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**EFFECTS  
OF  
ANGER MANAGEMENT AND SOCIAL CONTACT  
ON  
ALCOHOL AND TOBACCO CONSUMPTION**

A thesis presented in partial fulfilment of the requirements  
for the degree of  
Master of Arts in Psychology  
at Massey University

Fiona Margaret Alpass

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## ABSTRACT

Relationships between anger management, social contact, and alcohol and tobacco consumption were investigated to examine a number of issues: (1) That anger management and social contact would be correlated to each other and therefore possibly confounded, (2) that anger management and social contact would be independently related to alcohol and tobacco consumption, (3) that anger management and social contact would jointly influence alcohol and tobacco consumption, (4) that anger management, social contact and alcohol and tobacco consumption would vary across age, sex and socioeconomic status, (5) that age, sex and socioeconomic status would moderate the effects of anger management and social contact on alcohol and tobacco consumption, and (6) that alcohol and tobacco consumption would, in conjunction with psychosocial and sociodemographic variables, operate interactively on each other. A secondary analysis was undertaken on a sub-sample of 831 control subjects taken from the general population as a part of the Auckland Heart Study. Analyses revealed that anger discussion was positively correlated with social availability. No other significant correlations were found between anger management and social contact variables. Multiple regression analyses showed no independent effects of anger management and social contact variables on alcohol and tobacco consumption, but revealed a number of significant interaction effects involving sociodemographic variables. Only one significant interaction effect was found involving both anger management and social contact on either alcohol or tobacco consumption. Analyses revealed that anger management, social contact and alcohol and tobacco consumption varied by age, sex and socioeconomic status. It was concluded that anger management and social contact were not confounded, and were not independently or jointly related to alcohol and tobacco consumption. Results were thus inconsistent with a mediating relationship for smoking and alcohol consumption between psychosocial variables and health outcomes. The number of significant interaction effects was supportive of the value of an interactive approach to health variables. Conceptual and methodological issues are discussed in view of the general lack of support for the research questions and hypotheses.

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## TABLE OF CONTENTS

Abstract	..	..	..	..	..	..	..	i
Acknowledgements	..	..	..	..	..	..	..	ii
List of Tables	..	..	..	..	..	..	..	iii
<b>INTRODUCTION</b>	Overview							1
<b>CHAPTER ONE</b>	Anger Management and Social Contact							5
<b>CHAPTER TWO</b>	Alcohol and Tobacco Consumption							20
<b>CHAPTER THREE</b>	Age, Sex and Socioeconomic Status							25
<b>CHAPTER FOUR</b>	Hypotheses							33
<b>METHOD</b>	..	..	..	..	..	..	..	37
<b>RESULTS</b>	..	..	..	..	..	..	..	41
<b>DISCUSSION</b>	..	..	..	..	..	..	..	53
<b>REFERENCES</b>	..	..	..	..	..	..	..	72

## LIST OF TABLES

<b>Table 1</b>	Simple correlation among anger management, social contact, alcohol consumption and age for all subjects (N=831)	42
<b>Table 2</b>	Means and standard deviations of the anger management, social contact, alcohol consumption scores, and of age for all subjects (N=831), males (n=483), females (n= 348), white collar subjects (n=578), and blue collar subjects (n=253).	43
<b>Table 3</b>	Multiple regression of alcohol consumption on sociodemographic, psychological factors, smoking behaviour, significant second and third order interaction effects, showing standardised regression coefficients (betas), and adjusted R <sup>2</sup> for all subjects (N=831).	46
<b>Table 4</b>	Unstandardised regression coefficients for third order interaction effects on alcohol consumption.	46
<b>Table 5</b>	Multiple regression of smoking behaviour (smoke/non-smoke) on sociodemographic, psychological factors, alcohol consumption, significant second and third order interaction effects, showing standardised regression coefficients (betas), and adjusted R <sup>2</sup> for all subjects (N=831: Smokers=203, Non-smokers=628).	48
<b>Table 6</b>	Unstandardised regression coefficients for second order interaction effects on smoking behaviour (smoke/non-smoke).	49
<b>Table 7</b>	Unstandardised regression coefficients for third order interaction effects on smoking behaviour (smoke/non-smoke).	49

<b>Table 8</b>	Multiple regression of number of cigarettes smoked per day on sociodemographic, psychological factors, alcohol consumption, and significant second order interaction effects, showing standardised regression coefficients (betas), and adjusted $R^2$ for all cigarette smoking subjects (n=167).	51
<b>Table 9</b>	Unstandardised regression coefficients for second order interaction effects on number of cigarettes smoked per day.	51

## INTRODUCTION

### OVERVIEW

A great deal of research has been undertaken to assess the role of psychosocial factors in the aetiology of physical disease. There now exists research evidence linking the key variables of the present study, anger management and social contact, to health status (Haynes et al, 1978; Booth-Kewley, & Friedman 1987; Berkman & Syme, 1979; Blumenthal et al, 1987). A mechanism that may link these two variables to health outcomes is engaging in behaviours which endanger health, such as smoking and alcohol consumption. For instance, the individual with an inappropriate anger management style or lacking in social contact may be more likely to engage in negative health behaviours such as maintaining poor dietary habits, lack of exercise, smoking and drinking alcohol. Such an individual might initiate these behaviours because of low self-esteem, or lack of support from others to engage in health promoting behaviours. The present study focuses on anger management and social contact and the nature of their relationships with smoking and alcohol consumption.

Although the literature linking anger management and social contact to health is substantial, in general these variables have not been studied together, which raises issues of confounding. One study using the same measures as the present study found anger management and social contact to be correlated (Spicer & Hong, 1991). If correlations are found, confounding is likely to be a problem.

In substantive terms, anger management must be viewed contextually, that is, an individual's anger management style is to some extent linked to their social or interpersonal environment. Given this view and the possibility that anger management and social contact may be confounded in their ability to predict health outcomes, and that both have been associated with alcohol and tobacco consumption, it is possible that they may also be confounded in their ability to predict these health behaviours.

The possible association between anger management and social contact not only has statistical implications re confounding but also raises substantive issues of **how** these variables are related. For instance, do anger episodes increase with social contact

requiring the increased use of anger management strategies, or is the suppression of anger related to an inability to maintain supportive relationships resulting in a lack of social contact? An important research question then is, what is the nature and form of the substantive relationship between anger management and social contact? As noted earlier there is considerable evidence linking anger management and social contact to health outcomes. In discussing the connections between psychosocial variables and physical health, an important focus of attention is the role of life style variables, such as smoking and alcohol consumption, as health risk factors. Smoking and alcohol have been consistently associated with poor health outcomes (Pomerleau, 1978; World Health Organisation, 1991; Berg, 1976; Schmidt & Popham, 1975; Stason et al, 1976; Hennekens et al, 1978; Glynn, Labry, & Hou, 1988;), and there is some evidence for the association between these health behaviours and anger management and social contact (Haynes et al, 1978; Johnson, 1990; Thomas, 1989; Houston and Vavak, 1991; Berkman & Syme, 1979; Mermelstein et al, 1986). If anger management and social contact are risk factors for health, then it is possible that physical factors common to a range of diseases, such as smoking and alcohol consumption, may be **mediating** the relationship. Although the present study does not measure health outcomes and therefore this mediating relationship can not be tested as such, evidence linking anger management and social contact to smoking and alcohol consumption would lend some support for this possibility or conversely failure to find associations may weaken the case for mediation.

Age, sex and socioeconomic status are also important and well established risk factors for poor health (Aravanis, 1983; Wingard et al, 1983; Verbrugge, 1989; Syme & Berkman, 1976; Marmot et al, 1987). It can be argued that the association between sociodemographic variables and health outcomes may also be confounded by correlated psychological factors. For instance there is some evidence that anger management and social contact vary over age, sex and socioeconomic status (Haynes et al, 1978; Cohen & Syme, 1985; Weidner et al, 1989; Antonucci and Akiyama, 1987; Belle, 1987; Matthews et al, 1989; Thomas, 1989; Flaherty & Richman, 1989; Shumaker & Hill, 1991), as do smoking behaviour and alcohol consumption (Haynes et al, 1978; Waldron, 1986; Winkleby et al, 1990; DuNah et al, 1991; Rice et al, 1984; Biener, 1987). Consequently sociodemographic variables should be included

in an analysis of the relationships among anger management, social contact, smoking and alcohol consumption as potential confounds.

Most often these psychosocial variables, demographics and behavioural processes are looked at independently in relation to health. Increasingly, researchers recommend that the relationships among health variables not be treated separately but interactively (Bowers, 1987). Because of the failure to study anger management and social contact variables together, study of the possible interactions between them has not been a major area of research. Given the extensive evidence for the buffering effect of social support on health (see chapter one), there is clearly grounds for looking at the potential interaction effects of anger management and social contact on smoking and alcohol consumption.

Matthews (1989) suggests, researchers typically treat sociodemographic variables as secondary, static constructs of more interest to epidemiologists than those interested in the relationships between behaviour and health outcomes. In the context of the present study, age, sex and socioeconomic status may moderate the relationship between the psychosocial variables and the health behaviours. Moreover, sociodemographic variables may be important attributes of individuals and/or groups that could act as **markers** for differing psychobiological processes that operate across subgroups. Bowers (1987) has argued for an interactive approach to the study of health variables, with particular emphasis on the interactions of psychological and physical variables on physical health outcomes. In this regard, it is possible that alcohol and tobacco consumption may, in conjunction with the other study variables, operate interactively on each other.

In sum, in etiological studies of disease, anger management and social contact variables are most often considered separately, which raises issues of confounding. Additionally, the possible association of these two variables raises questions as to the nature of the relationships between the two. A possible mechanism for the relationships between anger management, social contact and health is the practice of negative health behaviours, i.e. smoking and alcohol consumption, suggesting a potential mediating relationship between psychological and physical variables. Due to the failure to study anger management and social contact together in aetiological studies, potential interaction effects on physical health variables has not been

extensively analysed. Similarly, sociodemographic variables are generally used as descriptive variables in research so potential interaction effects with psychosocial variables on health variables are neglected. Additionally, alcohol and tobacco consumption may operate interactively, in conjunction with psychosocial and sociodemographic variables, on each other.

The present study examines the relationships between anger management, social contact, smoking and alcohol consumption. Using a multivariate approach possible interaction effects among these variables can be investigated. Similarly, the potential moderating effect of age, sex, socioeconomic status, alcohol and tobacco consumption can also be examined.

The remainder of this introduction will proceed as follows: Chapter one will address the psychosocial variables, anger management and social contact. Issues relating to construct and operational definitions will be discussed and a review of the evidence for the relationships between anger management, social contact and health outcomes will be provided. Chapter two will consider the associations between alcohol and tobacco consumption and the psychosocial variables, the sociodemographic variables and disease outcomes. Chapter three will address the sociodemographic variables, age, sex and socioeconomic status. Evidence relating to the associations between the sociodemographic variables and anger management and social contact will be discussed, accompanied by a brief review of sociodemographic links to health outcomes.

## CHAPTER ONE

### ANGER MANAGEMENT AND SOCIAL CONTACT

This chapter will discuss issues relating to construct and operational definitions of anger management and social contact. Evidence of the associations between anger management/social contact variables and health outcomes will then be reviewed.

#### **Anger Management**

Ambiguity still exists in the conceptualisation and measurement of anger variables and unanimity of opinion on clear definitions of the construct remains elusive. Spielberger et al (1985) propose that anger is a simpler concept than hostility or aggression, and that the concept of anger usually refers to an emotional state. Hostility, although usually involving angry feelings, is generally considered an attitudinal variable, whereas aggression is a behaviour, possibly motivated by hostility, usually directed toward destroying objects or injuring other people (Spielberger et al., 1985). These somewhat overlapping phenomena have been collectively labelled the anger/hostility/aggression (AHA!) syndrome (Spielberger et al, 1985). Despite Spielberger et al (1985) stating that anger is more rudimentary than either hostility or aggression and is therefore the core of AHA!, it is yet unclear whether either anger, hostility or aggression is the core component of the syndrome. In fact, as will be discussed later, there is considerable evidence that emphasises the importance of hostility in the AHA! syndrome.

Despite the uncertainty regarding the relative importance of the different components of the AHA! syndrome, importantly, there have been some clear distinctions made with regard to how the individual may choose to deal with their anger. An individual's reaction to an anger provoking situation can differ in a number of ways. For, instance, anger can be suppressed (bottled up), expressed somatically (headaches, migraines, stomach upsets), expressed by discussing it with a friend or anger can be expressed by taking it out on others (Thomas, 1989).

A conceptual distinction between different types of anger expression was first discussed by Funkenstein et al (1954) which classified people as either 'anger-in', if they tend to suppress their anger and direct it inward, or 'anger-out' if they express

their anger outwards, towards other individuals or the environment. A number of measures have similarly attempted to distinguish between various aspects of anger management (Evans & Strangeland, 1971; Zelin et al, 1972; Novaco, 1975; Spielberger et al, 1985; Spielberger et al, 1988). Anger management assessed with the Framingham Anger Scales (Haynes et al., 1978), the scale used in the present study, measures the likelihood of anger-in (anger held in, kept to oneself), anger-out (anger taken out on others) and anger-discuss (anger discussed with a friend). The majority of research into anger management and health have used an anger suppression/anger expression measure and although both anger-in and anger-out dimensions have been significantly associated with poor health outcomes, the general trend of findings suggests that anger suppression is the most detrimental anger management style to health (see Health Outcomes below, pg.8).

### **Social contact**

An extensive array of differing definitions, models and outcomes have been proposed to provide a theoretical framework for the study of the "existence, number and frequency" of social relationships (House et al, 1988). The term social support is generally applied to a broad range of conceptualisations of social relationships and how they work. Caplan (1974) suggested that social support networks consist of "continuing social aggregates that provide individuals with opportunities for feedback about themselves and for validations of their expectations of others" (p.4). These others are said to provide the recipient with information and guidance, resources and practical aid, and emotional backup in times of need (Sarason & Sarason 1985). Cobb (1976) defines social support as an interpersonal transaction involving one or more of the following: 1) emotional concern (feelings of being cared for), 2) instrumental aid (tangible resources), 3) information about the environment, 4) appraisal information relevant to self-evaluation (Sarason & Sarason, 1985).

In recent times, research in the social support area has focused on three broad categories of conceptual definitions or operational definitions of social support. These are; quantity, structure and function (House & Kahn 1985).

Firstly, quantity refers to the existence of social relationships, type and frequency of contact. Most standard measures of this kind include questions on marital status,

number and frequency of contacts with friends and family, church attendance and membership of voluntary organisations, and have been found to be generally objective and reliable measures (House & Kahn, 1985).

Secondly, structure refers to the social network structure and the analysis of that structure as opposed to measuring their existence or their functional content. There are a number of structural variables that can be measured: (1) size or range, (2) density, (3) content, (4) directedness or reciprocity, (5) durability, (6) intensity or emotional closeness, (7) frequency, (8) dispersion, and (9) homogeneity (Israel, 1982; House & Kahn, 1985).

Thirdly, function refers to the content or quality of social relationships and these functional components of social support are generally operationalised as the perceptions of the recipient. There is a wide array of definitions and measures of functional support ranging from general measures of quality to more specific measures of esteem, tangible aid, information provision, timing of support, intimacy of social relations, matching of support to stress, cost of support to the provider and even absence of social support or isolation (Ganster & Victor, 1988). House & Kahn (1985) suggest that due to the diversity of measures and the often weak research designs of studies attempting to measure functional support, evidence of construct validity is limited.

This set of phenomena collectively termed social support is somewhat cumbersome to be truly meaningful, and most research endorses a multidimensional view of support. In the present study, we focus on social contact. Participants were asked to record their: marital status; church membership; number of house residents; number of group memberships; number of social acquaintances and; number of close friends. Although instruments measuring these types of variables provide rather basic assessments of people's social relationships, they are overall, as noted by House & Kahn (1985), objective and reliable. It should be noted, that a measure of social contact does not assess the general social interaction of the individual. For instance, a subject may report having numerous contacts, but interaction with these contacts may be few. Respondents were also asked to provide details on the frequency of their social contact, as it is possible that availability of contacts and frequency of contacts, may operate differently in relation to other variables, such as anger

management and alcohol and tobacco consumption.

In summary, ambiguity still exists in providing precise and comprehensive definitions of anger and social support constructs. The general consensus is that both phenomena are multidimensional and that searching for a unitary definition of either is somewhat meaningless. In spite of this ambiguity, distinctions have been made between anger experience and anger management and on a number of anger management dimensions, primarily anger suppression and anger expression. Similarly, a number of distinctions have been made between quantitative and qualitative aspects of social support. A simple but reliable type of measure is that which records the individual's social contacts e.g. marital status, church attendance etc. Again, a measure of available social contact was used in the present study, along with a measure of the frequency of those contacts.

### **Health Outcomes**

Despite the somewhat equivocal nature of the definitions of anger and social support, reliable associations are generally found with health outcomes.

### **Anger Management and Health Outcomes**

The majority of research into the health consequences of anger have focused on its potential as a risk factor in cardiovascular disease (CVD). Siegel (1985) offers a useful distinction between three pathways by which anger has been identified as a potential risk factor for CVD: (1) its relationship with elevated blood pressure, (2) as a major component of the Type A behaviour pattern, and (3) its relationship to coronary atherosclerosis. A brief discussion of the research on these possible pathways follows.

The research previously cited, carried out by Funkenstein et al (1954) reported that in healthy students exposed to stress-inducing laboratory situations, increase in pulse rate for students classified as 'anger-in' were three times greater than for those classified as 'anger-out', however with regard to blood pressure, these two groups did not differ in systolic (SBP) or diastolic (DBP) blood pressure. Spielberger et al (1985) note that the modes of anger expression were not consistent and changed

frequently, seemingly influenced by situational factors. Stronger and more recent evidence for the relationship between anger and blood pressure comes from Gentry et al (1981; 1982) who found individuals who suppressed their anger had higher SBP and DBP than individuals who expressed their anger. Moreover Gentry (1985), found anger-in moderated the relationship between self-reported hostility and blood pressure such that those high in hostility who tended to suppress their anger had higher DBP than all other combination of these two variables. Additionally, Gentry found that anger-in moderated the relationship between life strain and blood pressure such that those high in job strain and who also suppressed their anger had significantly elevated DBP compared to those who did not experience job strain and/or expressed their anger. These relationships provide further support for an interactive approach to studying health outcomes.

Further studies have also found suppressed anger (anger-in) to be related to blood pressure. Harburg et al (1973) observed that black and white males classified as employing 'anger-in' modes of anger expression had significantly higher mean DBP and more documented evidence of hypertensive disease than their 'anger-out' counterparts. Similar findings were reported for black and white females (Gentry et al, 1973). Further research by Harburg and colleagues reported that individuals classified by an 'anger-in' coping style were more highly represented among high-renin hypertensives (63%) than among either low-renin hypertensives (33%) or normotensives (10%) (Esler et al, 1977), and that a coping style focused around resentment (i.e. keeping anger in or expressing it through aggressive behaviour) was generally associated with higher observed DBP and greater evidence of hypertension than a more 'reflective', (i.e. problem-solving approach), coping style (Harburg et al, 1979). More recently, Harburg et al (1991) found only anger-out to be significantly associated with blood pressure. Anger-in, though highly correlated with anger-out ( $r$  ranging from 0.54 to 0.64), did not interact with anger-out and was not predictive of BP. Siegel (1985) suggests that it is difficult without longitudinal data to conclude that anger causes permanent elevations in BP, although a lot of cross-sectional data provides evidence that anger is characteristic of the hypertensive subject. She goes on to suggest that anger may be secondary to hypertension, either as an emotional response to the diagnosis or as a manifestation of changes in

physiology, or both. However, Kahn et al (1972) found an association between self-reported ineffective management of anger and sustained hypertension in a five-year prospective study of Israeli civil servants, suggesting a causal direction in the relationship between anger and hypertension.

Siegel's second pathway by which anger has been identified as a potential risk factor for CVD is the type-A behaviour pattern. Type-A behaviour (TAB) is a multidimensional construct involving a complex set of behaviours such as irritability, hostility, proneness to anger, competitiveness, achievement oriented, impatience, a sense of time urgency and aggressiveness (Friedman and Rosenman, 1974). The relative absence of these characteristics and a different style of coping is identified as Type-B (Chesney & Roseman, 1985).

Type A behaviour has been related significantly and consistently to CVD in a number of studies. Two major prospective studies, the Western Collaborative Group Study (Rosenman et al, 1975) and the Framingham Heart Study (Haynes et al, 1980), found TAB to be a significant and independent predictor of CHD comparable to the effect of risk factors such as smoking.

Although TAB is relatively well established as a risk factor for CHD (Matthews, 1982; Booth-Kewley & Friedman, 1987; Friedman & Booth-Kewley, 1988), contrary evidence regarding the risk factor status of TAB (Shekelle et al, 1985), and measurement issues (Matthews, 1982; Matthews & Haynes, 1986) indicate that there may be conceptual confusion with regard to global TAB. It is possible that the predictiveness of the TAB is weakened because there are components of the pattern that may be beneficial to the subject and consequently by moving beyond the global TAB, specific components may be more predictive (more toxic), when considered separately. There is some evidence to suggest that the anger/hostility component of TAB may confer coronary proneness (Siegel, 1985; Chesney & Roseman, 1985). Matthews (1987) in a meta-analytic review of type-A behaviours and CHD found that hostility was a reliable predictor of CHD across all measures of hostility. Williams & Anderson (1987) suggest evidence points toward hostility as perhaps the strongest predictor of CHD among Type-A subjects. This is consistent with previous research (Williams et al, 1980; Barefoot et al, 1983; Shekelle et al 1983) and findings which suggest that hostility is the only consistently predictive component of TAB

(Dembroski et al, 1989; Joesoef et al 1989). Regardless of the debate as to whether hostility is the singular toxic ingredient in TAB, the comprehensive investigation of the association between TAB and CHD certainly contributes to the evidence suggesting that hostility and/or anger have strong and reliable associations with CHD.

The third pathway by which anger has been identified as a potential risk factor for CVD suggested by Siegel (1985) is the research linking it with coronary atherosclerosis. Williams et al (1980) reported that patients with scores above a certain level on the MMPI hostility scale showed a 70% rate of significant coronary atherosclerosis compared to patients with low scores on the scale (48% rate of significant occlusions). An item analysis showed that the low Ho score individuals were less likely to endorse items that assume other people are basically mean, self-centred and going to take advantage. This association suggests a connection to their interactions with others. Individuals who are reluctant to endorse such sentiments are probably more trusting of their fellow human beings and will be more likely to be actively involved in developing and maintaining supportive networks. Whereas, individuals who see others in a negative, untrusting light, are probably less likely to actively seek involvement with others. Additionally, these same people may endorse these opinions due to deterioration in their own supportive relationships, which may be due to their initial hostile behaviour. Dembroski et al (1984) found that coronary atherosclerosis was significantly positively associated with ratings of potential for hostility and found an interaction effect with 'anger-in'. This finding and others (Gentry, 1985; Harburg, 1991) lends further for support to an interactive approach to studying health outcomes and the general issue the anger management - social contact relationship.

A more recent study (Helmer et al., 1991) has observed no positive association between hostility and coronary occlusion (suggesting that the conclusion that there is a unique toxic, hostility component of TAB is premature).

The bias towards CVD endpoints in the research on anger and hostility implies a disease specific relationship. What about the broader context? Do these variables contribute to variations in other health outcomes? There is evidence to suggest the

toxicity of anger/hostility variables is not confined to CVD. Johnson (1990) reports findings that show anger-out associated with a higher rate of adverse health outcomes, whereas Julius et al (1986) report an association between anger-in and higher mortality. In a meta-analytic review of the construct "disease-prone personality", Friedman & Booth-Kewley (1987) found that a generic "disease-prone" personality that involves depression, anger/hostility, anxiety and possibly other aspects of personality, may exist. Although, associations were weak, the variables anger/hostility and anger/hostility/aggression were not only significantly associated with CHD, but also with asthma and arthritis. Arguably, AHA variables may be related to an individual's general ability to survive. Barefoot et al (1983) found no evidence of a relationship between scores on the Cook Medley (1954) hostility scale (Ho) and the incidence of diseases other than CHD and hypertension in their 25 year follow-up study of 255 physicians, however, Ho scores predicted subsequent mortality from all causes. In the Western Electric Study (Shekelle et al, 1983), the Ho scale was positively and significantly associated with risk of death from all causes. Subsequent work has also found a linear relationship between Ho scores and mortality (Barefoot et al 1987). If, as the evidence suggests, AHA variables are in some way associated with an individuals's survival ability then this could suggest that high anger/hostility individuals may be differentiated from their low anger/hostility counterparts by important psychosocial, behavioural and biological factors associated with health outcomes.

In sum, there is considerable evidence to suggest that emotions conceptualised under the umbrella terms of anger, hostility and aggression are detrimental to health with particularly strong support for their injurious associations with the development and precipitation of CVD. Inconsistencies across studies may be attributed to a number of reasons. Lack of consensus on precise definitions still exists. A profusion of different conceptual terms have been coined in the literature (e.g. anger-in, anger-out, anger-discuss, suppressed anger, suppressed hostility, conflict over anger (Harburg et al, 1991)), accompanied by a similarly wide array of measures. Moreover, the frequent inability to clearly distinguish between constructs of anger, hostility and aggression, leads to conceptual ambiguity as to what exactly is being measured and

difficulty in making comparisons across studies. However, although inconsistencies are reported in the literature with regard to the relationship between anger/hostility variables and health outcomes, the general trend suggests that **anger suppression** is the most potentially detrimental mode of anger management in relation to health.

### **Social Contact and Health Outcomes**

Social relationships have long been believed to be beneficial to health and be protective against disease and even death (e.g. Durkheim, 1951).

Despite differences in conceptualisations, definitions, research and theory, significant relationships between low social support and high incidence of morbidity and mortality are still found (Shumaker & Hill, 1991). A great deal of research describes the psychological and physical benefits of social support and documents how individuals with social support adjust better psychologically to stressful events, recover more rapidly from illness and reduce their risk of mortality from specific diseases (Cohen & Wills 1985; Cohen 1988; Taylor 1990). More specifically, recent prospective, population-based studies have consistently shown the beneficial effects of social support on mortality.

Analysis of data from the Alameda County Study (Berkman & Syme, 1979), showed a linear relationship between scores on a Social Network Index (SNI) and mortality, that is, low scores on the SNI were related to high mortality rates. In the North Karelia study for men there was an increased risk of all-cause and CVD mortality for low levels of social support as compared to higher levels of social support (a threshold effect) (Orth-Gomer & Johnson, 1987). The trend was similar for women but was not significant. House, Robbins & Metzner (1982) found a significant relationship between social support and mortality for men but although all relationships were in the hypothesised directions, only church attendance as an indicator of social contact was a significant predictor of mortality for women in the Tecumseh Community Health Study. Blazer (1982) reported data from the Durham County Study; low levels of social support were associated with higher rates of mortality compared to high levels of social support.

The Evans Country Study (Shoenback, Kaplan, Friedman & Kleinbaum, 1986), showed an overall pattern of increased mortality related with low scores on a

cumulative score of social support. Overall the relationship between social support and mortality was similar to the Tecumseh findings in that it was non-linear, that is, the lowest level of support accounted for most of the effect.

Orth-Gomer and Johnson (1987) analysed data from the Swedish National Survey of Living Conditions; overall mortality rates were highest in a low social support group for both males and females. As with the Tecumseh and Evans County studies low social support accounted for most of the effect, as there was no difference in mortality between high and middle social support groups.

With the exception of the Durham County study, all these prospective studies used a structural measure of social support. Generally, structural measures based on network size are found to be positively associated with health outcomes (House & Kahn, 1985), however studies of the relationships between other structural variables and health and well-being have produced conflicting results (Israel, 1982).

There is also considerable data linking marital status (arguably an aspect of social support) and mortality (Berkman & Syme, 1979; House et al, 1982; Wingard et al, 1983). Generally, single, separated, widowed or divorced people experience higher mortality rates than do married people (Berkman, 1985), but the differential risk is lower for women than men.

As noted earlier, few studies into the relationship between social support and health have focused exclusively on specific disease outcomes. With regard to CVD, both the North Karelia and the Alameda County studies found an increased risk of CVD mortality for low levels of social support as compared to higher levels of social support (Orth-Gomer and Johnson, 1987); Berkman & Syme, 1979).

House, Robbins & Metzner (1982) conducted secondary analyses on the Tecumseh Community Health Study data and reported a strong relationship between a cumulative score of social support and ischemic heart disease in women comparable to all-cause mortality data in men but House et al urge caution in interpreting these findings due to the small sample size and skewed distributions. Orth-Gomer & Johnson (1987) reported findings that suggest that lack of social support was associated with a moderate risk for cardiovascular mortality. Seeman and Syme (1987) found that subjects with greater network instrumental support tended to have less atherosclerosis.

Social support also appears to be a protective factor for CVD in the workplace. Haynes and Feinleib (1980) reported that female clerical workers with a non-supportive boss were more likely to develop coronary heart disease. Similarly, Welin et al (1985) reported that CVD was excessive for workers who had low social support.

These findings raise the issue of whether the relationship between social support and health is a direct or buffering effect. For instance, whether the relationship between social support and health is positive because support enhances health and well-being irrespective of stress level (direct or main effects model) or because support protects from the negative effects of stressful events (buffering effects model). Cohen & Syme (1985) suggest that there is evidence for both models, however the direct and buffering processes may be linked with different definitions of social support. Direct effects are generally reported when the support has been measured in terms of how an individual is integrated within a social network and buffering effects are generally reported when the support is measured in terms of the availability of resources that an individual may use to respond to stressful events.

Support for the interactional study of social support and health comes from Johnson (1986, cited in Shumaker & Hill, 1991) who found that for both men and women the interaction with co-workers (social support) buffered work stress against CVD prevalence. Similarly, Ruberman et al (1984) in a prospective study of MI patients found that patients low in stress and who were socially connected had one-fourth the rate of mortality of those who experienced high stress and were isolated. Additionally, Blumenthal et al (1987) found an interaction relationship between social support, type A behaviour and coronary artery disease, that is, type A's with high social support had lower levels of CAD compared to types A's with low levels of social support, though Seeman and Syme (1987) found no type-A/social interaction effect. Considering the debate regarding the toxicity of the hostility component of TAB, these findings suggest social support may buffer the relationship between hostility and CVD. In contrast to these findings, the Honolulu heart study, found that social support had no main effect on the incidence of CHD, nor did it buffer the relationship between risk factors (e.g. smoking) and the incidence of CHD during a follow-up period (Reed et al, 1983).

Although there are relatively few studies of social support that focus on particular disease outcomes, studies which have examined various cardiovascular outcomes provide general support in line with the extensive research undertaken on social support and all-cause mortality and morbidity. That is, lack of social support appears to be associated with the development and precipitation of CVD. The effects of social support appear to be similar for both CVD and total mortality. This suggests that the effect of social support on health outcomes is a general one and not disease specific. This conclusion is similar to the non-specific effect of anger and hostility discussed previously.

Studies consistently show a protective role of social support for men. However, the relationship between social support and health for women remains unclear and consistent patterns do not appear, due in part to the lack of substantive data in this area on women. A lot of the research on the relationship between social support and health has been limited to white men (Shumaker & Hill 1991). The best support for a relationship between social support and health for women comes from the Alameda and Swedish studies which show linear (increased social support associated with decrease in mortality rates) and threshold (low social support predicts high mortality) effects respectively. The Tecumseh study provides suggestive data for the relationship between social support and mortality for women, in that higher church attendance rates were significantly related to lower mortality rates and, keeping in mind the authors' caution on interpretation, the significant relationship between a cumulative index of social support and ischemic heart disease in women. The Evans County study also provides data linking social support to mortality for women, if somewhat conflicting. Women over 60 showed a linear relationship (increased mortality associated with low social support) however women under 60 years of age showed a reversal of this expected relationship in that lower social support scores were related to lower mortality. The Finnish study showed a trend for women of increased relative risk of all-cause and CVD mortality for low levels of social support compared to higher levels of social support, that although not significant, provides further evidence for a relationship between social support and mortality for women. A few studies have looked at the relationships between gender, social support and morbidity with mixed results. In the Seeman and Syme (1987) study no gender

differences emerged between social support measures and coronary artery disease. Spicer et al (in press) report a relationship between availability of social contact and myocardial infarction for women but not for men. In the study that reported the social support/type-A health interaction (Blumenthal et al, 1987) there was no interaction effect by the gender of the subject and there were no gender specific analyses reported. Kutner (1987) looked at how social support was related to perceived health in patients visiting an outpatient clinic. There were marked gender differences amongst the various measures of social support but no differences between male and females in the relationship of social support to perceived health. Some clue to the nature of this relationship for women may be suggested by a number of unexpected results in previously mentioned data. Firstly in the Alameda study, women with high social support scores between the age of 50 and 59 had high mortality rates, a reversal of the expected direction of the relationship. Secondly, as mentioned above, in the Evans County study, women under 60 years of age with the highest levels of social support also had the highest mortality rates. Finally, in the Swedish study, women with high levels of support between the ages of 65 and 74 had the highest mortality rates. These unexpected findings were not demonstrated in the male data and Shumaker and Hill (1991) suggest these anomalies could reflect differences in the meaning of social support for men and women and differences in the provider and recipient roles in social support interactions.

Furthermore, differences may also relate to the more taxing role of women in the provision of social support. Because women tend to develop, and maintain networks more than men, they are exposed to more of what Shumaker and Hill (1991) call "network strain". This term refers to the negative outcomes associated with network involvement, such as heavy demands, disapproval, disrespect, failure to fulfil expectations and ingratitude of network members. Rook (1984), in a study on 120 widows aged between 60 and 89 years old, found larger networks were associated with higher mortality rates for a subgroup of subjects. Women, because they serve as providers of support more often and more intensively than men are in the position to receive support but Shumaker and Hill (1991) suggest that the benefits of this support may be negated by both the physical and emotional demands placed on them. Additionally there may be gender differences in the mechanisms linking social

support to health. If, under certain circumstances, as it has been suggested, social support buffers the effect of stress on health, then could the fact that women are less biologically reactive to stress than men (Stone, Dembroski, Costa, MacDougall, 1990), partially explain the gender differences in the relationship between social support and health. If a supportive person or relationship diminishes stress-reactivity differently for women as compared to men maybe other biologically based factors are affected differently by social support in men and women.

In sum, although the general picture appears to indicate an association between social support and health outcomes, there are a number of inconsistencies across studies. For example, different studies have reported quite different risks of mortality associated with measures of social support (Berkman, 1986). Additionally, measures are, with few exceptions, quantitatively based measures of social structure and social interaction, which are often derived from questions relating to the social environment in studies already undertaken. The fact that measures vary between studies, that populations differ markedly and there is a lack of data on women may partially explain the difference in the magnitude of risk found across studies. Despite the differences in definitions, methodology and populations however, significant relationships between social support and physical health outcomes are still found.

### **Summary**

An examination of the literature suggests that anger/hostility and social support variables are associated with morbidity and mortality, with particularly strong support for relationships with CVD. Social support is generally viewed as an environmental attribute to which people have access. It is possibly more fruitful to examine these environmental attributes along with attributes of the individual (such as anger management styles and/or hostility) which allow them to develop and maintain supportive ties. Anger has been variously described as a social event, social contact between antagonists, an interpersonal interaction, and a response due to unfair acts of others. Anger management may possibly be connected to the individuals social interaction with others and possibly the availability of social contacts, and indeed this has been demonstrated (Shekelle et al, 1983; Hardy & Smith, 1988; Smith et al,

1988; Houston & Vavak, 1991). Social environment may moderate the extent to which a particular subgroup of people will respond to an anger provoking situation. This has implications for the differences in the social context of anger for different individuals. It has been argued that anger suppression may be a function of the need to be loved and a fear of upsetting others (Johnson, 1990), so differences in anger management styles may be a function of differences in how individuals develop and maintain social ties and the importance they place on those ties.

This implies that anger management and social contact variables may be confounded in their ability to predict health outcomes, and offers support for the notion that anger management and social contact constructs may be linked. For instance, a resentful mode of coping with anger, may influence the individual's ability to develop and maintain social ties, or lack of social contact may result in the use of inappropriate modes of anger management. Moreover, anger management and social contact may operate interactively on health outcomes. Given the well documented relationships between smoking and alcohol consumption, and health outcomes, the present study will look at the possible interaction effects among anger management and social contact, and smoking and alcohol consumption as indicators of health status.

## **CHAPTER TWO**

### **ALCOHOL AND TOBACCO CONSUMPTION**

As discussed earlier there is considerable evidence linking anger management and social contact to health. A mechanism that may link these two variables to health outcomes is engaging in negative health behaviours, such as alcohol and tobacco consumption.

This chapter will firstly provide a brief outline of the associations between health outcomes and alcohol and tobacco consumption. Secondly, evidence for the association between these health behaviours and anger management and social contact variables will be discussed, and finally age, sex and socioeconomic differences in smoking and alcohol consumption will be examined.

#### **Alcohol and Tobacco Consumption and Health Outcomes**

There is substantial evidence linking cigarette smoking to a variety of health outcomes such as CHD, circulatory disease and cancer (New Zealand Department of Health, 1988; WHO, 1990; 1991). Although there have been significant decreases in the prevalence of smoking over the past two decades, cigarette smoking related diseases, such as circulatory disease and cancer, caused 19.4%, or 1 in 5 of all adult deaths in New Zealand between 1981 and 1985 (New Zealand Department of Health, 1988). Smoking related deaths are by far the leading cause of premature mortality in the age group 15-64 in developed countries. Smoking deaths at ages 35-64 account for almost one half of all smoking deaths estimated to occur in developed countries (WHO, 1990), suggesting that deaths due to cigarette smoking do not only occur in the old.

Alcohol abuse has also been linked to a variety of health problems such as heart disorders, cancer, cirrhosis of the liver and accidents (Helzer, 1987). Alcohol has rapid temporary effects on heart functioning (Regan et al, 1977) . Extended alcohol consumption has been linked with lipoprotein levels (Castelli et al 1977), blood pressure (Regan et al, 1977), and smoking (Klatsky et al, 1977; Johnson et al., 1990), all major risk factors in the development of CVD. However, alcohol consumption has also been related to high density lipoprotein cholesterol levels (Castelli et al,

1977), which have been shown to be associated with a reduced risk of heart disease (Gordon et al, 1977), which may partially account for the evidence supporting a U-shaped relationship between alcohol consumption and CVD (Hennekens et al, 1978; Klatsky et al, 1974; Chafetz, 1974; Stason et al, 1976; LaPorte, Cresanta & Kuller, 1980; Jackson et al., 1991). Generally, results from epidemiological studies tend to suggest that moderate drinking appears to be associated with a lower risk of CVD compared to abstinence, low consumption and heavy drinking, furthermore Chafetz (1974) reports that across all-cause mortality, moderate drinkers tend to have lower rates of mortality than teetotallers and heavy drinkers.

Alcohol consumption and smoking have been linked in numerous studies, such that the more the individual drinks the more likely he/she is to smoke and smoke more heavily (e.g. Klatsky et al, 1977; Johnson et al., 1990)

### **Alcohol and Tobacco Consumption and Anger Management and Social Contact**

One possible explanation of the relationship between anger, hostility and aggression variables and mortality may be that individuals with inappropriate anger management strategies are more likely to engage in behaviours detrimental to their health such as smoking and drinking. In this regard we would expect anger suppression and hostile anger expression to be positively related and anger discussion to be negatively related to alcohol and tobacco consumption given their associations with health outcomes discussed in chapter one. There is little data on the nature of the relationships between smoking and alcohol consumption behaviours and anger management. Anger expression (anger-out) has been significantly related to cigarette smoking and heavy consumption of alcohol among black American men (Johnson, 1990). However, Haynes et al (1978) found that men were more likely to smoke if they were prone to suppressing anger. A further trend for men was the negative association between discussion of anger and smoking. As a further component of the AHA! syndrome, hostility has been found to be positively related to alcohol consumption (Shekelle et al, 1983; Houston and Vavak, 1991) and smoking (Shekelle et al, 1983; Dembroski et al, 1989).

Again there is little direct data on the relationships between social contact and

smoking and alcohol consumption, however, involvement in social relationships may help to promote behaviours that are generally beneficial to health, such as seeking health care, complying with medical advice, good nutrition, non-smoking, and moderate drinking behaviour. For instance, Berkman & Syme (1979) in their prospective analysis of the Alameda County data found that health practices were positively associated with a social network index. Blazer (1982) also found a relationship between three support measures and relatively beneficial changes in self-care over the course of a 30 month study. Moderate drinking, (considered less detrimental to health), has been strongly associated with an important indicator of social support (being married), and men who have never married or who are divorced or separated have markedly elevated rates of problems with drinking (Glynn et al, 1988). Similarly, Haynes et al (1978) found that marital dissatisfaction was significantly correlated with cigarette smoking among women. Additionally, successful quitting of smoking has been associated positively with supportive behaviours from one's spouse, and maintaining smoking abstinence has been associated with perceived availability of social support (Mermelstein et al, 1986). Social relationships may promote health behaviours through an enhanced sense of self worth, peer pressure, provision of health care information within networks and a positive psychological state derived from support systems. It is also worth considering that social contact may help to promote poor health behaviours via peer pressure and involvement in a social milieu that encourages and reinforces negative health behaviours. Cohen (1988) reports that initiating, quitting and staying off cigarettes has been tied to the proportion of smokers in a person's social network.

### **Sociodemographic Differences in Alcohol and Tobacco Consumption**

Smoking habits tend to vary across age groups. In general, smoking rates rise markedly in adolescence, reach their peak in middle age, and tend to decrease in old age (Lee et al, 1991). Gender differences are also apparent. Males have higher rates of smoking than females and male smokers on average smoke more than women, but the gap has narrowed in recent years, (Wagenknecht et al, 1990; Winkleby et al, 1990; Lee et al, 1991). Although, overall rates of smoking among both men and women seem to be decreasing, rates of smoking among women are declining at a

slower rate (Cleary, 1987), resulting in converging rates for men and women. Indices of socioeconomic status also have important associations with smoking behaviour. Social class is often measured by education levels. Education has been found to be a powerful negative correlate of current smoking behaviour (Wagenknecht et al, 1990). A higher prevalence of heavy smoking among those with less education has also been reported (Winkleby et al, 1990; DuNah et al, 1991). Also, Haynes et al (1978) found that lack of educational mobility was significantly correlated with cigarette smoking among women. Job status is also a commonly used measure of social class. Generally, smoking is more prevalent among blue collar workers than white collar workers (Haynes et al., 1978; Winkleby et al., 1990). It is possible that part of this effect is due largely to the confounding of education, that is, lower educational attainment may not only be associated with higher prevalence of smoking but could also possibly be associated with lower job status. Perhaps health campaigns are more effective among more highly educated people. Education may provide positive attitudes about health, higher self esteem and effective coping skills, while in combination with higher income, provide access to preventive health services and admission into a social environment where positive health behaviour is reinforced.

Age is an important factor in drinking behaviour patterns. The proportion of abstainers increases with age; the proportions of light, moderate and heavier drinkers decrease with age (Brooks et al, 1989). Alcohol use tends to be highest in those aged 21-34 years (accompanied by alcohol related problems), with use declining in older age (Williams et al, 1987).

Most studies of alcohol consumption by gender have found men usually drink more than women, they have a higher tolerance to alcohol, drink more frequently and a greater proportion of the total male population drinks than the female population (e.g. Biener, 1987). The "macho male" image of alcohol and public disfavour of female drunkenness may have in the past contributed to the difference. However, over the last decade or so drinking and activities associated with it have become less delineated by gender and this is being reflected in the evidence that suggests alcoholism may be becoming more prevalent among females (Helzer, 1987).

Higher levels of alcohol consumption exist in the upper socioeconomic classes, but

the social consequences of alcohol consumption are more apparent in the lower socioeconomic classes (Hezler, 1987). At least one study has found that lower socioeconomic status men were more likely to be current non-drinkers, and moderate drinking was found to be strongly associated with higher socioeconomic status (Glynn et al, 1988). Given the relationship between SES and health, and the U-shaped relationship of alcohol to health, these results suggests a complex pattern of relationships associated with differential risk of disease.

### **Summary**

Smoking and alcohol consumption are important risk factors in health, and have been consistently associated with various adverse health outcomes. Both vary by age, sex and socioeconomic status, suggesting that sociodemographics may be markers for participation in health damaging behaviours. Smoking and alcohol consumption are also associated with anger management and social social contact. A possible insight into the relationship between anger and health outcomes may be that people using inappropriate anger management styles are more likely to engage in behaviours detrimental to their health. Additionally, lack of social contact may deprive the individual of sense of self worth, health care information and a positive psychological state, factors which could contribute to the use of cigarettes and alcohol. Similarly, inappropriate social contact may reinforce existing or encourage further such adverse behaviours.

## CHAPTER THREE

### AGE, SEX AND SOCIOECONOMIC STATUS

This chapter will address the study variables age, sex and socioeconomic status. Firstly, a rationale for a more integrated approach to studying sociodemographics in etiological studies is given. Secondly, evidence linking these variables to health outcomes will be briefly reviewed. Finally, the relationships between age, sex and socioeconomic status, and anger management and social contact will be examined.

As noted earlier, sociodemographics are more often than not treated as background descriptive variables in the area of health psychology, and often provide important epidemiological information. For instance, we know that men, certain ethnic groups, and those of lower socioeconomic status tend to have higher morbidity and mortality rates (Verbrugge, 1985; Johnson, 1990; Winkleby et al, 1990). Matthews (1989) argues that these sorts of variables are more usefully seen as potential markers for underlying psychosocial processes that affect health outcomes. Thus, risk of disease associated with psychosocial variables may be moderated by sociodemographic variables. The most commonly reported sociodemographic variables in psychosocial research into health are age, sex, and socioeconomic status.

#### **Age, Sex and Socioeconomic Status and Health Outcomes**

The most obvious change in a population over a time is the death of all of its members, as aging processes are progressive and irreversible. The risk of disease and dying then is inextricably linked to age. For instance, Aravanis (1983) in a follow-up study of 9,182 men found a significant positive linear relationship between age and 10-year mortality from CHD. A stronger relationship was found in the relationship between age and 10-year mortality from all causes. The probability of dying increases with age exponentially, doubling around eight and a half years in a human population (Kohn, 1985).

Gender differences in mortality are well documented. Women's rates of mortality are lower than men's at all age groups in most western countries. However, women have higher overall rates of physical illness, disability days, doctors' visits and drug

use than men (Verbrugge, 1989). Men have higher rates of impairments and life threatening chronic diseases than women. Women's rates of acute illness are higher but men's injury rate is higher. Overall women have more chronic conditions but women's are less life threatening than men's (Verbrugge, 1989). Waldron (1976) reported that the largest differences between men and women in mortality rates occur for coronary heart disease, accidents, suicide, lung cancer and cirrhosis of the liver. These differences may be linked to behaviours that have been historically more socially acceptable and therefore encouraged in males (e.g. smoking and drinking). Biological factors probably play an important part in this differential as well. For instance males, have higher death rates than females even in infancy and prenatal life (Wingard, 1982), when presumably behavioural factors do not differ across sex. More acute awareness and monitoring of physical symptoms among women, and also earlier and more continual care by women for their symptoms are probably also a function of psychosocial factors (e.g. the existence of supportive others to reinforce health care practices).

Lower socioeconomic status is consistently associated with poor health outcomes (e.g. Syme & Berkman, 1976; Marmot et al, 1987). The reasons for the apparent differences in mortality and morbidity among social classes is unclear. It could be due to low income, resulting in poor nutrition (Rose et al 1981; Millar et al, 1986) and inadequate health care (Millar et al, 1986). As discussed previously, some levels of social class could also account for a higher presence of high risk behaviours (Rose et al, 1981, Blaxter, 1987) or perhaps increased exposure to an adverse environment (Kaplan et al 1987; Syme & Berkman, 1976). Some researchers have also suggested that ill health may lead to a downward drift in social status (Haan et al, 1977; Marmot et al, 1987). So it may be that higher socioeconomic status is protective of ill-health in that it provides resources against adverse situations, and/or it assists the individual in securing positive social and psychological competence. Factors contributing to higher socioeconomic status, such as a high level of education, may also provide the individual with the opportunity to acquire positive attitudes about health, and the money and skills to access preventative health care services.

## Sociodemographic Differences in Anger Management and Social Contact

### Age

There is little data in the literature on the patterns of anger, hostility and aggression variables and aging. Haynes et al (1978) reported that anger-in tended to be more prevalent in older people, however, Harburg (1991) found older groups had significantly lower mean anger-in scores than younger groups, and older men showed significantly lower anger-out scores than younger men. This findings may be due in part to the age range in the studies and a possible U-shaped function between age and anger variables. For instance, Barefoot et al (1991) found the relationship between Ho scores and age to be U-shaped, that is higher Ho scores in the younger and older groups compared to the middle aged groups (age range 18 to 90 years). These findings are in accordance with previous longitudinal studies (e.g. Swenson, Pearson, and Osborne, 1973). Also, samples using college students have reported higher Ho scores than studies using somewhat older adults (Barefoot et al, 1991). This suggests that anger/hostility is a stage phenomenon. That is, there may be aspects of the life cycle that lead to a decrease in hostility in the middle years and then an increase in the latter years. For example, as will be discussed below, social networks tend to shrink with age. This may be reflected in a deterioration of interpersonal skills such as empathy, and sociability that are important in eliciting support from others, which in turn may develop into a suspicious and hostile attitude to others. The individual's hostile behaviour prevents them from building and preserving interpersonal relationships. This same behaviour precludes the presence of significant social support in influencing health outcomes.

The extent and quality of social relationships experienced by individuals is also a function of age. Network size has overall shrinkage with aging, and as men tend to rely more exclusively on their spouse for support (Shumaker & Hill, 1991), there are implications for possibly larger decreases in network size for men with age. Seeman & Syme (1987) found a significant negative relationship between network instrumental support and age. Similarly, Orth-Gomer and Johnson (1987), reported that frequency of social interaction and social contacts decreased with increasing age. Different processes may link social contact to physical health at different stages of

the individual's life. It could be that across age groups, different types of social ties assume different importance. For example, Seeman et al (1987) found that marital status was significantly associated with mortality in younger subjects (38-59 yrs) but this association declined in older subjects (60-70+yrs). One possible explanation for this is that losing one's spouse in older age is a more normative event and therefore possibly less detrimental to the survivor's health than for a younger individual. On the other hand, the researchers found that ties with friends and relatives were more beneficial for older subjects. So, at points along the life cycle, the process by which social contact operates as well as the amount, type, or source of support that is optimal, may differ, and this may be complicated further by other significant psychosocial variables (e.g. anger management styles).

### Sex

Few studies have been undertaken to assess directly the gender differences in anger expression. It is a popular belief that men express anger more than women, that men are allowed to express anger as part of a macho aggressive role image, and that women suppress their anger, although the empirical evidence provides conflicting support for these beliefs. There is some evidence for women being more likely to suppress anger than men (Haynes, Levine, Scotch, Feinleib & Kannel, 1978), although in the same study there were no differences between sexes in anger-out scores with the exception of subjects aged 55-64 years; the women in this group scored significantly lower on anger-out than did the men. In contrast, in a study employing the same anger scales (Framingham Anger Scales), Thomas (1989) found in a mid-life sample, that men and women did not differ in the likelihood of suppressing their anger (anger-in), nor were there gender differences in anger-out. T tests revealed significant differences between men and women in the likelihood of discussing anger, and expressing anger via physical symptoms with women scoring higher on both. Haynes et al (1978) and Weidner et al, (1989) also reported the higher likelihood of women to have physical responses to anger. Thomas's findings that women are more likely to discuss anger than men have been found elsewhere using the same scales (Weidner et al., 1989) and is consistent with the literature which indicates women are more articulate about discussing emotions than men (e.g.

Tschann, 1988). Similarly, Harburg observed that when women were angry they were more likely than men to use a reflective coping style characterised by a constructive behavioural response (Harburg et al 1979). In an examination of clusters of psychosocial variables related to CHD, Weidner et al (1989), found women scored **lower** on the anger suppression dimension than men.

These contradictory findings suggest that the connection between anger and gender is not simple. Not only may anger mean different things to men and women, but other influences that may have a bearing on anger expression (e.g. age, socioeconomic status, social environment) may also bring about different anger responses across and within the gender categories. For example, Fritz (1979, cited in Johnson, 1990), found that where the anger event occurred (e.g. at work, at home, in public) was one of the most important factors determining how men and women responded when they were angry. For instance, in public places men were more likely to express their anger openly or use their anger instrumentally than women when provoked. Furthermore, Frodi, Mcaulay & Thome (1977) found that women were more fearful of expressing anger than men in a relationship because of a belief that a display of assertiveness could lead to problems in their relationship. This has implications for the differences in the social context of anger between men and women. Women may be more likely to moderate their anger response because they are more anxious about antagonising others and potential loss of a source of support, therefore suppressing their anger more often. Johnson (1990) argues that chronic suppression of anger may be a function of the individual's need to be loved, fear of losing love, fear of being abandoned and fear of upsetting others. So the gender-anger relationship may also be a function of differences in how men and women establish and maintain social ties.

Socialisation is differentiated by gender and as socialisation is obviously tied to the development, maintenance, composition and function of social support networks, it is not surprising that gender differences emerge. Men tend to have more extensive but less intensive networks than women across the life span with some exceptions in older age groups (Belle, 1987), and over the lifespan females are more likely to have confidants and to have more confidants than men (Flaherty and Richman, 1989). In adulthood, men often cite their spouses as their only confidant, but women cite

spouses and friends with approximately the same frequency. Men's greater reliance on a single confidant matched with their shrinking network as they age, may make them more vulnerable to isolation than women. Women's networks serve more functions than men's do (Antonucci and Akiyama, 1987), and females report receiving more emotional and health related support from their children and friends than do men (Depner & Ingersoll-Dayton, 1988). Women are more likely to be involved in help and care giving than men (Flaherty and Richman, 1989) and both men and women rely more heavily on women for support (Antonucci & Akiyama, 1987; Belle, 1987). Women often end up providing support for not only their children but their parents as well and sometimes even their spouse's parents. Women are more likely to mobilise support when they need it but men once they have mobilised the support will focus on spouses for all types of support (Belle, 1987). Women are not only informal givers (spouse, children, friends) but more often than not dominate the professional giver functions as well (nurse, charity, teacher etc), and women resort to social support as an important coping strategy to a much higher degree than men (Belle, 1987).

It appears that overall, women provide, receive and use all types of support more than men do and this may be reflected in differences in the meaning of social support for men and women and differences in the provider and recipient roles in social support interactions. Moreover, differences may also relate to other gender related variables that could influence the ability of the individual to attract and maintain social ties, such as anger management. For instance, as discussed, women may differ from men in the mode of anger management they employ depending on the social environment or social consequences of their actions. Similarly, as discussed earlier, hostile individuals avoid seeking or accepting social support (Hardy & Smith, 1988; Houston and Vavak, 1991). Hostile individuals and those prone to anger outbursts may elicit unfriendly actions in others, precluding them from developing supportive relationships. There is evidence for men scoring higher on hostility measures than women (e.g. Johnson, 1990; Barefoot et al, 1991). Therefore, it could be argued that the sex differences in provision and receipt of social support may be due in part to the differing anger management strategies employed by men and women as a consequence of the relative importance they place on their social relationships.

### **Socioeconomic Status**

Few studies have looked directly at the association between socioeconomic status and anger. Some insights into this relationship can be gained from the literature on Type-A behaviour pattern (TAB). Friedman and Rosenman (1974) observed that patients identified as Type-A were irritable, hostile and easily provoked to anger, and as mentioned earlier, a number of authors have suggested perhaps an underlying mechanism driving TAB is hostility (e.g. Williams et al, 1980). Although the associations are generally weak, occupational status, years of education and socioeconomic status have consistently been positively related to measures of TAB (Baker, Dearborn, & Hamberger, 1984). This suggests that hostility is more prevalent in high socioeconomic groups. However, Barefoot et al (1991) in a survey of correlates of the Cook-Medley Hostility Scales, found Ho scores strongly related to lower SES. These findings are similar to work by Carmilli, Roseman and Swan (1988) who reported Ho scores inversely related to SES.

In relation to anger coping styles, Thomas (1989) reported that for both men and women, lower education was linked with higher anger symptomology, but not with anger suppression or anger expression. Matthews et al (1989) reported less educated women reported being angry more frequently, but were less likely to discuss anger and suppressed anger more than their higher educated counterparts. A possible explanation for this finding is that high SES women may be more likely to have high status jobs demanding a more assertive approach to solving anger provoking situations than perhaps low SES women, whose job security may depend on a more submissive demeanour. It appears that anger and hostility may be more prevalent in lower socioeconomic groups, and as will be discussed below, low SES is also associated with poor social support.

Research suggests that the supportive aspects of social ties are more pronounced among groups with high levels of personal resources, e.g. income and education, while the detrimental aspects of social ties are more pronounced among those with fewer such resources (Belle, 1987). The poor are generally less socially integrated than others (House, 1987), and lack of economic resources in itself may prevent social interaction - a number of social activities cost money. Poverty also means a lot of problems and stress, which leaves less psychological energy for social

interaction. Higher rates of divorce, lower levels of organisational involvement and church attendance (indicators of social support) have also been evidenced in lower socioeconomic status groups, while individuals with higher educational and income levels generally report larger networks, more organisational involvement and more frequent contact with network members (House, Umberson & Landis, 1988). Similarly, Hanson & Ostergren (1986) found social class was associated with smaller networks, lower social participation, lower availability of concrete informal and emotional support and a feeling of lower adequacy of social influence than individuals in higher social classes.

As noted previously, Matthews et al (1989) reported less educated women reported been angry more frequently, were less likely to discuss anger and suppressed anger more than higher educated women. These women also reported having little social support (suggesting that fewer contacts may result in fewer opportunities to discuss anger provoking episodes).

### **Summary**

Sociodemographic variables such as age, sex and socioeconomic status are important risk factors for health outcomes. However, in health psychology research, they are usually treated as static descriptive variables. These variables may be markers for underlying psychosocial processes in relation to health outcomes. For instance poor health outcomes may not just be the inevitable consequence of old age, in fact old age may be a marker for inappropriate anger management styles and low levels of social support. Sex may be a marker for more than just gender-biology differences in morbidity and mortality, but may also point to differing responses to anger-provoking situations (e.g. women suppressing, men expressing anger) and quite different provision and receipt of social support. Low socioeconomic status may not just be an indicator of inadequate health resources, but may also be a marker for inappropriate anger responses and inadequate social support. So, sociodemographics possibly function as markers for psychobiological processes that are differentially distributed in the population which in turn may lead to differences in disease outcomes across subgroups.

## CHAPTER FOUR

### HYPOTHESES

A review of the literature suggests that anger management and social contact variables may be confounded in their ability to predict health outcomes. It has also been suggested that anger management and social contact will be associated with smoking and alcohol consumption, as they may mediate the relationship between anger management, social contact, and health outcomes, although this was not fully tested in the present study. Furthermore it has been proposed that anger management and social contact may operate interactively on health. It is expected in the present study that anger management and social contact will also operate interactively on smoking and alcohol consumption. It has been argued that sociodemographic variables point to underlying psychosocial processes that may lead to differences in disease outcomes across subgroups. In the present study it is expected that age, sex and sociodemographic variables will moderate the relationship between anger management, social contact, and alcohol and tobacco consumption, and consequently provide information with regard to the differing processes operating across subgroups. Additionally, it has been suggested that the relationships between psychosocial variables, physical health variables, and physical health outcomes should be treated interactively. In the present study, it is suggested that smoking and alcohol may operate interactively on each other in conjunction with the sociodemographic and/or the psychosocial variables.

The following hypotheses were generated prior to data analysis:

#### **Anger Management and Social Contact**

1. Anger and social support variables will be correlated in the following ways:
  - (a) As opportunities to discuss anger are likely to increase with more social contact available (pg.32), it is expected that social contact will be positively associated with anger discussion.
  - (b) Outwardly expressing or suppressing anger may influence the individual's ability to develop and sustain social ties (pp.27 & 29). Similarly greater social contact increases the opportunities to discuss anger diminishing the

need to adopt other anger management styles. Thus, a negative correlation between social contact and anger-out and anger-in variables is expected.

- (c) Individuals who suppress their anger will be less likely to discuss it with others. Additionally, given the somewhat hostile nature of the anger-out items (e.g. "take it out on others"), individuals who express their anger in this way are less likely to discuss it with others. Thus, anger discussion will be negatively correlated with anger-in, as found by Spicer & Hong (1991), and with anger-out.
- (d) Anger-in and anger-out will be negatively correlated with each other, as has been found in previous studies (Haynes et al., 1978; Thomas, 1989; Spicer & Hong, 1991).
- (e) Social frequency and social availability will be positively correlated with each other replicating results of Spicer & Hong (1991).

### **Sociodemographic Differences in Anger Management and Social Contact**

2. A subject's scores on social support and anger variables will differ according to age sex and socioeconomic status. Specific relationships expected to be found are:
  - (a) The evidence for anger management and age associations is inconsistent, however there is evidence for a U-shaped function between age and hostility, (pg.27). Given that the items in the anger-out scale may reflect a hostile attitude, then a sample ranging from 40-64 years will display a positive linear relationship between anger-out and age.
  - (b) As social support tends to decline with age, (pg.27), we would expect to find a negative correlation between social contact and age in this sample.
  - (c) Due to the conflicting evidence with regard to gender differences in anger-in and anger-out, no specific hypothesis were formulated re gender differences. As women are more likely to discuss their emotions (pg.28), women are expected to score more highly on anger-discuss than men.
  - (d) Because women appear to provide, receive and use all types of support more than men (pg.29), women are expected to score more highly on social contact variables.

- (e) SES is inversely related to social support (p.32) so it is expected that low SES subjects will score lower on social contact variables than high SES subject.
- (f) There is some evidence for suppressed anger to be negatively related to SES (pg.31). It is expected that low SES subjects will score more highly on anger-in than high SES subjects.
- (g) Anger-discuss has been positively associated with SES (pg.31). It is expected that low SES subjects will score lower on anger-discuss than high SES subjects.
- (h) The association between hostility and SES, suggests that a hostile or expressive mode of anger may also be more prevalent in lower SES groups (pg.31). Therefore it is expected the low SES subjects will score more highly on anger-out than high SES subjects.

### **Determinants of Alcohol and Tobacco Consumption**

3. A subject's propensity for smoking or alcohol consumption will differ according not only to their age, sex and socioeconomic status but also to their score on anger management and social contact variables as well, consistent with the suggestion that health behaviours mediate the relationship between psychosocial variables and health. Specific relationships expected to be found are:
  - (a) Smoking and higher alcohol consumption will be more prevalent in younger subjects, men and low socioeconomic subjects (chapter two).
  - (b) Given that supportive relationships may encourage positive health behaviours (pg.22), and that low social contact is associated with poor health (chapter one), it is expected that low social contact will increase the likelihood of smoking and greater alcohol consumption.
  - (c) Hostile anger expression has been positively associated with smoking and alcohol consumption (pg.21). It is expected that subjects who score high on anger-out will be more likely to smoke and consume greater amounts of alcohol.
  - (d) Suppressed anger is generally considered the most harmful mode of anger

management with regard to health (chapter one). It is expected that anger-in will be positively associated with smoking and alcohol consumption.

- (e) Although there is little data on the relationships between anger-discuss and alcohol and tobacco consumption (pg.21), it is expected that anger-discuss will be negatively associated with smoking and alcohol consumption.
- (f) Given the positive association found between alcohol and tobacco consumption (pg.21) it is expected that smoking will be positively correlated with drinking.

Researchers increasingly recommend psychosocial variables be studied interactively rather than independently in the field of health (Bowers, 1987). Specific hypotheses for interaction effects are not detailed in the present study due to the general lack of previous theoretical and empirical knowledge in this area. The nature of these analyses is more exploratory than those undertaken to test main effects hypotheses. Nonetheless, there is evidence supporting the general buffering effects of social support on the relationship between stressors and health outcomes (chapter one). It is expected in the present study that social contact will moderate (buffer) the relationships between anger management and smoking and alcohol consumption (health risk behaviours). For instance, a positive association between anger suppression and alcohol and tobacco consumption will be stronger for low social contact subjects.

Anger management, social contact, smoking and alcohol consumption have all been found to vary across age, sex and socioeconomic status (chapter three). The present study intends to explore the moderating effects of these sociodemographic variables on the relationships between anger management and social contact, and smoking and alcohol consumption. Additionally, Bowers (1987) argues for the interactive study of psychological and physical variables on physical health outcomes. The present study will investigate the possible moderating effects these variables have on each other in conjunction with anger management, social contact, age, sex and socioeconomic status.

## METHOD

The present study is a secondary analysis of data collected in the Auckland Heart Study, a retrospective case-control study of myocardial infarction. The following is a summary of details on sampling, measures and procedures detailed elsewhere (Jackson et al., 1991; Spicer et al., in press).

### **Subjects**

The subjects in the following analysis were taken from the control group in the Auckland Heart Study. This sample was randomly sampled from the Auckland Central Statistical Area using the Auckland electoral rolls as the sampling frame. Since the acceptance rate amongst the relatively small number of Maori and Pacific Island individuals was low, and since the psychological measures have not been validated for these groups, these subjects were not included in the present study. Subjects aged below 40 years were also excluded to enable comparisons with the Framingham study which was the source of the anger management measures. These exclusion criteria, and occasional missing data, resulted in a sample of 483 men and 348 women. Response rates for these subgroups were approximately 80% and 85% respectively.

### **Procedure**

All of the psychosocial data were collected by trained interviewers following a detailed interview schedule after extensive pilot testing. The vast majority of subjects were interviewed at the Auckland School of Medicine. Only a few were interviewed at home because of health or transport difficulties. The interview lasted 30-50 minutes, and a variety of psychological, social and physical information was gathered. The present study focuses on anger management, social contact, alcohol consumption, smoking, sex, age and socioeconomic status, so no details of other measures or procedures will be discussed.

### **Psychosocial Measures**

Measures were obtained of anger management and social contact. Anger

management was assessed with the Framingham Anger Scales (Haynes et al., 1978). The scales assess the likelihood of anger-in (anger held in, kept to oneself), anger-out (anger taken out on others) and anger-discuss (anger discussed with a friend). Although very brief these measures display adequate reliability (Haynes et al, 1978). The alpha reliabilities in the present study sample were: 0.56 for anger-in, 0.56 for anger-out, and 0.60 for anger-discuss. Following the Framingham uniform scoring procedure, the score on each of the preceding measures was calculated by transforming each item score to a value between 0 and 1, then summing across and dividing by the appropriate number of items. Respondents were asked to complete the anger measures with reference to the preceding twelve months.

Availability of social contact in the preceding twelve months was assessed using items which recorded participant's: marital status; church membership; number of house residents; number of group memberships; number of social acquaintances and; number of close friends. Frequency of social contact in the preceding twelve months was based on estimates of the frequency of: church attendance; group attendance; social events; and seeing close friends. The details of the scoring system for obtaining the overall social availability and frequency scores can be found in Spicer and Hong (1991).

Socioeconomic status was assessed using a modified version of the British Registrar-General's classification of social class, which is based on occupation (Pearce, Davis, Smith, & Foster, 1983). For the present study the six-fold classification was collapsed into a white-collar/blue collar dichotomy by combining classes I, II and IIIN, and classes IIIM, IV and V. Three measures were taken: social class of the subject; highest social class of any family member and social class of the main wage earner in the respondent's home. Taking into consideration the large number of women not employed outside the home in the sample, social class of the main wage earner was used in the present study so that a direct comparison of men and women could be made.

Age was recorded as reported by the respondent.

### **Health Behaviour Measures**

Smoking behaviour was assessed using items which asked participants: Do you smoke cigarettes?, How many cigarettes do you smoke per day?, and Do you smoke a pipe or cigar? In the present study, two variables were created using these three items. The first categorised subjects as either smokers (people who smoked either cigarettes, a pipe or cigars) or non-smokers, and the second recorded the number of cigarettes smoked per day by the cigarette smokers.

Alcohol consumption was also measured on a number of items. A measure of grams of alcohol consumed per day was calculated from these items (Jackson et al, 1991), and used in the present study. Participants were asked to provide information on their usual alcohol consumption over the last three months. Subjects who reported no alcohol consumption were included in all analyses as the effects of alcohol on health may be non-linear, in that moderate drinking is related to lower health risks compared to non-drinking and heavy drinking (LaPorte et al, 1980).

### **Data Analysis**

To examine the relationships among variables, SPSS-PC (Norusis, 1988) was used. The relationships between anger management and social contact variables were examined using simple Pearson correlations which were computed for the sample as a whole. T-tests were used to examine the difference of group means on the psychosocial variables by age, sex and socioeconomic status. Statistical significance was assessed using two-tailed tests with alpha set at 0.05.

Main and interaction effects on alcohol and tobacco consumption were examined using hierarchical moderated regression analyses (Jaccard et al., 1990). Sex, socioeconomic status and smoking were coded as follows: Smokers=1, Non-smokers=2; White collars=1, Blue collars=2; Males=1; Females=2. Binary coding, provides interpretable mean differences as regression coefficients (Jaccard et al., 1990).

Firstly, analysis of main and interaction effects of anger management, social contact, age, sex, social class and smoking were undertaken on alcohol consumption. Secondly, analysis of main and interaction effects of anger management, social

contact, age, sex social class and alcohol consumption were undertaken on smoking versus non-smoking. Thirdly, analysis of the main and interaction effects of anger management, social contact, age, sex, social class, and alcohol consumption were undertaken on number of cigarettes consumed. All interactions were modelled using cross-product terms. This moderated strategy, where only one regression model is estimated for the whole sample, maximises power and avoids spurious effects due to differences in subgroup sizes or variances. Where interaction effects were found their nature was explored using subgroup regressions, in order to avoid the pitfalls of interpreting the signs of cross-product terms (Mossholder, Kemery, & Bedeian, 1990). In addition, these analyses were repeated but with alcohol consumption as a quadratic term as there is evidence that the relationship between alcohol consumption and heart disease is curvilinear in a subsample of this data set (Jackson et al., 1991) and in other samples (e.g. LaPorte et al., 1980). These analyses revealed no differences with respect to the main analyses, no non-linear effects were found nor were there changes to interaction effects so these analyses are not reported.

## RESULTS

### Data Screening

Prior to the main analyses, data was screened for accuracy of data entry, missing values and fit between variable distributions and assumptions of multiple regression. Transformations were required for the "alcohol consumption" and "anger-out" variables due to moderate positive skewness, which was considerably reduced following logarithmic transformations.

All other variables were retained in original form since none had less than five per cent missing cases and all satisfactorily met remaining multivariate assumptions (Tabachnick and Fidell, 1989).

Checks for univariate and multivariate outliers revealed no serious problems and the 831 cases were retained for analysis.

There were more men than women in the sample, and more white collar than blue collar subjects, with blue collar women being the smallest subgroup. Age ranged from 40 to 64 years of age (Mean=53.95, SD=6.77), with subgroup means across sex and SES ranging from 52.94 for men to 55.36 for women.

Results from analyses are presented as they relate to hypotheses displayed in Chapter four.

### Anger Management and Social Contact

The first set of hypotheses concerned the correlations between the anger management and social contact variables. Correlations between anger management, and social contact, are presented in Table 1.

**Hypothesis 1(a)** which stated that social contact would be positively associated with anger discussion was supported. There was a slight positive association between anger-discuss and social availability.

**Hypothesis 1(b)** was not supported. It was expected that social contact would be negatively correlated with anger-out and anger-in variables.

Contrary to expectations there were no significant associations between anger-in,

anger-out and the social contact variables.

**Table 1** Simple correlation among anger management and social contact for all subjects (N=831)

	AI	AO	AD	SA
Anger-in (AI)				
Anger-out (AO)	-0.11**			
Anger-discuss (AD)	-0.42**	0.06		
Social availability (SA)	-0.01	0.06	0.09*	
Social frequency (SF)	-0.01	-0.04	0.01	0.42**

\*p<.05 \*\*p<.01

**Hypothesis 1(c)** stated that anger discussion would be negatively correlated with anger-in and anger-out. There was partial support for this hypothesis in that anger-discuss was strongly negatively correlated with anger-in, but this expectation was not supported with regard to anger-out.

Examination of the relationships among the anger variables reveals a negative association between anger-in and anger-out, supporting **Hypothesis 1(d)**.

As expected, **Hypothesis 1(e)**, social frequency and social availability were positively correlated with each other.

To summarise the results of this block of hypotheses, there is little support for the view that anger management and social contact are related. Only the association between discussion of anger and social availability proved to be significant and this was relatively meagre. Associations among the anger management variables were generally as predicted, (with the exception of a predicted negative association between anger discussion and anger-out), as was the association between the social contact variables.

### Age, Sex, Socioeconomic Status

The second block of hypotheses concerned the bivariate relationships between age, sex, socioeconomic status, and the anger management and social contact variables.

**Hypothesis 2(a)** stated that anger-out and age would be positively associated. This hypothesis was not supported. In fact, unexpectedly anger-out and age were negatively correlated ( $r=-0.19$ ,  $p<.01$ )

**Hypothesis 2(b)** which stated that social contact and age would be negatively correlated was partially supported. Social availability and age were negatively correlated ( $r=-0.18$ ,  $p<.01$ ) but social frequency and age were positively associated, though this association was weak and non-significant.

The mean scores for anger management and social contact measures grouped by Sex and SES are shown in Table 2. Men in the Framingham study aged 45-64 years were on average more likely to suppress their anger (0.47) and less likely to discuss their anger (0.59) than did men in the present study (Haynes et al., 1978). Additionally, women in this age bracket from the Framingham study were more likely to suppress (0.53) and less likely to discuss their anger (0.62) than women in the present study. Anger-out scores were generally comparable between the two study samples.

**Table 2** Means and standard deviations of the anger management and social contact for all subjects (N=831), males (n=483), females (n= 348), white collar subjects (n=578), and blue collar subjects (n=253).

	All		Males		Females		White Collar		Blue Collar	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Anger-in	0.42	0.30	0.39	0.28	0.45	0.32	0.43	0.30	0.40	0.30
Anger-out	0.11	0.20	0.11	0.20	0.11	0.20	0.12	0.21	0.09	0.19
Anger-discuss	0.67	0.33	0.65	0.32	0.69	0.33	0.67	0.33	0.67	0.32
Soc-av	15.23	3.51	15.40	3.58	15.00	3.42	15.65	3.33	14.28	3.73
Soc-freq	5.11	1.77	5.16	1.71	5.04	1.86	5.21	1.73	4.88	1.85

**Hypothesis 2(c)** stated that women would score more highly on anger-discuss than men. Scores on anger-discuss were on average lower for men than women, though this difference was not significant ( $t=1.81$ ,  $df=829$ ,  $p=.071$ ). As in the Framingham study, women on average suppressed their anger more than men and this difference between men and women was significant ( $t=2.98$ ,  $df=691.69$ ,  $p<.01$ ).

Unexpectedly, males scored on average higher on both social contact variables than women, contrary to **Hypothesis 2(d)**, however neither of these differences were significant.

**Hypothesis 2(e)** stated that low SES subjects would score lower on social contact variables than high SES subjects. This hypothesis was supported. White collar

subjects on average scored higher on both social availability and social frequency than blue collar subjects. A comparison of means showed the difference between SES groups to be significant for both variables (socav:  $t= 5.08$ ,  $df=438.59$ ,  $p<.001$  and socfreq:  $t=2.53$ ,  $df=829$ ,  $p<.05$ ).

Contrary to expectations, **Hypothesis 2(f)**, low SES subjects did not score more highly on anger-in than high SES subjects. White collar subjects scored marginally higher on anger-in than blue collar subjects, but this difference was found to be non-significant ( $t=1.48$ ,  $df=829$ ,  $p=.14$ ).

Although blue collar subjects were expected to score on average lower than white collar subjects on anger-discuss, **Hypothesis 2(g)**, these subjects reported the same mean scores on this variable.

There was no support for **Hypothesis 2(h)** that low SES subjects would score more highly on anger-out than high SES subjects. White collar subjects in fact scored on average higher, than blue collar subjects, but analysis revealed a borderline significance ( $t=1.93$ ,  $df=829$ ,  $p=.054$ ) for this difference.

To summarise, there was mixed support for this group of hypotheses. Older subjects scored lower on anger-out than younger subjects. Older subjects also reported fewer social contacts but more frequency of contacts than younger subjects, although only the first relationship was significant. Women discussed their anger more than men as expected but men reported more social contact and frequency of those contacts than women, contrary to expectations, though again these relationships were not significant. Lower socioeconomic status was related to lower social contact as predicted, but the relationship between socioeconomic status and anger-in was opposite to that expected in that white collar subjects reported higher anger-in scores than blue collar subjects, although this relationship was not significant. There was no difference in anger discussion between white collar and blue collar subjects. White collar subjects scored higher on anger-out than blue collar subjects but the significance was borderline.

### **Alcohol and Tobacco Consumption - Main and Interaction Effects**

Results from a regression analysis of the variables with log alcohol consumption as the dependent variable are presented in Table 3. Main effects accounted for 10% of

the variance in alcohol consumption ( $F(9,821)=11.01$ ,  $p<.001$ ). Anger management and social contact variables were not significant predictors of alcohol consumption. This is not surprising, given the lack of significant correlations among these variables in bivariate analysis, with only a weak negative association between anger-in and alcohol consumption being significant ( $r=0.09$ ,  $p<.05$ ). Only three predictors (Smoking, SES and Sex) contributed significantly to alcohol consumption for the whole group. Univariate analyses showed that smokers and non-smokers differed significantly in the amount of alcohol consumed,  $M=18.57$  and  $M=9.96$  grams per day respectively ( $t=4.14$ ,  $df=301.65$ ,  $p<.001$ ), as did males and females,  $M=15.74$  and  $M=6.96$  respectively ( $t=6.47$ ,  $df=825.74$ ,  $p<.001$ ). A similar trend was found across SES, with blue collars drinking more than white collars but this was not significant.

Two second-order interaction effects are significant; Social Frequency x Sex, and Sex x SES. The variability predicted by significant main effects and second-order interaction effects together was increased by 1% to 11% with these effects entered ( $F(9,821) = 7.22$ ,  $p<.001$ ). Examination of unstandardised regression coefficients for Social Frequency for males and females show that there is a positive relationship between social frequency and alcohol consumption for males, but for females the relationship is effectively zero. Interaction effects between sociodemographic variables on alcohol consumption was not a focus of this study, but brief examination of the means for the Sex x SES interaction show that blue collar women on average drink less than white collar women and all men.

Two third order interactions were also significant for alcohol consumption; Sex x Smoking x Anger-out, and Sex x Social Availability x Social Frequency. Variability predicted by significant main effects, second-order and third-order interaction effects together increased to 13%, an increase of 2% ( $F(18,812)= 8.12$ ,  $p<.001$ ).

Separate unstandardised regression coefficients are shown in Table 4 for the Sex x Smoking x Anger-out, and the Sex x Social Availability x Social Frequency interactions. These results show a positive relationship between alcohol consumption and anger-out scores for female smokers, but for female non-smokers the relationship is negative. Additionally, of lesser magnitude, the relationship for male smokers is negative and for non-smoking males it is positive. There is a positive relationship

between social frequency and alcohol consumption for males low on social availability, such that as social frequency decreases so does alcohol consumption.

**Table 3** Multiple regression of alcohol consumption on sociodemographics, psychological factors, smoking behaviour, significant second and third order interaction effects, showing standardised regression coefficients (betas), and adjusted R<sup>2</sup> for all subjects (N=831).

	Betas	
<b>Main effects</b>		
Smoking	-0.157***	
Sex	-0.275***	
Socioeconomic status	-0.071*	
Anger-in	-0.043	
Anger-out	0.030	
Anger-discuss	0.027	
Social availability	-0.014	
Social frequency	0.061	
Age	-0.008	
F(9,821) = 11.01***		Adjusted R <sup>2</sup> =.10
<b>Second-order interactions</b>		
Social frequency x sex	0.125*	
SES x sex	-0.180*	
Social availability x sex	-0.061	
Smoking x sex	0.033	
Anger-out x sex	-0.001	
Anger-out x smoking	-0.060	
Social availability x social frequency	0.048	
F(16,814) = 7.22***		Adjusted R <sup>2</sup> =.11
<b>Third-order interactions</b>		
Sex x Socav x Socfreq	-0.226***	
Sex x Smoking x Anger-out	-0.183**	
F(18,812) = 8.12***		Adjusted R <sup>2</sup> = .13

\*\*\*p<.001, \*\*p<.01, \*p<.05

**Table 4** Unstandardised regression coefficients for third order interaction effects on alcohol consumption.

Sex x Smoking x Anger-out		
	Males	Females
Anger-out	Smokers	-0.042
	Non-smokers	0.380
Sex x Social availability x Social frequency		
	Males	Females
Social frequency	High social availability	-0.001
	Low social availability	0.098***

\*p<.05, \*\*\*p<.001

The relationships for the other three subgroups are of lesser magnitude. For females

low on social availability this relationship is negative and for females high on social availability the relationship is positive. For males high on social availability the relationship is negative. Results from a regression analysis on all variables with smoking behaviour, (smokers versus non-smokers), as the dependent variable are presented in Table 5. Main effects accounted for 3% of variance in smoking behaviour ( $F(9,821)=4.27, p<.001$ ). As with alcohol consumption as the dependent variable, anger management and social contact variables were not significant predictors of smoking behaviour. The only two significant predictors of smoking behaviour were alcohol consumption and socioeconomic status. Univariate analyses showed that smokers consumed significantly larger amounts of alcohol than non-smokers and a greater proportion of blue collar subjects were smokers compared to white collar subjects.

There were three significant second-order interaction effects, Anger-in x Anger-out, Anger-in x Socioeconomic Status, and Anger-discuss x Socioeconomic Status. The variability predicted by significant main effects and second-order effects together increases to 5% ( $F(23,807)=2.71, p<.001$ ). Separate unstandardised regression coefficients for these interactions are shown in Table 6. For the Anger-out x Anger-in interaction there is a negative relationship between anger-out and smoking behaviour for subjects high on anger-in, suggesting that subjects high on both anger-in and anger-out are more likely to be smokers. The relationship for subjects low on anger-in is positive, suggesting that these subjects are less likely to be smokers if they are high on anger-out. The results for the Anger-in x Socioeconomic Status interaction indicate that blue collar subjects who suppress their anger are more likely to be non-smokers. The relationship is reversed and of lesser magnitude for white collar subjects, in that white collar subjects who suppress their anger are more likely to be smokers. Separate unstandardised regression coefficients for the Anger-discuss x Socioeconomic status interaction indicate that white collar subjects high on anger discussion are more likely to smoke, but blue collar subjects high on anger discussion are more likely to be non-smokers.

Four third-order interactions were also significant; Age x Social Availability x Alcohol Consumption, Sex x Anger-out x Alcohol consumption, Sex x Social Availability x Social Frequency, and Socioeconomic Status x Anger-discuss x Social

Frequency. Variability predicted increased by a further 2% to 7% with the addition of these effects ( $F(27,803)=3.29$ ,  $p<.001$ ). Separate unstandardised regression coefficients for these interactions are presented in Table 7. For the Age x Social

**Table 5** Multiple regression of smoking behaviour (smoke/non-smoke) on sociodemographics, psychological factors, alcohol consumption, significant second and third order interaction effects, showing standardised regression coefficients (betas), and adjusted  $R^2$  for all subjects ( $N=831$ : Smokers=203, Non-smokers=628).

	Betas	
<b>Main effects</b>		
Alcohol consumption	-0.168***	
Socioeconomic status	-0.097**	
Sex	-0.040	
Anger-in	-0.006	
Anger-out	0.002	
Anger-discuss	0.001	
Social availability	0.034	
Social frequency	0.070	
Age	0.047	
$F(9,821) = 4.27***$		Adjusted $R^2 = .03$
<b>Second-order interactions</b>		
Anger-in x Anger-out	-0.077*	
Anger-in x SES	-0.201**	
Anger-discuss x SES	-0.167*	
Anger-out x Alcohol consumption	-0.029	
Social availability x Age	-0.009	
Anger-discuss x Social frequency	0.053	
Social availability x Alcohol consumption	<-0.001	
Social availability x Social frequency	-0.36	
Alcohol consumption x Age	0.033	
Social frequency x Sex	-0.035	
Anger-out x Sex	-0.009	
Alcohol consumption x Sex	<-0.001	
Social availability x Sex	-0.085	
Social frequency x Socioeconomic status	-0.052	
$F(23,807) = 2.71***$		Adjusted $R^2 = .05$
<b>Third-order interactions</b>		
Age x Socav x Alc conump	0.085*	
Sex x Anger-out x Alc conump	0.114*	
Sex x Socav x Socfreq	-0.113*	
SES x Anger-discuss x Socfreq	0.177**	
$F(27,803) = 3.29***$		Adjusted $R^2 = .07$

\*\*\* $p<.001$ , \*\* $p<.01$ , \* $p<.05$

Availability x Alcohol Consumption interaction the strongest relationship is for subjects high on alcohol consumption and social availability. These results suggest that older subjects, high on social availability and who drink more are more likely to be smokers.

**Table 6** Unstandardised regression coefficients for second order interaction effects on smoking behaviour (smoke/non-smoke).

Anger-in x Anger-out (Median Split: Anger-in=.33)		
	Hi Anger-in	Low Anger-in
Anger-out	-0.767*	0.560
Anger-in x SES		
	White Collar	Blue Collar
Anger-in	-0.117	0.237*
Anger-discuss x SES		
	White Collar	Blue Collar
Anger-discuss	-0.060	0.134

\*p<.05

**Table 7** Unstandardised regression coefficients for third order interaction effects on smoking behaviour (smoke/non-smoke).

Age x Social Availability x Alcohol Consumption (Median Splits: Alcohol consump.=.65; Socav=15)		
Age	Hi Social availability	Low Social availability
High alcohol consumption	-0.163*	0.049
Low alcohol consumption	0.011	-0.077
Sex x Social Availability x Social Frequency (Median Split: Socav=15)		
Social frequency	Hi Social availability	Low Social availability
Males	-0.012	0.036*
Females	0.037	0.025
SES x Anger-discuss x Social Frequency (Median Split: Socfreq=5)		
Anger-discuss	Hi Social frequency	Low Social frequency
White Collar	0.068	-0.200*
Blue Collar	0.162	0.138
Sex x Anger-out x Alcohol Consumption (Median Split: Alcohol consumption=.65)		
Anger-out	Males	Females
Hi alcohol consumption	0.171	-1.160
Lo Alcohol consumption	-0.377	0.665

\*p<.05

The separate unstandardised regression coefficients for the Sex x Social Availability x Social Frequency interaction suggest that men low on both social contact variables

are more likely to be smokers, whereas women high on both social contact variables are more likely to be non-smokers.

The SES x Anger-discuss x Social Frequency interaction suggests that white collar subjects, low in social frequency and high on anger-discuss, are more likely to be smokers, whereas blue collar subjects high on social frequency and anger discussion are more likely to be non-smokers. The unstandardised regression coefficients for the Sex x Anger-out x Alcohol Consumption interaction suggest that women who drink more and express their anger outwards appear more likely to be smokers. This relationship is reversed for women low in alcohol consumption, where high anger-out scores are related to non-smoking.

Results from a regression analysis of the variables with number of cigarettes smoked per day as the dependent variable are presented in Table 8. Main effects accounted for 6% of the variance in number of cigarettes smoked ( $F(9,157)=2.18, p<.05$ ). Again, anger management and social contact variables were not significant predictors of number of cigarettes smoked. The only two variables that were significant predictors were Alcohol Consumption and Sex. As shown in the bivariate analyses, alcohol consumption was significantly associated with number of cigarettes smoked, and univariate results show men smoke significantly more cigarettes than women. Two second-order interactions were significant, Anger-in x Age and Anger-out x Alcohol Consumption. R for regression was significant ( $F(11,156)=3.07, p<.001$ ), when second-order interactions were added. The variability predicted by significant main effects and second-order interaction effects together increases to 12%, an increase of 6%. The unstandardised regression coefficients for these interaction effects are presented in Table 9. This data for the Anger-in x Age interaction suggests that for older subjects the number of cigarettes smoked per day is positively related to suppression of anger, but for younger subjects the trend is reversed. The Anger-out x Alcohol Consumption interaction can be interpreted to mean that for subjects who are high on alcohol consumption, cigarette consumption increases with anger-out, whereas for subjects low on alcohol consumption, cigarette consumption decreases as anger-out increases.

**Table 8** Multiple regression of number of cigarettes smoked per day on sociodemographics, psychological factors, alcohol consumption, and significant second order interaction effects, showing standardised regression coefficients (betas), and adjusted R<sup>2</sup> for all cigarette smoking subjects (n=167).

	Betas	
<b>Main effects</b>		
Alcohol consumption	0.198*	
Socioeconomic status	-0.009	
Sex	-0.200*	
Anger-in	0.036	
Anger-out	0.012	
Anger-discuss	0.045	
Social availability	-0.166	
Social frequency	-0.025	
Age	0.040	
F(9,157) = 2.18*		Adjusted R <sup>2</sup> =.06
<b>Second-order interactions</b>		
Anger-in x Age	-0.175*	
Anger-out x alcohol consumption	0.231**	
F(11,155) = 3.07***		Adjusted R <sup>2</sup> =.12

\*\*\*p<.001, \*\*p<.01, \*p<.05

**Table 9** Unstandardised regression coefficients for second order interaction effects on number of cigarettes smoked per day.

Anger-in x Age (Median Split: Age=55)		
	40-54yrs	55-64yrs
Anger-in	-0.033	0.022
Anger-out x Alcohol consumption (Median Split: Alcohol consumption=.65)		
	Hi Alcohol consumption	Lo Alcohol consumption
Anger-out	15.761	-25.303

To summarise the multivariate analyses, the specific hypotheses relating to main effects on alcohol or tobacco consumption were not well supported in regression analyses. There was mixed support for **Hypothesis 3(a)**. Age was not predictive of alcohol and tobacco consumption. Sex significantly predicted alcohol consumption but was not a significant predictor of whether an individual smoked. However, it was predictive of the number of cigarettes smoked, in that males smoked more than women. Socioeconomic status was predictive of alcohol and tobacco consumption in that alcohol consumption increased for white collar subjects and blue collar subjects were more likely to be smokers, however SES was not predictive of how many cigarettes were smoked per day. **Hypothesis 3(f)** was supported in that

smoking was a significant predictor of alcohol consumption, and alcohol consumption was a significant predictor of both smoking behaviour and number of cigarettes smoked. However, none of the hypotheses relating to the main effects of anger management and social contact on alcohol and tobacco consumption were supported (hypotheses 3b, 3c, 3d, 3e).

Specific interaction effects of anger management and social contact on alcohol and tobacco consumption were not predicted, although it was expected that social contact would buffer the relationships between anger management variables and the dependent variables. This expectation was not fulfilled, with the exception of one third order interaction effect on smoking behaviour. There were no other significant interaction effects found between anger management and social contact on either alcohol consumption, smoking behaviour or number of cigarettes consumed.

Investigation of the possible moderating effects of age, sex and socioeconomic status on the relationships between anger management, social contact and alcohol and tobacco consumption revealed a number of significant interaction effects on all three dependent variables as detailed above.

The moderating effects of alcohol and tobacco consumption were also explored. Significant interaction effects of smoking with sociodemographic variables and psychosocial variables on alcohol consumption, were found. Additionally significant interaction effects of alcohol consumption with sociodemographic variables and psychosocial variables on tobacco consumption were also found. These are also detailed above.

## DISCUSSION

Generally, the present study has failed to fulfil expectations with regard to hypotheses and exploratory research questions.

The primary focus of this thesis was to study the relationships between anger management, social contact, and alcohol and tobacco consumption. Analyses were undertaken to examine three related issues.

Firstly, that anger management and social contact would be correlated to each other therefore possibly confounded. Analyses of the population sampled show in general there is little support to suggest that anger management and social contact are interrelated. Over all analyses, only anger-discuss was significantly positively related to the availability of social contact. Anger-in and anger-out failed to correlate significantly with either of the social contact variables in any of the analyses.

Secondly, that anger management and social contact would be related to alcohol and tobacco consumption, consistent with the notion that health behaviours may mediate the relationship between psychosocial variables and health outcomes. None of the hypotheses regarding these expected relationships were supported. In multiple regression analyses, none of the anger management or social contact variables were related to alcohol consumption, smoking behaviour or number of cigarettes smoked. And thirdly, that anger management and social contact would jointly influence alcohol and tobacco consumption. Only one significant third order interaction effect was found involving these variables together, SES x Social Frequency x Anger-discuss on smoking behaviour. This interaction suggests that white collar subjects, low in social frequency and high on anger-discuss, are more likely to be smokers, for the three other subgroups high anger discussion was associated with non-smoking. The implications of this interaction are unclear.

No other significant interaction effects between anger management and social contact variables on alcohol consumption, smoking behaviour or number of cigarettes smoked as dependent variables were found.

In conjunction with these three issues, the secondary focus of the present study was on three further related issues.

Firstly, anger management, social contact and alcohol and tobacco consumption

would vary across age, sex and socioeconomic status. A number of relationships were found between these variables. Higher social availability was more prevalent in younger subjects; white collars scored higher on social contact than blue collars; men consumed more alcohol and tobacco than women; white collars consumed more alcohol than blue collars and blue collars smoked more cigarettes than white collars. Secondly, age, sex and socioeconomic status would moderate the effects of anger management and social contact on alcohol and tobacco consumption. A number of significant interaction effects were found between the sociodemographic and psychosocial variables on alcohol consumption and smoking behaviours.

Thirdly, alcohol consumption would moderate the relationships between psychosocial, sociodemographic variables and smoking behaviour, and also tobacco consumption would moderate the relationships between these variables and alcohol consumption. A number of significant effects were found. All interaction effects will be discussed more fully later.

Before discussing the present findings in relation to research questions and hypotheses, a number of related issues are raised that may partially explain the general failure of data to support hypotheses in the present study.

## **Conceptual Issues**

### **Anger Management**

A primary concern for researchers is how to conceptualise and operationally define the constructs under investigation. It has been argued that there is considerable ambiguity in the conceptualisation of anger management. Traditionally, the focus has been on the concept of anger expression and anger suppression in the area of health psychology. It is debatable as to whether this classification system is an appropriate way to conceptualise anger management. The anger-in/anger-out dichotomy implies a rather simplistic classification system, in that people are categorised as either predominantly anger-out or predominantly anger-in types. This distinction may overlook what may be important underlying processes operating within the individual, and the sometimes anomalous results in the health literature with regards to the in/out distinction indicate this may be the case. Additionally, the use of this dichotomy

to operationally define anger management generally assumes that one or other of these anger management styles is less beneficial than the other, and it is a common perception that anger-in is more detrimental to health. However, both anger-in and anger-out dimensions have been significantly associated with poor health outcomes (e.g. Harburg et al, 1991; Gentry, 1985; Chesney & Roseman, 1985). If this is the case, then perhaps a reconceptualisation of anger management is appropriate. Harburg et al (1991) suggest that a further distinction can be made between resentful and reflective styles of coping with anger. When anger is provoked a person will exhibit either anger-out behaviour (attacking others) or anger-in behaviour (hiding one's anger). The crucial question may not be which of these management styles is exhibited, but how the individual handles the anger at the time of provocation and afterwards. For instance, does he/she try to calmly problem solve or do they generate resentment. A resentful attitude may also lie behind the concept of hostility. Hostility scores as measured by the Cook-Medley Hostility Scale have been found to be closely related to anger proneness, resentment and suspicion (Smith & Frohm, 1985). The process of resentful anger may be the detrimental element of both anger-in and anger-out styles of coping, and a reflective problem-solving anger the most appropriate anger. If, as Harburg and colleagues (1991) assume "the social consequences of behaviour define the appearance of psychosocial problems for the individual"(p. 158), then if the individual does not resort to a reflective mode of anger, a resentful process may be initiated which in turn may influence social interaction with others (perhaps resulting in deteriorating social support), further compounding the initial anger episode. This approach suggests here is a requirement for a theory driven approach to the measurement of anger. Further theoretical investigation is required into the conceptualisation of anger and to contribute valid and interpretative measures of anger.

### **Social Contact**

As discussed in the introduction, research into social support generally focuses on three broad categories of conceptual definitions or operational definitions of social support; quantity, structure and function (House & Kahn 1985).

Quantity refers to the existence of social relationships, type and frequency of contact.

Most standard measures of this kind include questions on marital status, number and frequency of contacts with friends and family, church attendance and membership of voluntary organisations. In the present study the choice of a quantitative measure of social contact was dictated by the questions about the social environment that were available in the existing data set. Questions were embedded in a lengthy interview and their breadth prescribed by time and the need for a measure which could be completed by a close friend or relative of a coronary death subject. It could be argued that this type of conceptualisation of social contact may not adequately capture the true meaning or value of social interaction for the participants. Although generally objective, reliable and related to health outcomes (House & Kahn, 1985), a purely quantitative conceptualisation of social contact, does not assess attributes such as quality, intensity, intimacy, reciprocity and content of social ties. Perhaps the simplistic quantitative notion of social contact ignores more subtle, underlying processes and meanings associated with the mechanism of social interaction. Contact measures used in future studies of this nature should be chosen because they represent appropriate concepts that relate to anger management and health behaviours.

In sum, variables are partial representations of constructs. Even if concepts are well defined and data collection is painstakingly undertaken, the variables used to measure those concepts rarely capture the complexity of a theoretical construct. It can be argued that both anger management and social contact are complex phenomena and almost defy definition. However, to investigate the ways in which these psychosocial factors may impact on health and more importantly for the present study, health risk behaviours, it must be firstly made explicit what exactly is meant by the terms anger management and social contact. In the present study investigation of key relationships is constrained by the somewhat perplexing state of construct definition. The findings of the present study suggest deficiencies in the theoretical definition of terms inevitably results in shortcomings in conceptualisation of measures.

### **Methodological Issues**

There are a number of measurement issues that may have contributed to

underestimation of relationships among the variables in the present study.

Any correlation coefficient is affected by the range of individual differences in the group (Anastasi, 1988). The restriction in range of the social availability and social frequency scales may contribute to underestimation of relationships. There were few subjects reporting low levels of contact, with few that could be considered social isolates (7% having less than 10 contacts). In a sample ranging from 38 to 94 years of age Seeman et al (1987) classified 24 percent of subjects (N=4,174) as being socially isolated based on, number of contacts with close friends and relatives. It could be argued that the difference in age ranges between these samples may account for this discrepancy, however, in the Seeman et al study, older age groups (over seventy) were no more likely to report being isolated than those in younger groups. The restricted range in the present study suggests little variability in the number of social contacts and frequency of contact, with very few subjects reporting low levels of contact.

Further, the anger management scale is very brief, seven items, and alpha reliabilities in the present study were somewhat lower than ideal (alpha reliabilities: 0.56 for anger-in, 0.56 for anger-out, and 0.60 for anger-discuss) which may also have contributed to the lack of associations.

Participants were asked to recall social contacts and anger responses over the past twelve months. Memory of such events inevitably lacks reliability in that people's recollection of past events tends to be influenced by their current mood (Myers, 1988), which could serve to underestimate responses to anger provoking episodes. A way to enhance recollection of events is to ask many questions with regard to that event (Anastasi, 1988). The length of the data collection interview in the present study would have precluded using this strategy, however this should be considered in further studies of this nature using a retrospective design. Additionally, under-reporting is a well known problem in the measurement of alcohol consumption. In the present study, data have been obtained retrospectively by interviews, with participants asked to recall their usual alcohol consumption over the past three months. Data so obtained are known to underestimate the total consumption of the

population under study, usually by 40-60% (Poikolainen & Simpura, 1983). It is difficult to detect whether this was the case in the present study as under reporting is endemic in the measurement of alcohol making it difficult to compare this sample to other population data. Underestimation of alcohol consumption could also result in an underestimation of its relationships with other study variables, resulting in type II error. There are no unfailing procedures that can readily solve the problem of under reporting, however it has been suggested that repeated interviews, using the same interviewer, asking the same questions over a period of time can be considered more accurate than data elicited in a single interview survey (Poikolainen & Simpura, 1983). This, of course does not solve the problem of the retrospective design and researchers need to be mindful of the tendency to under-report and therefore underestimate relationships when presenting results. It is possible that the general failure in this study to support hypotheses with regard to alcohol consumption may be in part due to this under-reporting.

A further issue is that of sampling bias. The sampling procedures outlined in the method section and reported in more detail elsewhere (Jackson et al., 1991) would tend to preclude any substantial concern in this regard. Of possible concern is the general sociodemographic homogeneity of the sample. Because the control subjects in the initial study (from which the present sample was taken) were matched with myocardial infarction subjects, and Maori and Polynesian subjects were dropped from analyses, subjects were white, predominantly white collar, mostly male, and were within a restricted age range (40-64 years). This poses problems with external validity. For instance, evidence suggests that the number and nature of social interaction changes over age groups (Shumaker & Hill, 1991), and it has been suggested that anger management may also be a stage phenomenon (chapter two). With this in mind a cross sectional study on a sample with a particular range of ages may fail to detect important temporal distinctions in both anger management and social contact, reducing the generalisability of the findings.

Future studies of this nature should aim for a more heterogenous sample.

Of concern in the present study is the possibility of finding "statistically significant"

associations that have occurred by chance due to the number of comparisons that have been undertaken. The possibility of chance effects increases given the exploratory nature of the interaction effects. However, Rothman (1986) argues that adhering strictly to this logic becomes somewhat nonsensical if taken to its full conclusion. In the present study no adjustments were made to the significance criterion or the calculated P-value to deal with this problem. Instead, following Rothman (1986), non-significant as well as significant results have been presented, in order to interpret properly the P-values for the positive findings. Contrary to previous methodological issues discussed, the problem of multiple comparisons could result in an increase in type I error and a decrease in type II error.

### **Relationships between Anger Management and Social Contact**

A major but unfulfilled expectation of the present study was that anger management and social contact variables would be related. Only anger-discuss was significantly related to social availability, for the group as a whole. Spicer and Hong (1991) also found a significant relationship between anger discussion and social availability ( $r=0.23$ ,  $p<.05$ ). This relationship appears logical in that individuals who have more contacts available would be expected to have more opportunities to discuss their anger.

Unexpectedly anger suppression and anger-out failed to correlate significantly with social contact variables. This could be due in part to the issues raised above. Firstly, the conceptualisation of anger management as an anger-in/anger-out dichotomy may fail to capture subtle processes underlying the anger response. As Harburg et al (1991) suggest an important conceptual distinction could be made between resentful and reflective styles of coping with anger, with resentful anger being the possible harmful ingredient of both anger-in and anger-out styles of coping. A resentful style of coping could also be related to the ability to form social ties. These are aspects which would not be captured by the anger-in/anger-out dimensions of the Framingham scales. Further support for this argument is the relationship found between anger discussion and social availability. It could be argued that discussing anger is analogous to a reflective, problem-solving anger coping style, a more 'socially acceptable' anger coping strategy.

Secondly, the simple quantitative measure of social contact may also fail to capture important subtleties in social interaction related to how anger is managed. For example, as discussed earlier, individuals may respond differently to an anger provoking situation depending on the social context (see chapter one). If this is the case then a quantitative measure of social contact may fail to correlate with anger-in and anger-out because it does not assess the meaning and importance of social ties. Finally, a simple explanation for the general lack of association between anger management and social contact variables in the present study could be that in reality they are totally unrelated attributes and concern over confounding is unjustified. However, emphasis has been placed on the contextual nature of anger management (chapter one), and both anger-in and anger-out have been found to be significantly related to social availability elsewhere (Spicer & Hong, 1991). Further there is evidence linking hostility (arguably related to anger) to social support (Hardy & Smith, 1988; Smith et al, 1988). It is reasonable to suggest that there are grounds for further investigation of the relationship between anger management and social contact. Taking cognisance of the conceptual and methodological issues discussed above, it may be that anger and anger management need to be reconceptualised for future research in this area. A shift in focus from the individual's dominant anger coping style, (anger-in/anger-out), to the underlying processes inappropriate styles may trigger, such as the reflective/resentment distinction suggested by Harburg et al (1991), may provide a more informative insight into the anger coping process and provide clearer links to other psychosocial variables such as social contact. Additionally, more complex measures of social contact may be needed to assess how social interaction relates to anger management. As individuals may respond differently to an anger provoking situation depending on the social context (see chapter one) then perhaps a measure of social contact that assesses the value and meaning of social ties may be more appropriate than a purely quantitative measure.

With regard to the relationships among the anger management variables, individuals who suppressed their anger were, not surprisingly, less likely to discuss it with others. These findings are consistent with previous studies (Thomas, 1989; Spicer & Hong, 1991), and a similar trend was found in the Framingham study (Haynes et al.,

1978), though the relationship was somewhat weaker and not significant. Anger-out was not found to be related to anger-discuss. Correlations were weak and in the opposite direction than expected. Similar findings have been reported elsewhere (Haynes et al., 1978, Spicer & Hong, 1991). It is interesting to note this lack of association. Given the somewhat hostile nature of the items in the anger-out scale ("take it out on others" and "blame someone else"), it was expected that individuals who expressed their anger this way would be less likely to discuss their anger with a "partner, friend or relative". It may be that a further anger-discuss item, "get it off your chest", is related to the anger-out item "take it out on others". Similarly by expressing anger outwards, even in a hostile manner (anger-out), the individual is making others aware of his/her feelings, possibly augmenting the chances of eventually discussing the anger provoking episode.

### **Effects of Anger Management and Social Contact on Alcohol and Tobacco Consumption**

The expectations that anger management and social contact would influence alcohol and tobacco consumption both independently and jointly, were not fulfilled. Doubts about the reliability and validity of anger management, social contact and alcohol consumption measures have already been raised. In the case of social contact variables, again a simple quantitative measure may fail to discriminate between alcohol and smoking behaviours. A measure which perhaps assesses where, and in what context, the social interaction takes place (e.g. pubs, work, social clubs, the home) may be more appropriate. Additionally, it may be prudent to note the involvement in these health behaviours by the subject's social contacts. This would provide insight into whether peer pressure plays a part in the consumption of alcohol and tobacco. Also, with regard to the range of cigarettes smoked, although the number of cigarettes smoked per day ranged from 1 to 55, there were very few "heavy smokers" with 84% of cigarette smokers smoking 25 or less per day. It may be that most of the association between smoking and social contact and anger management occurs at higher levels of smoking. Nonetheless, the findings in the present study do not support the view that the relationship between social contact, anger management and health outcomes is mediated by either alcohol or tobacco

consumption, nor do the results suggest that anger management and social contact operate interactively on alcohol and tobacco consumption.

### **Sociodemographic Differences in Anger Management, Social Contact, and Alcohol and Tobacco Consumption**

As expected, scores on social contact and anger management variables varied according to age sex and socioeconomic status. Unexpectedly, anger-out was more prevalent among younger subjects. These findings reflect those of Harburg et al (1991) who found older men had significantly lower anger-out scores than younger men, and a similar trend was found in the Framingham study for both men and women (Haynes et al., 1978). This finding may reflect an expectation that older individuals handle their anger better than younger individuals. Alternatively, this result may also suggest that basing expectations of findings on comparisons of relationships found between hostility measures and anger-out measures (see chapter four) are unproductive, despite the seemingly close conceptual link between the two. Anger-out as measured by the Framingham scale assesses responses to anger provoking situations, whereas scores on scales such as the Cook-Medley Hostility Scale may reflect an attitudinal attribute of the individual, making direct comparison of findings inappropriate and somewhat meaningless.

As expected, social contact was negatively related to age. Social network size tends to shrink with aging, (Orth-Gomer & Johnson, 1987; Shumaker & Hill, 1991). Low social support is associated with poor health outcomes (e.g. Berkman & Syme, 1979) so shrinking social networks may have important health outcomes for the elderly.

No differences between the sexes on aggressive expression of anger were found in the present study. This is consistent with previous findings (Haynes et al., 1978; Thomas, 1989). The finding that women suppressed their anger more than men, is consistent with the Framingham study (Haynes et al., 1978). However, two studies using the same scales have found the gender difference in anger suppression to be non-existent or opposite to the present findings (Thomas, 1989; Weidner et al., 1989). Contrary to expectations there were no gender differences in discussion of anger.

This finding is consistent with the Framingham study (Haynes et al., 1978), however, Thomas (1989) and Weidner et al (1989) both found that women scored significantly higher on anger discussion than men. These inconsistent findings between studies with regard to anger suppression and discussion may be partly explained by the issues relating to the reliability and validity of the anger measure discussed previously. A further possible explanation for these findings is the relative size of samples used; the Framingham study consisted of 1822 subjects, and in the present study the sample was 831. Whereas Thomas's sample was 139 and Weidner et al had 412 subjects in their study. Additionally, there were considerable differences in mean age across the studies. The mean age for the present study was 54 years, and for the Framingham study 57.5, whereas the Thomas study had a mean age of 44 years and Weidner et al, a mean age of 43.5. Given that it has been argued that anger is a stage phenomenon (chapter three) and that men and women may moderate their response to anger depending on different environmental cues, it is quite possible that anger responses differ for men and women at different times of their lives. For instance Johnson (1990) reports a study in which adolescent males were more likely to **suppress** their feelings of anger than females, but both sexes were similar in the degree to which anger was expressed outwardly at other people and objects in the environment, which was determined mainly by the frequency with which anger itself was experienced. Johnson also reports a study on young adults which found that no gender differences occurred in expression of anger but women were more likely to report higher levels of fear and anxiety about expressing anger. These results suggest that differences in the way men and women respond to anger episodes may arise during the process of aging and may partially explain why different studies have reported contradictory results in samples that differ in age range.

This raises the question of why in the present study and in the Framingham study, women are more likely to suppress their anger than men. A possible explanation for gender differences in anger suppression may be the perceived consequences of outwardly expressing angry emotions. It has already been argued that situational context is an important factor in determining how men and women respond when they are angry (Frit, 1979, cited in Johnson, 1990). The perceived consequences of outwardly expressing anger in a particular social situation may result in women

moderating their anger response accordingly. For instance, Frodi et al (1977) found women less inclined to express anger than men in a relationship because of fear of the negative consequences for their relationship. Suppression of anger may be a function of the need to feel loved and supported, and given that women are more likely to provide, receive and use all types of support more than men (chapter three), then the gender-anger relationship may also be a function of differences in how men and women develop and maintain social ties.

Unexpectedly, men scored more highly on both social availability and social frequency, though the difference was non-significant. A possible explanation for this is the nature of the scales used to measure social contact. As discussed earlier, social availability and frequency were measured with a simple quantitative measure which assessed the number of contacts and how often interaction with these contacts occurred. Although women may be involved in providing, receiving and utilising more support, men tend to have more extensive but less intensive networks than women (Belle, 1987), and consequently a quantitative measure of social contact may not capture the intensity or depth of women's social interaction. A qualitative measure of social interaction might be more useful in distinguishing between male and female social interaction.

As expected blue collar subjects scored lower on the social contact variables than white collar subjects and this is consistent with other findings (House, 1987; House, Umberson & Landis, 1988). The supportive aspects of social ties appear to be more pronounced among those with high levels of income and education, while the injurious aspects of social ties are more pronounced among those with fewer such resources (Belle, 1987).

Contrary to expectations, white collar subjects scored more highly on anger suppression than blue collar subjects, however this relationship was not significant. Thomas (1989) also reported no significant association between anger suppression and socioeconomic status. The findings that white collar and blue collar subjects scored the same on discussion of anger and that white collars scored on average marginally higher on anger-out than blue collar subjects were also unexpected, although the finding re anger expression reflects that of Thomas (1989) who found

that lower education was not linked to anger expression. A possible explanation for these unexpected findings is the way in which socioeconomic status is measured. SES was assessed in the present study using a modified version of the British Registrar-General's classification of social class, which is based on occupation (Pearce et al., 1983). A six-fold classification was collapsed into white collar and blue collar subjects for this study. This resulted in a large number of white collar subjects compared to blue collar subjects and may also have resulted in subtle differences across the categories being lost. Additionally, the measure used was the SES of the main wage earner for the purposes of direct comparisons between men and women. Consequently, SES in the present study was only an indicator of socioeconomic environment. The reservations about the Framingham scales discussed earlier must also be taken into consideration when looking at the lack of association between SES and anger management variables in the present study.

Unexpectedly, age was not associated with either alcohol or tobacco consumption. A possible explanation for this is the range of age in the present sample. It could be argued that the range (40 - 64 years), with a mean age of 54 years, generally covers middle-aged people and a restriction in range could help to underestimate any real association between age and alcohol and tobacco consumption. Additionally there is the problem discussed earlier of the underestimation of alcohol consumption. As anticipated males consumed more alcohol and tobacco than females, although they were no more likely to be smokers than women. Bivariate analyses showed a significant difference between men and women in the average amount of alcohol consumed per day - men consumed over twice as much as women on average. The reasons for these differences have been discussed elsewhere (chapter two). The implications of this trend for differential health risk are important. Consumption of more than 3oz per day appears to be associated with an increased prevalence of hypertension, heavy drinkers have higher risks of certain types of cancer, and heavy drinking is highly associated with psychosocial problems (LaPorte et al., 1980). If men on average drink more alcohol than women then the overall risk for certain diseases must be higher. Moderate drinking has been associated with lower risk of heart disease than either non-drinking or heavy drinking. Interestingly, there were a greater percentage of women non-drinkers (38%) than men non-drinkers (23%), but

more men drinking more than 3oz a day (3%) than women (0.1%), suggesting a rather complex pattern of risk, differentiated by gender between disease and alcohol consumption.

The results relating to gender and smoking may reflect changing trends in smoking behaviour. Although males tend to have higher rates of smoking than females and tend to smoke more than women, the gap between men and women is closing. The overall rates of smoking for both men and women are declining however rates of smoking for women are declining at a slower rate resulting in converging rates of smoking between the sexes (Cleary, 1987). So, the percentage of men and women who smoke may be converging but men may still smoke on average more than women, which would account for the findings in the present study.

As predicted, socioeconomic status was associated with both alcohol consumption and smoking behaviour (smoke/non-smoke), however not with the number of cigarettes smoked. It should also be noted that although blue collar groups suffer the consequences of heavy alcohol consumption more than white collar groups, white collars generally consume on average larger amounts of alcohol (Helzer, 1987). The differences in social consequences of heavy alcohol consumption may be a function of the varying degrees of knowledge about health, health facilities and social resources available and that the better educated may be more likely to make proportionally greater use of these resources than the less well informed or less educated. A pragmatic explanation for the higher alcohol consumption by white collars is the higher discretionary income on which they can draw to expend on alcohol.

Although the cross-sectional design of the present study does not permit interpretation of the direction of the observed associations, it is most likely that SES, or factors associated with it (e.g. education), in some way influence tobacco consumption rather than the other way round. It may be that higher education facilitates the acquisition of positive attitudes about health, psychological assets, and higher self esteem, while higher income provides economic assets, access to preventive health services, admission into a social milieu where positive health behaviour is reinforced and by preventing exposure to detrimental influences. If SES does influence smoking and perhaps alcohol consumption via higher education, then

the possibilities for intervention strategies are numerous.

The findings that alcohol and tobacco consumption were associated with each other is consistent with previous findings (Klatsky et al, 1977, LaPorte et al., 1980; Johnson et al., 1990). The health implications of smoking and heavy drinking have been discussed elsewhere (chapter two) and need not be detailed further here, suffice to say that engaging in both behaviours elevates the risk of poor health outcomes, particularly those associated with CVD.

### **Interaction Effects on Alcohol Consumption**

The finding that men drink more the more frequently they socialise is not surprising given the social context of most drinking occasions. That the relationship for women was effectively zero may be accounted for by women's lower frequency of social interaction and lower alcohol consumption. Additionally, there were proportionally more non-drinking women (37%) in the sample than non-drinking men (27%), which could also account for this relationship.

It was found that alcohol consumption was low for males low in social availability and frequency. It is reasonable to assume that for the individual with fewer social contacts, the overall frequency of contacts would be fewer than an individual with many contacts. Social frequency and social availability were positively correlated with each other in bivariate analyses, and we have already seen that alcohol consumption is positively related to social frequency for males. Thus, this interaction is not unusual. The magnitude of the relationships for the other three subgroups is insubstantial and perhaps meaningful analysis will not be served by further investigation.

Alcohol consumption was greater for female smokers who aggressively expressed their anger, but for female non-smokers alcohol consumption was negatively related to anger-out, (This effect is reflected in analyses on smoking behaviour in that women who drank more and aggressively expressed their anger were more likely to be smokers). The relationship for male non-smokers was positive but for male smokers it was negative. From the magnitude of the relationships, the relationship for female smokers is the most salient of the four groups, however it is difficult to unravel the directional pattern of the relationships. We already know that smoking

and alcohol consumption are positively related, (LaPorte et al., 1980), so it would not be unusual to find that women smokers drank more than non-smoking women, but why this relationship is enhanced if the woman expresses her anger outwardly is harder to explain. Anger-out has been shown to be positively associated with alcohol consumption (Johnson, 1990), but this relationship was not found in this study and would not explain why male smokers and female non-smokers drank less if they expressed their anger this way. It is difficult to make conceptual sense out of these relationships and it is questionable whether they convey anything meaningful in a real sense. Smoking behaviour and anger expressed in a hostile manner may possibly be markers for negative psychological characteristics such as depression, hostility, anxiety and lack of self-esteem. Accordingly, the finding that hostile female smokers consume larger quantities of alcohol than other groups differentiated by sex and smoking behaviour, may suggest a cluster of negative emotions, of particular relevance to women, that could influence drinking behaviour.

### **Interaction Effects on Smoking versus Non-smoking**

It was found that subjects high on both anger-in and anger-out were more likely to be smokers and that subjects low on anger-in were less likely to be smokers if they are high on anger-out. Clearly the nature of the anger management scales makes it possible for subjects to score highly on both anger-in and anger-out, however the ensuing behaviour is harder to categorise. Looking at the items that characterise these behaviours, it is possible that the individual who endorses anger-in items such as "keep it inside" and "apologise even when right" may at the same time engage in anger-out behaviours such as "taking it out on others" and "blaming someone else" without being outwardly aggressive. Perhaps a more subtle way of engaging in anger-out behaviours may initiate a resentful process in the management of anger, as suggested by Harburg et al (1991). It appears in the present study that anger suppression or anger expression (anger-out) were not independently associated with smoking behaviour, but anger suppression confers an elevated risk of engaging in this behaviour for people who also outwardly express their anger. It may be that by suppressing anger the anger-out individual compounds the anger episode leading to a higher probability of engaging in negative health behaviours. This set of

relationships provides support for the detrimental nature of anger suppression on health.

Blue collar subjects who **did not** suppress or discuss their anger were more likely to be smokers, however white collar subjects who suppressed or discussed their anger were also more likely to be smokers. The positive association between anger suppression and smoking for white collars and the relationship between anger discussion and smoking for blue collars is consistent with discussion on the relationships between anger management variables and smoking (chapter two), however, the implications of the other findings are unclear.

Results suggest that older subjects, high on social availability and who drink more are more likely to be smokers. The finding that alcohol and social availability are related is not surprising nor is the link to smoking, however it is unclear why this relationship should occur only for older subjects. Perhaps younger subjects are more concerned about their health and are more aware of the consequences of engaging in negative health behaviours.

Men low on both social contact variables were more likely to be smokers. These relationships suggest that for men, being either high or low on **both** social contact variables increases the probability of being a smoker however, being low on one contact variable and high on the other increases the probability of being a non-smoker. These relationships may provide insight into the influence of social contact on engaging in negative health behaviours. For instance it has been found that low social support has been associated with smoking and failure to quit smoking (Haynes et al., 1978; Mermelstein et al., 1986), additionally, there is evidence to suggest that peer pressure may play a part in the continuation of negative health behaviours (Cohen, 1988). It may be that male smokers in the present study are either lacking in social contacts and the frequency of interaction with those contacts or they have a large number of contacts and interact with them often. Both situations could be associated with a heightened risk of being a smoker (e.g Mermelstein et al, 1986; Cohen, 1988). The relationships for women are slightly different. For women low on both contact variables the relationship is the same as that for men, but women high on both variables are more likely to be non-smokers. If the peer pressure argument is applied to this relationship, then the fact that fewer women smoke than

men may partially account for this relationship.

### **Interaction Effects on Number of Cigarettes Smoked**

For older subjects the number of cigarettes smoked per day was positively related to suppression of anger. This result has implications for the detrimental effect of suppressed anger on health in the elderly.

Subjects who were high on alcohol consumption, and anger-out smoked more, whereas for subjects low on alcohol consumption and high on anger-out, cigarette consumption was low. For the anger-out individual alcohol consumption was a determinant of the number of cigarettes smoked. The combination of being high on outward expression of anger and high on alcohol and tobacco consumption has serious implications for health. All three have been associated with poor health outcomes, in particular heart disease (Harburg et al., 1991, Helzer, 1987; Aravanis; 1983).

In sum, has the interactive approach to the study variables been justified? Only one significant anger management/social contact interaction effect was found on either of the three dependent variables. This does not necessarily suggest that further investigation of these two variables interactively in relation to these health behaviours would be unproductive. Further investigation taking into account the issues discussed earlier pertaining to the conceptualisation and measurement of the study variables could prove to be fruitful. The finding of a number of significant interaction effects involving age, sex and sociodemographic variables is supportive of Matthews (1989) argument that sociodemographic variables may be markers for underlying processes. Sociodemographic attributes may point to differing psychobiological processes operating across subgroups. Interaction effects showing the moderating effects of alcohol and tobacco consumption add further support for the interactive approach to health related variables. What can be said about the nature of these interaction effects? Interactions involving three variables are generally interpretable and meaningful based on previous knowledge and findings and are suggestive of possible relationships among the study variables. However, interpretation of more complex interaction effects are unclear. Unravelling the patterns of relationships to reveal any

substantive information is difficult and is compounded by the general lack of any real theoretical approach to the interactive nature of these variables. Jaccard et al (1990) argue that exploratory analyses, can only be interpreted in the context of what they are, what they call "post hoc data snooping", and suggest that interpretation of anything more than bi-linear interactions when undertaken in an exploratory nature should be done cautiously in the absence of a strong theoretical base. To the extent that the interaction analyses in the present study were largely exploratory, the significant effects found are suggestive of further investigation using an interactive approach, but conclusions can not be drawn without replication on a theoretical basis. Despite these limitations in interpretability, the discovery of a number of interaction effects on alcohol and tobacco consumption reinforces the value of the interactive approach to studying health variables.

Extracting general conclusions from the complex findings of the present study is difficult. However, the findings suggest that anger management and social contact, as they are measured in the present study, are not associated with each other and are thus unlikely to be confounded in their ability to predict health outcomes. Consequently studies which have studied these variables separately in relation to health have probably not seriously mis-estimated their effects. It is also evident that anger management and social contact are not related to alcohol and tobacco consumption, thereby suggesting that these health behaviours are unlikely mediators of the relationship between anger management, social contact and health. Alcohol and tobacco consumption do vary in terms of sociodemographics as do anger management and social contact suggesting that sociodemographics may be markers for differential health risk. The present findings also suggest that anger management and social contact do not jointly influence alcohol and tobacco consumption, however the value of studying interactions between psychosocial, sociodemographic and physical health variables was reinforced by the number of significant interactions found on alcohol and tobacco consumption.

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