Similarly, for the anger and hostility measures, the women may not accurately remember how often in the last month statements such as 'when you were slowed down by others mistakes' or how often in the last month you 'pouted', or you 'were secretly critical of others' applied to them. This may have affected the accuracy of the report and contributed to the lack of significant findings.

The last issue is generalisability. The exercise measure required the respondents to recall how often over the last month they had engaged in exercise, and to approximate how many hours per week they took part in the different exercise activities. The respondents may have inaccurately generalised the amount of exercise per week. Both recall and generalisation may contribute to the ineffectiveness of the self report measures. In addition, the data collection took place during winter so women may not have engaged in as much exercise as if it had been summer.

The present study found no significant correlations between the exercise variables and anger expression, anger suppression and hostility. One reason for this may be the nature of the scale instructions. While the Trait Anger Scale asks participants to indicate how they generally feel, the Anger Expression Scales ask how they generally react or behave in the manner described, and the Hostility scale asks how they respond to situations.

Although there are very subtle differences in the instructions, the consequences of how one responds or reacts to situations may seem larger than the consequences of how one feels. Because feelings appear to be internal this may keep the individual safe in the knowledge that they will not be penalised. But if women are asked to say how they react or respond they may feel more afraid of the consequences, even though in reality there are no consequences in the research situation.

The influence of Anger and Hostility on Blood Pressure whilst controlling for Exercise

The hypothesis that the anger and hostility variables would be significantly related to resting blood pressure whilst controlling for exercise was not supported. Exercise did not appear to confound the relationship between the variables, none of which were related to BP. In other New Zealand studies no significant relationships have been found between these variables and resting BP, with the exception of Spicer & Chamberlain's (1996) finding that hostile women are more likely to display higher resting blood pressure. The present study did not replicate this finding.

The hypothesis that exercise would play a mediating role in the relationship between the psychological variables and resting blood pressure was not supported. There was a lack of significant associations between the psychological variables and resting blood pressure, and only a very limited relationship between exercise and BP. Therefore exercise could not play a mediating role in a relationship that did not exist. Although other studies have found a significant relationship between exercise and blood pressure (Norris, Carroll and Cochrane, 1992), and exercise and anger suppression (Buchman, Sallis, Criqui, Dimsdale, & Kaplan, 1991) the present study's results only revealed a moderate correlation between exercise and blood pressure. These included significant negative associations between the frequency of formal exercise and diastolic blood pressure, and duration of exercise and systolic blood pressure.

Instead the present study contributes to the growing body of evidence that has found no significant relationships between the anger and hostility variables, and resting blood pressure in New Zealand. These studies included Knight, Paulin & Waal-Manning

(1987), and Spicer and Chamberlain (1996). Spicer and Chamberlain (1996) attribute the lack of significant findings to the cultural differences of emotional life. If emotions are practices which are socially constructed, then the rules and norms of emotional experience and expression may differ across cultures. Each culture may have its own set of rules which are dictated by what is morally right and wrong. Social practices are bound by these rules which are often reinforced by social consequences. If cross-cultural differences in emotions exist there are several issues which may impact on research such as the present study.

The Spielberger Trait Anger Scale was developed in the USA and while a number of studies have found a significant relationship between anger and blood pressure in American samples, none of the NZ studies reveal the same relationship. One reason for this may be derived from the cultural import of the construct being measured. On a conceptual level, the nature of the anger expression constructs may not have cultural significance in NZ. For example, anger suppression, which relates to elevated blood pressure in the United States but not in NZ, may not be a mode of emotional expression that has negative connotations for New Zealanders. If this is true measuring a construct such as suppressed anger may not gain the same response across cultures.

To investigate this issue further the anger expression mean scores were compared for American and NZ samples. The American samples reflect slightly higher scores on both Spielberger Anger Expression subscales. In studies from Spielberger et al. (1985) and Spielberger (1996) the range of mean scores for anger suppression is from 15.70 to 18.04. Knight et al. (1988), Spicer and Chamberlain (1996) and the present study report NZ mean scores ranging from 14.00 to 16.46. For anger expression, Spielberger et al. (1985) and Spielberger (1996) report a range of 14.41 to 16.73. Knight et al. (1988), Spicer and Chamberlain (1996) and the present study report mean scores ranging from 9.67 to 16.59. It is apparent that data from NZ studies report slightly lower mean scores on the anger expression scale. More importantly, the cross-cultural limitation discussed above suggests that even if the means are different or similar, it is impossible to conclude whether the standardised measure is assessing the same phenomena for both groups of people.

The implication of cross-cultural differences for health research is that constructs which are related to health in one country may not relate to the same health indicators in another country. The relationship between the construct and health may depend on the cultures local rules and norms. For example, anger suppression may not cause elevated blood pressure in a NZ sample even if it was assessed via an alternative scale. Instead other aspects of emotional life that have not yet been empirically measured may cause elevated blood pressure. Furthermore, since New Zealand is considered a multicultural country, the implication this has on health research is that methods developed to investigate possible risk factors for health in pakehas may not be suitable for Maori or Polynesian. This reflects a need for further research in the development of culture specific theory and measures of emotional experience and expression. To summarise, the construct of anger suppression may not have local significant importance in a culture. Because of cross-cultural differences the construct and the measure may not impact on health the way it has in other countries.

Cross-cultural differences may also explain the present studies lack of findings between women's exercise behaviour and the anger expression scales. Buchman et al. (1991) found that American women who exercised more frequently were less likely to suppress anger. The American media may portray stronger images of exercising women than the NZ media. Due to advertising and marketing strategies there may be stronger emphasis on the beneficial mental health effects of exercising in the United States. For example, a television advertisement for an exercise machine often portrays a women who is fit, assertive, and especially buoyant during her workout on this particular machine. If emotions are socially constructed then the media may be one social influence on women's lives. The links between exercise and psychological characteristics may be more apparent in American life which may in turn influence the experience and expression of American women emotions.

The lack of a significant relationship between anger expression and blood pressure may also be due to the nature of the questions in the anger expression scale. The scale may not tap into the way women express anger. It seems that on face value some of the scale items denote physical aggression, suggesting that the development of the scale may be influenced by male bias. For example, 'hitting', a behaviour more characteristic of men is

included in the scale, whereas crying and rational discussion, behaviours that may be more characteristic of women are not included. There is little empirical evidence on gender differences of anger expression, but Stoney & Engebretson (1994) suggest that women display anger in a more communicative way, while Brody (1997) suggests women display less facial, vocal, and physiological changes due to anger than men do. If this is true then the anger expression scale used in the present study may be unsuitable for the measurement of women's anger expression. Comparisons of female and male mean scores on the Anger Expression scales reveal very few differences (Spielberger et al., 1985; Spielberger, 1996; Knight et al., 1988). But despite the lack of comparative differences, it is not possible to conclude whether the standardised expression scales are measuring the appropriate modes of anger expression in women.

The results of the present study revealed no significant relationship between hostility and blood pressure. The Cook-Medley Hostility Inventory contains subscales which measure different dimensions of hostility that the present study did not explore. These dimensions capture different personality aspects which may relate to health differently. It has been suggested that different diseases may be linked to the different subscales (Helmers, Posluszny, & Krantz, 1994). Significant associations may appear if the subscale scores were investigated rather than the total hostility score. No attempt was made to use these subscales in the present sample since previous analyses of the subscale in a New Zealand sample showed them to be seriously unreliable (Spicer, 1998, personal communication).

The interactive effects of Exercise, Anger and Hostility on Blood Pressure

Exercise as a moderator on the relationship between Anger Out and DBP

Hypothesis 7, that exercise would act as a moderating variable in the association between the psychological variables and blood pressure was partially supported. Formal exercise acted as a moderating variable in an interaction between anger expression and diastolic blood pressure. The shape of the interaction indicates that for women who engaged in more formal exercise, not expressing anger outwardly was related to elevated DBP. There are several ways to interpret this interaction.

First, by focusing on the role of anger expression in this interaction it could be argued that exercise may be beneficial. Johnson (1984, cited in Spielberger, 1996) found in the Tampa study that women who express anger were more likely to display elevated blood pressure. One view of the present interaction is that expressing anger outwardly was related to elevated DBP in women who spent less time engaging in formal exercise. The tendency to expressing anger outwardly was related to lower levels of DBP in women who spent more time engaging in formal exercise. Therefore if Johnson's results are true, according to this interaction it could be argued that frequently engaging in formal exercise might buffer the detrimental effect of anger expression on blood pressure. Engaging in formal exercise may be another outlet or an additional coping style for expressing angry feelings. Although as discussed earlier, informal exercise was considered more appropriate in terms of venting angry feelings.

An alternative way to discuss this interaction is to examine the psychological pattern of the women who frequently engaged in formal exercise, i.e. women who do more than 4 hours of formal exercise per week. Within this exercise group, the women who expressed anger outwardly were more likely to display lower DBP, while those who did not express anger were more likely to display higher DBP. The original hypothesis expected that exercise would attenuate the relationship between expressed anger and blood pressure. However, it was found that for women who exercised frequently, not expressing anger was related to elevated DBP. One way of explaining this unexpected finding, is to explore the possible effects of anger suppression. There is a possibility that individuals who report a low score on anger expression may actually suppress their anger. This would suggest that women who frequently engage in formal exercise and who suppress their anger (as indicated by a low score on anger expression), tend to display higher DBP. Unfortunately, this does not support the original hypothesis that exercise would act as a buffer to the relationship between suppressed anger and blood pressure. Furthermore, it should be considered that the formal exercise group was dichotomised at the median, which was 4 hours of exercise per week. Therefore the group who engaged in less formal exercise still took part in exercise up to 4 hours per week.

The form of this interaction was not expected, the above interpretations are attempts to explain the some what unusual findings. However, the ability of the researcher to search for possible meanings and interpretations is a limitation of the present study. Furthermore, if the above criticisms of the anger out scale are accurate then an attempt to interpret these results should be made with caution.

Hostility and Anger Temperament as moderators in relationships between Anger Out and SBP

Hypothesis nine, that the positive association between the expression of anger and blood pressure will be stronger in more hostile women was not supported. Instead the results suggests that hostile women who do not express their anger outwardly actually display higher levels of systolic blood pressure. The same was true for hypothesis ten, that the positive association between anger expression and blood pressure will be stronger in women who frequently experience anger was not supported. Instead the results suggests that for the women who experience anger frequently, not expressing their anger outwardly was more likely to be related to higher levels of systolic blood pressure.

The direction of these results was unexpected. This may be due to the effect of anger suppression. As discussed above, a low score on anger out may be interpreted as anger suppression, therefore those that don't express anger may actually suppress their anger. In this case the results reflect that women who are hostile and suppress anger (indicated by a low score on anger expression) are more likely to display elevated BP levels. This finding would support the notion of the interactive influence of hostility and anger suppression on blood pressure.

The same may be true for the interaction between anger temperament and anger expression. If the a low score on anger expression is interpreted as anger suppression then women who experience anger frequently and suppress their anger are more likely to display elevated BP. This would suggest that anger suppression is detrimental to health. Alternatively, Spielberger et al. (1985) found that women who expressed their anger outwardly displayed lower blood pressure. One way of viewing the present interaction is that for women who experience a lot of anger, by expressing it outwardly they are more

likely to display a lower systolic blood pressure. This interpretation might support Spielberger et al.'s suggestion that anger expression is healthy. On the other hand, women who do not experience anger frequently and who express it outwardly tend to display elevated blood pressure.

If the above interpretation based on the effect of anger suppression are true then why is there no significant results for anger suppression on BP? One reason may be due to the very nature of the characteristics of anger suppression. Women who are anger suppressers may not admit easily to their experiences of anger or to the way that they express their anger. So when they are asked to report their own suppression these women may not rate themselves highly on the anger suppression scale. Additionally if anger suppression is related to hostility then these distrusting women are even less likely to reveal themselves as anger suppressers on a self-report measure. Therefore one way to interpret the results is to assume that the group who do not express anger outwardly are actually anger suppressers and hence the association of low anger out scores to elevated BP.

The unusual form of these interactions were unexpected. This may be a result of the measurement limitations discussed above. The anger and hostility scales used in the present study may be culture and gender bound while the exercise measure may not be accurate. These limitations may influence the significance of the results. Thus interpretation of the results are made with caution. As mentioned above, the ability of the researcher to search for many possible meanings and interpretations is a limitation of the present study.

Associations among Anger and Hostility

Women who displayed the tendency to perceive situations as anger provoking were more likely to suppress anger. These women may be more aware that expressing anger is not an acceptable behaviour therefore reporting suppressed anger instead. The results contrast to Spielberger's (1996) findings that women who possessed trait anger characteristics were more likely to express their anger. As discussed earlier, one reason

for this inconsistency may be that women in New Zealand and United States may express their anger differently.

The present study found that women who experienced anger frequently were more likely to use both modes of anger expression. Spielberger (1996) reports a significant relation between anger expression and anger temperament only. Again this may be due to cross-cultural differences. However, New Zealand data by Spicer and Chamberlain (1996) reveal a similar correlation to Spielberger's (1996), but Spicer and Chamberlain's sample was comprised of women and men. This may indicate that there are differences in the way individuals who experience anger frequently express their anger due to gender. While men who experience anger frequently may be more likely to express, women may use both modes. In some social situations where males would usually express their anger it may be socially unacceptable for women to express their anger in the same situation, even though they are feeling angry. A women who is experiencing a wide range of angry situations may possess a larger repertoire of expression modes. This may be reflected in women's lifestyles, i.e. if they come into contact with a wider range of people; babies, children, and elderly, then their modes of expression may vary according to different circumstances.

Hostility was positively related to anger suppression, suggesting that hostility and resentment are a consequence of chronically suppressed anger, or that they at least have a reciprocal relationship (Johnson, 1990; Spicer & Chamberlain, 1996). The findings indicate that cynical, mistrusting women suppress their anger, indicating that the social constraints on women's expression of anger may strongly influence them not to express their anger openly. The present results reveal that hostile individuals are also more likely to perceive situations as anger-provoking, but are not more likely to experience anger frequently. If women perceive situations as anger-provoking then they may be more likely to possess negative, cynical thoughts about others who may be the cause of unfair situations. Interestingly, these hostile women are likely to perceive situations as anger-provoking but are not likely to experience anger frequently. This may be due to the impact hostile attitude has on self reporting. Cynical women may not see themselves as experiencing anger frequently or their distrust may prevent them from reporting angry experiences.

The two modes of anger expression were not related. This appears to support Spielberger et al.'s (1985) theory that anger expression and anger suppression are two different not two points on one dimension. The implications of this finding is that individuals are able to use both modes of expression. This is reflected in the correlations described above, that women who experience anger frequently use both modes of expression.

Limitations of the Present Study

There are several limitations concerning the nature of the present sample. Firstly, the small sample size of 104 respondents may not be large enough to display the processes that were expected. Secondly, the present sample included mostly young females who were tertiary educated. They also displayed relatively low blood pressure. Because some of the risk factors for elevated blood pressure include age, being male, and low socioeconomic status, the expected relationships in the present study may be so strongly apparent in a group such as the present sample. The sample characteristics may have limited the strength of the expected associations.

As already mentioned briefly above, one limitation of the study includes the gap between the theoretical notion of physicality and the measure of exercise. The initial hypothesis suggested that exercise, via the notion of physicality, may impact on women's emotions. To assess physicality however, more knowledge on the experience of exercise is required. This could be achieved by a more in depth examination of the exercise experience on an individual level. Further knowledge about the processes and expectations of the exercise experience might provide a more accurate account of physicality, and how physical embodiment and social agency might be integrated. By exploring; the import of exercise in women's lives, motivations to exercise, the meaning behind exercise behaviour, ways of talking about exercise and women's bodies, and the social influences on the construction the body, researchers might be able to develop a broader understanding of embodiment. A more thorough investigation of the exercise experience may also shed light on Young (1990) and Bordo's (1989) argument that exercise is another form of social control.

Furthermore, a limitation of the present study involves the theoretical process of studying separate psychological characteristics an individual, such as anger and hostility. By fragmenting the individual into compartments the researcher separates them from their social environment (Spicer and Chamberlain, 1994). If emotions are socially constructed consisting of social practices which are dependent on the social milieu, then the social environment is essential for the individual to function. This current theoretical approach ignores the dynamic relations or representations of the individuals social world. Further, the researcher is faced with the problem of first, reassembling the individual, and second writing meaningful interpretations of the end result (Spicer & Chamberlain, 1996b). By reconnecting the individuals psychological and social worlds, researchers will be able to redirect the research focus to sociocultural processes and issues such as morality, instead of focusing on isolated characteristics of anger.

Conclusions

The initial hypotheses aimed to clarify some of the inconsistencies in the relationship between anger, hostility and blood pressure by examining the role of exercise. Disappointingly the results concerning the impact of exercise were not as productive as expected. However, by reviewing the literature in the anger and hostility field several conclusions can be made regarding this research area.

It is apparent that the literature is fraught with inconsistencies despite the burgeoning amount of research regarding the relationship between anger, hostility and blood pressure. This may be due to problematic issues underlying the methods used by the predominant research paradigm. It appears that health research aims to determine risk factors of ill-health and certain diseases. However, to do this researchers need to integrate people's socially symbolic activities with their physiological functioning (Lyons, 1996). But the dominant research methods do not enable the symbolic meanings, social practices and processes to be explored. There are several dominant practices which hinder progress; the fragmented nature of the predominant scales, and quantitative analysis. The first has been discussed above, the second process involves the researcher quantifying, averaging and testing the statistically significance of a group of individuals

experience. From this process the researcher expects to gain some meaning of the psychological phenomena on an individual level. So far, this predominant quantitative practice has led to few meaningful consistent interpretations, despite the large amount of studies in this area.

Qualitative study, however, in this area involves moving away from scales which separate psychological characteristics. In depth examination of psychological phenomena on an individual level will require an integrated approach which does not separate and isolate the individual from their experience. To do this researchers need to develop new classification systems that encompass the symbolic meanings and the dynamic nature of individuals social lives. In doing so researchers may find that anger suppression and anger expression are not the only modes of expressing anger.

Despite the current focus of integrating psychological and social processes, links between physiology and psychosocial processes need to be developed further. The notion of physicality in the present study was one way to explore women's bodies and their physical being from a psychosocial standpoint. Further theorising is needed on the connection between the biological being and psychosocial phenomena, i.e. the 'biopsychosocial' approach. Recently, Radley (1991) has made attempts to bridge these two worlds by highlighting the social construction of the body. If researchers aim to integrate symbolic and social meaning with physiological functioning (Lyons, 1996), then they may benefit by understanding the influence of social symbols such as the media, the medical profession, and sporting institutions on individuals perceptions of their body. While often the focus on the body is via disease, a broader understanding of embodiment may benefit health research (Radley, 1991).

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Appendix A

EMOTIONS, RESTING BLOOD PRESSURE AND EXERCISE

CONSENT FORM

I have read the Information Sheet for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time, or to decline to answer any particular questions in the study. I agree to provide information to the researchers on the understanding that it is completely confidential.

I wish to participate in this study under the conditions set out on the Information Sheet.

Signed: _____

Name: _____

Date: _____

Researcher: _____

Appendix B

Emotions, Resting Blood Pressure and Exercise INFORMATION SHEET

What is this study about?

The aim of this study is to explore the way women experience emotions, and how they are related to various health factors. In particular I will be exploring *recent* experiences of anger and hostility, and their association with resting blood pressure and recent exercise behaviour. The project is being run by Gina Madigan as a masterate research project and is supervised by John Spicer. It is funded by Massey University.

What would I have to do?

If you agree to take part, you would need to come to the Psychology Department. This would take no more than 30 minutes of your time. During the meeting I would ask you to rest for 5 minutes and then I would measure your *resting blood pressure* twice. Following this I would ask you to complete a questionnaire on how you have dealt with emotions such as anger in the last month. Also you would be asked some questions about your general health, any medication you are currently taking, your recent exercise habits, your alcohol and cigarette intake, and your height and weight.

What can I expect from the researcher?

If you take part in the study, you have the right to:

- refuse to answer any question, or withdraw from the study at any time.
- ask any questions about the research that occur to you during your participation
- have answered any questions by the researchers and to discuss any aspects of the study before agreeing to complete the questionnaire.
- provide information on the understanding that it is completely confidential to the researchers. All records are identified only by code number, they are seen only by the researchers and are only used for the purposes of the research. It will not be possible to identify individuals in any reports of the results.
- have access to a summary of the findings from the study when it is concluded.
- every participant will be told their blood pressure.

It is important to emphasise that we will not be offering advice about your physical and mental health, since the information we are collecting is not suitable for that purpose. If you have any concerns about your health we assume that you will take appropriate action, as you would normally.

If you are interested in taking part and would like me to contact you to arrange a meeting, please fill out your name and phone number on the tear off section below. However, if you'd like to think further about it, or have any questions regarding the study please phone me on 3584279.

Gina Madigan

I am happy to be contacted.

Name:

Phone Number:

Appendix C

Emotions, Health and Exercise Questionnaire

Please read the following questions carefully.

You should not write your name on this questionnaire. Please note that all the information that you give us is confidential and will be used only for the purposes of this study.

This questionnaire will take you about 20 minutes to complete. Please try to answer all the questions and be careful not to skip any pages.

The following questionnaire is in 3 sections. The first section requires you to answer questions about your health, the second section asks you about exercise, and the third section is on emotions.

Height, Weight and Blood Pressure

Record 1

			3
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Age _____

--	--

Height (cms) _____

--	--	--

Weight (kg.1) _____

--	--	--	--

BP1 systolic _____

--	--	--

BP1 diastolic _____

--	--	--

BP2 systolic _____

--	--	--

BP2 diastolic _____

--	--	--

Menstrual cycle _____

		26
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Health Status and History

High blood pressure

Have you ever been told by a doctor that you have high blood pressure?

Yes No

28

Have you ever taken medication for high blood pressure?

Yes No

Are you currently taking medication for high blood pressure?

Yes No

Please indicate if any of your family have been told that they
have high blood pressure.

father Yes No Don't know

mother Yes No Don't know

brother or sister Yes No Don't know

33

Heart disease

Have you ever had angina or a heart attack?

Yes No

35

If yes, were you admitted to hospital for treatment?

Yes No

Are you currently taking medication for heart problems?

Yes No

Please indicate if any of your family have had angina
or a heart attack .

father Yes No Don't know

mother Yes No Don't know

brother or sister Yes No Don't know

40

Diabetes

Have you ever been told by a doctor that you have diabetes?

Yes No

42

General

Do you currently have any medical problems other than those above?

Yes No

 43

Please list them

Are you currently taking any medication other than for high blood pressure or heart problems?

Yes No

If yes, what is the medication for?

Smoking and alcohol

Do you currently smoke tobacco?

Yes No

Have you ever smoked tobacco regularly?

Yes No

During the last **1 month** how **often** have you drunk any alcohol, on average?

Every day
 3-6 times a week
 1-2 times a week
 1-3 times a month
 less than once a month
 not at all

If you have drunk alcohol in the last one month, **how many** drinks did you have on an average day?

12 or more
 7-11
 5-6
 3-4
 2
 1

 52

Physical Exercise

Please answer the following questions on physical exercise. It is important that you only think about physical exercise and physical activity that you have been doing in the **last month**. On this page you can record *formal exercise*, this includes exercise you set aside specific time for during the day or week.

On the next page you can record *informal activities*, including activities that might contribute to fitness that haven't already been mentioned in the formal exercise section.

If you participate in more than one activity, space is provided for you to list them if needed.

Activity 1

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

Activity 2

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

Activity 3

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

Informal physical activity

Activity 1

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

Record 2

--	--

1

--	--	--	--

--	--

--

Activity 2

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

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Activity 3

- Name the exercise/sport _____
- For approximately how many years and/or months have you participated in this activity, years ___ months ___
- Approximately how many hours per week do you participate in this activity _____
- Do you engage in the activity on your own
- with others (Tick one box only)
- or both

--	--

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--

2

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate answer to indicate how you have felt in the *last month*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you have generally felt in the *last month*.

1 ----- 2 ----- 3 ----- 4
 almost never sometimes often almost always

- | | | | | | |
|--|---|---|---|---|--------------------------|
| I have a fiery temper | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I am quick tempered..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I am a hotheaded person | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I fly off the handle | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| It makes me furious when I am
criticised in front of others | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I feel infuriated when I do a good
job and get a poor evaluation | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I feel annoyed when I am not given
recognition for doing good work..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I feel irritated | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| It makes my blood boil when I am pressured | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| When I get frustrated, I feel like hitting someone..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| When I get mad, I say nasty things | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I feel angry..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I get angry when I'm slowed down by others' mistakes | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| People who think they are always right irritate me | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I get annoyed when I am singled out for correction | 1 | 2 | 3 | 4 | <input type="checkbox"/> |

Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people have used to describe their reactions when they feel angry or furious. Read each statement and then circle the number to the right of the statement that indicates how often you have generally reacted or behaved in the manner described in the *last month*. There are no right or wrong answers. Do not spend too much time on any one statement.

1 ----- 2 ----- 3 ----- 4
 almost never sometimes often almost always

When angry or furious.....

- | | | | | | |
|---|---|---|---|---|--------------------------|
| I express my anger..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I keep things in | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I pout or sulk..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I withdraw from people | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I make sarcastic remarks to others | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I do things like slam doors | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I boil inside, but I don't show it | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I argue with others..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I tend to harbour grudges that I don't tell anyone about..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I strike out at whatever infuriates me | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I am secretly quite critical of others..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I am angrier than I am willing to admit..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I say nasty things | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I'm irritated a great deal more than people are aware of..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| I lose my temper | 1 | 2 | 3 | 4 | <input type="checkbox"/> |
| If someone annoys me, I'm apt to tell them how I feel..... | 1 | 2 | 3 | 4 | <input type="checkbox"/> |

This section examines how people respond differently to the same statement. Indicate whether each of the following statements is true as applied to you or false as applied to you in general. There are no right or wrong answers.

Circle true or false as best applied to you in general.

- | | T F | Record |
|--|-----|--------------------------|
| When I take a new job, I like to be told who I should get alongside of..... | T F | <input type="checkbox"/> |
| When someone does me a wrong, I feel I should pay them back if I can, just for the principle of the thing..... | T F | <input type="checkbox"/> |
| I prefer to pass by school friends, or people I know that I have not seen for a long time, unless they speak to me first | T F | <input type="checkbox"/> |
| I have often had to take orders from someone who did not know as much as I did..... | T F | <input type="checkbox"/> |
| I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others | T F | <input type="checkbox"/> |
| It takes a lot of argument to convince most people of the truth..... | T F | <input type="checkbox"/> |
| I think most people would lie to get ahead..... | T F | <input type="checkbox"/> |
| Someone has it in for me | T F | <input type="checkbox"/> |
| Most people are honest chiefly through fear of being caught..... | T F | <input type="checkbox"/> |
| Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it..... | T F | <input type="checkbox"/> |
| I commonly wonder what hidden reason another person may have for doing something nice for me | T F | <input type="checkbox"/> |
| It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important | T F | <input type="checkbox"/> |
| I feel that I have often been punished without cause | T F | <input type="checkbox"/> |
| I am against giving money to beggars..... | T F | <input type="checkbox"/> |
| Some of my family have habits that bother and annoy me very much | T F | <input type="checkbox"/> |
| My relatives are nearly all in sympathy with me | T F | <input type="checkbox"/> |
| My way of doing things is apt to be misunderstood by others | T F | <input type="checkbox"/> |

Circle true or false as best applied to you.

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|---|-----|--------------------------|
| I don't blame anyone for trying to grab everything they can get in this world..... | T F | <input type="checkbox"/> |
| No one cares much what happens to you..... | T F | <input type="checkbox"/> |
| I can be friendly with people who do things which I consider wrong..... | T F | <input type="checkbox"/> |
| It is safer to trust nobody | T F | <input type="checkbox"/> |
| I do not blame a person for taking advantage of people who lay themselves open to it..... | T F | <input type="checkbox"/> |
| I have often felt that strangers were looking at me critically..... | T F | <input type="checkbox"/> |
| Most people make friends because friends are likely to be useful to them... | T F | <input type="checkbox"/> |
| I am sure I am being talked about..... | T F | <input type="checkbox"/> |
| I am likely not to speak to people until they speak to me | T F | <input type="checkbox"/> |
| Most people inwardly dislike putting themselves out to help other people.. | T F | <input type="checkbox"/> |
| I tend to be on my guard with people who are somewhat more friendly than I had expected..... | T F | <input type="checkbox"/> |
| People often disappoint me | T F | <input type="checkbox"/> |
| I like to keep people guessing what I am going to do next..... | T F | <input type="checkbox"/> |
| I frequently ask people for advice..... | T F | <input type="checkbox"/> |
| I am not easily angered..... | T F | <input type="checkbox"/> |
| I have often met people who were supposed to be experts who were no better than I..... | T F | <input type="checkbox"/> |
| I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards..... | T F | <input type="checkbox"/> |
| I would certainly enjoy beating a criminal at his own game | T F | <input type="checkbox"/> |
| It makes me feel like a failure when I hear of the success of someone I know well | T F | <input type="checkbox"/> |
| I have at times had to be rough with people who were rude or annoying.... | T F | <input type="checkbox"/> |

Circle true or false as best applied to you.

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|--|-----|--------------------------|
| People generally demand more respect for their own rights than they are willing to allow for others..... | T F | <input type="checkbox"/> |
| There are certain people whom I dislike so much that I am inwardly pleased when they cop it for something they have done | T F | <input type="checkbox"/> |
| I am often inclined to go out of my way to win a point with someone who has opposed me..... | T F | <input type="checkbox"/> |
| I am quite often not in on the gossip and talk of the group I belong to..... | T F | <input type="checkbox"/> |
| The person who had most to do with me when I was a child (such as my parent, stepparent, etc) was very strict with me | T F | <input type="checkbox"/> |
| I have often found people jealous of my good ideas, just because they had not though of them first..... | T F | <input type="checkbox"/> |
| When a man is with a women he is usually thinking about things related to her sex..... | T F | <input type="checkbox"/> |
| I do not try to cover up my poor opinion or pity of a person so that they won't know how I feel | T F | <input type="checkbox"/> |
| I have frequently worked under people who seem to have things arranged so that they get credit for good work, but are able to pass off mistakes onto those under them..... | T F | <input type="checkbox"/> |
| I strongly defend my own opinions as a rule | T F | <input type="checkbox"/> |
| People can pretty easily change me even though I thought that my mind was already made up on a subject..... | T F | <input type="checkbox"/> |
| Sometime I am sure that other people can tell what I am thinking..... | T F | <input type="checkbox"/> |
| A large number of people are guilty of bad sexual conduct | T F | <input type="checkbox"/> |

Thank you for participating in this study. Your time and effort is appreciated.

The findings from this study will be displayed on the notice board in the Psychology Department early in 1998.