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TYPE A BEHAVIOUR AND TRAIT ANGER IN BOYS: BEHAVIOURAL, COGNITIVE, AND PHYSIOLOGICAL CORRELATES

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ABSTRACT

Coronary heart disease represents one endpoint of a process that begins early on in life. Recent interest has focused on identifying in children the presence of risk factors known to occur in adults. One such risk factor is the Type A behaviour pattern. Originally defined as consisting of enhanced aggressiveness, easily aroused hostility, a sense of time urgency, and competitive achievement-striving, many investigators recognized this behaviour pattern as a major independent risk factor for coronary heart disease. However, more recent research with adult populations has clearly shown that not all aspects of Type A are equally important risk factors. Hostility and cynicism appear to be the critical components implicated in increased disease risk. Research with children has identified the presence of Type A behaviours; however, studies have yet to address the issue of critical aspects of this behaviour pattern in children. The present study examined whether certain critical components of Type A, parallel to those identified for adults, could be identified in young boys, and whether they predicted psychophysiological functioning better than global Type A.

Sixty-three fourth, fifth, and sixth grade boys differing on behaviour type (A/B) and/or trait anger (high/low) status were studied to determine the relative effects of these variables on four variables: attributional style; peer perceptions of social behaviour; anger expression stylistics; and physiological (blood pressure) reactivity. These boys were selected from a larger sample of 163 fourth, fifth, and sixth grade boys based on their

scores on a teacher measure of Type A and a self-rating of trait anger.

High trait anger boys were found to differ from low trait anger boys on peer perceptions of social behaviours, mode of anger expression, and attributions of intentionality in response to ambiguous peer provocations. Type A/B differences were found only for peer perceptions of aggressive behaviours. Contrary to expectations, no differences in blood pressure reactivity in response to interpersonal conflict were found for either high versus low trait anger or Type A versus Type B groups. Overall, the results of the current study call into question the utility of the global Type A construct as an index of coronary-proneness. The implications of the current findings for both the early identification and tracking of coronary-prone behaviours and for goals and targets of intervention are discussed.

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TYPE A BEHAVIOUR AND TRAIT ANGER IN BOYS: PHYSIOLOGICAL, BEHAVIOURAL, AND COGNITIVE CORRELATES

History and Development of the Type A Construct

> ". . . it is not the delicate, neurotic person who is prone to angina pectoris but the robust, the vigorous in mind and body, the keen and ambitious man, the indicator of whose engines is always at 'full speed ahead'. There is indeed a frame and a facies at once suggestive of angina - the 'well set' man of from 45 to 55 years of age, with military bearing, iron grey hair, and florid complexions" (Osler, 1910).

These comments, made by the British physician Sir William Osler in 1910, attest to the long standing interest in and recognition of the role of psychological/behavioral factors in coronary heart disease. It was not, however, until the late 1950s that the scientific community began to give credence to the idea that psychological factors might place an individual at risk for coronary heart disease (CHD) independently of physiological factors. Disappointed by the realization that traditional risk factors such as smoking, diet, hypertension, and serum cholesterol level, taken either singly or in combination, accounted for less than one-half the incidence of CHD in middle-aged men (Jenkins, 1971; 1976), researchers began to broaden the scope of their search for precursors of the disease. At about this time two cardiologists, Meyer Friedman and Ray Rosenman, observed that, in comparison with the other patients they were treating, their cardiac patients consistently displayed a specific constellation of behavioral characteristics. These observations led to the development of the Type A construct, which was defined as "an

action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other persons. ...Persons possessing this pattern are quite prone to exhibiting a free floating but extraordinarily well-rationalized hostility." (Friedman and Rosenman, 1974).

Overt manifestations of the Type A behavior pattern include explosive accelerated speech, a heightened pace for living, impatience with slowness, concentration on more than one activity at a time, self-preoccupation, dissatisfaction with life, evaluation of the worth of one's activities in terms of numbers, a tendency to challenge and compete with others even in non-competitive situations, and free-floating hostility. Major characteristics of the Type A individual are an enhanced aggressiveness, easily aroused hostility, a sense of time urgency, and competitive achievement-striving (Rosenman, 1978). Type A behavior is said to result from the interaction of these specific predispositions with appropriate eliciting situations. Persons showing a relative absence of Type A characteristics are classified as Type B.

Validation of Type A as a CHD Risk Factor

Initial studies of the Type A behavior pattern were directed toward an examination of its possible biochemical correlates (Friedman, Rosenman, & Carroll, 1958; Friedman, George, Byers, &

Rosenman, 1960). Results of these studies demonstrated that biochemical pathways did exist through which excessive stress might influence human metabolic functions in ways that could increase a person's susceptibility to coronary heart disease. The same biochemical abnormalities characteristic of patients with coronary heart disease were also found in healthy persons exhibiting the coronary-prone behavior pattern. This finding provided support for the hypothesized relationship between the Type A behavior pattern and coronary heart disease and for the idea that the behavior pattern might precede the terminal manifestations of the disease. In order to examine further the relationship between psychological variables and coronary heart disease, a large scale study, the Western Collaborative Group Study (WCGS), was initiated by Friedman and Rosenman in 1960-1961.

The WCGS was a prospective, double-blind investigation of 3,154 men between the ages of 39 and 59 who were free of CHD at intake. Each subject was interviewed at intake and classified as Type A or Type B based on the presence or absence of six components critical to the definition of Type A. Interview data led to the categorization of 1,589 men as Type A and 1,565 men as Type B. For the course of the study, 21 variables, including behavior patterns, body measurements, socioeconomic factors, serum lipids and coagulation, individual habits, and cardiovascular status, were measured annually. Men who subsequently developed coronary heart disease were compared with men who remained free of the disease on each of these 21 variables.

The final data from the WCGS were reported eight and one half years after the initiation of the study (Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975). At this time 257 men had developed coronary heart disease. Results indicated that Type A men were twice as likely to develop CHD as men originally classified as Type B. A number of other findings were highlighted. First, the data showed that initially well Type As were five times more prone to a second myocardial infarction than were Type Bs. Second, fatal heart attacks occurred twice as often in Type As as in Type Bs. Third, of all men who had died of coronary disease during the course of the study, 88% (i.e., 22 out of 25 men) had been classified as Type A. Finally, of all subjects who died during the course of the study, whether from coronary heart disease or other causes, the degree of coronary atherosclerosis was approximately twice as high in Type As as in Type Bs. When a multiple regression procedure was used to statistically control for 12 other risk factors (e.g. age, parental history of CHD, current cigarette usage, serum cholesterol levels), the relationship between the Type A behavior pattern and coronary heart disease was still highly significant. In summary, the relationship between the Type A behavior pattern and coronary heart disease could not be explained away by other risk factors. Type A behavior was found to be consistently associated with a risk of angina and myocardial infarction.

Limitations of the Type A Construct

The WCGS was important in establishing the Type A behavior pattern as a major independent risk factor in the development of coronary heart disease. The impetus was thus provided for several groups of researchers to initiate further studies to elaborate on the construct and its association with disease. Several studies provided evidence linking the presence of the Type A behavior pattern to severity of coronary heart disease, recurrence of myocardial infarction, angina, and degree of atherosclerosis (e.g. Haynes, Feinleib, & Kannel, 1980; Jenkins, Rosenman, & Zynzanski, 1974; Jenkins, Zynzanski, & Rosenman, 1976; Jenkins, Zynzanski, & Rosenman 1971). In addition, other studies relating scores on measures of Type A to situation-specific increases on indices of psychophysiological arousal such as blood pressure reactivity and elevated heart rate provided support for the hypothesis that physiological hyperresponsiveness was one of the mechanisms mediating the association between Type A and increased CHD risk (see Houston, 1983 for a review). However, not all studies have found Type A to be predictive of various CHD endpoints (e.g. Aspirin Myocardial Infarction Research Group, 1980; Dimsdale, Hackett, Hutter, Block, Catanzano, & White, 1979; Hastrup, Kraemer, Hotchkiss, & Johnson, 1986; Multiple Risk Factor Intervention Trial Research Group, 1982), nor has Type A always been found to be associated with psychophysiological hyper-arousal to various situations (e.g. Houston, 1983; Evans and Moran, 1987). Increasing inconsistencies in the data relating Type A to CHD led to questions as to what might be causing the discrepant findings.

One very plausible hypothesis was that the use of different instruments to measure Type A in different studies was responsible for the conflicting data. Three primary measures have been used to assess Type A. The Structured Interview (SI-Rosenman, 1978) is a 25-question measure that allows for an assessment of both content and style of response to questions designed to tap the individual's characteristic ways of responding to a variety of situations. Interview questions cover 4 topic areas including ambition and drive, competitiveness, emotional expression, and impatience and time urgency. The Jenkins Activity Survey for Health Prediction (JAS, Jenkins, Zynzanski, & Rosenman, 1971) is a 50-item self-report questionnaire. The content of JAS items mimics that of the SI; however, the questionnaire method of administration precludes any direct assessment of the Type A stylistic characteristics. The Framingham Type A Scale (Haynes, Levine, Scotch, Feinleib, & Kannel, 1978) is a 10-item self report measure that assesses the individual's competitive drive, sense of time urgency, and job pressure. It is often assumed that these different Type A measures tap similar constructs. In fact, the degree of concordance between these measures is only moderate, with correlation coefficients ranging between .25 and .40 (Chesney, Black, Chadwick, & Rosenman, 1981; Matthews, Krantz, Dembroski, & MacDougall, 1982). This suggests that different components of behavior are being emphasized by the different measures of Type A.

The conceptual definition of Type A focuses on speed and impatience, job involvement, and hard-driving and competitive

behaviours; however, the extent to which the operational definition of each assessment instrument measures each component is unclear. Different studies have used different measures of Type A, making it difficult to compare the degree to which they have been measuring the same construct and leading to confusion in findings. Some studies have reported a significant association between Type A and CHD when one measure was used to classify subjects, but not when another measure was used to classify the same sample (Matthews, 1982). The most robust and reliable associations between Type A and CHD have been reported in studies where the Structured Interview was used to identify subjects as Type A (Matthews & Siegel, 1982). The implication of the fact that different components of Type A are being tapped by different measures, and that the use of any specific measure can influence the nature of the positive or negative results obtained (Matthews, 1982), is that some aspects of the Type A behavior pattern may be more important than others in mediating the association between the globally-defined behavior pattern and CHD.

Critical Components of Type A: Anger and Hostility

The increasing realization of inconsistencies in the Type A literature led to detailled reviews of the relevant data. The need to refine the construct in terms of its critical components has been emphasized repeatedly (e.g. Matthews, 1982; Dembroski & Costa, 1987). Important in identifying the critical components of Type A was the reanalysis of data from the Western Collaborative Group

Study using a component scoring system for the Structured Interview. The only two components that emerged from these data as significant predictors of CHD were anger and potential for hostility (Matthews, Glass, Rosenman, & Bortner, 1977). Other studies using the component scoring system of the SI to analyze their data have confirmed that anger and potential for hostility are critical components responsible for the relationship between behavior type and CHD (e.g. Dembroski, MacDougall, Williams, Haney, & Blumenthal, 1985). These studies also supported the contention that many of the key behaviours in the definition of Type A have little to do with coronary proneness. The emphasis on anger and hostility as critical components may explain why studies relying on the SI for the assessment of behaviour type have shown a stronger relationship to CHD endpoints than studies using the JAS or Framingham scales, which tap what might be considered to be the more benign components of Type A.

Studies using instruments specifically designed as measures of anger and hostility have supported the relationship between these variables and CHD. The most widely used measure has been the Cook-Medley Hostility Scale, a 50-item measure of hostility (Ho) derived from the MMPI (Hathaway & McKinley, 1943). The content of items endorsed by high scorers on this instrument suggests that the typical high scorer "is one who has little confidence in his fellow man. He sees people as dishonest, unsocial, immoral, ugly, and mean and believes that they should be made to suffer for their sins." (Cook and Medley, 1957). Support

for the relationship between Ho scores and CHD has been strong in both retrospective and prospective studies. Subjects obtaining high Ho scale scores have been found to have significantly greater coronary atherosclerosis (e.g. Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980) and significantly greater CHD incidence rates (e.g. Barefoot, Dahlstrom, & Williams 1983; Shekelle, Gale, Ostfeld, & Paul 1983) than low scorers. Furthermore, the relationship between Cook-Medley scores and CHD remains significant even after accounting for other traditional risk factors, and this relationship is stronger than that found between SI-assessed Type A and CHD.

Available data suggest that the characteristic tapped by the Ho scale is remarkably stable. For example, a correlation of .84 has been reported between Ho scores obtained on first and fourth annual examinations of a sample of initially healthy 40- to 55-year old men (Shekelle et al., 1983). Even more impressive is the report of a prospectively determined association between Ho scores of initially healthy young men and the incidence of subsequent CHD over a 25 year interval (Barefoot et al., 1983). The data from these studies suggest that the attitude measured by the Ho scale is a stable one and that it plays an important role in the pathogenesis and course of CHD.

Recent investigations are beginning to address the issue of what precise attitudes are tapped by the Cook Medley Ho scale and of what behavioral mechanisms might account for the relationship between high scores on this measure and CHD. Smith and Frohm

(1985) conducted a series of particularly relevant studies which led them to conclude that the Ho scale measures a kind of hostility more appropriately labelled cynicism. Based on the profile of items endorsed, high scorers were described as likely to experience anger often, to be bitter and resentful, and to view others with distrust and resentment, but not necessarily as likely to be overtly aggressive and assaultive. The combination of anger-proneness and a resentful, suspicious attitude suggests that high scorers are likely to view their interpersonal world as an irritating struggle requiring constant vigilance and to view people as objects to be used and manipulated but rarely trusted. Persons characterized by this cynical hostility have been shown to be somewhat dysphoric, to feel isolated and dissatisfied with their social supports, and to experience more frequent and subjectively severe daily irritants (Smith and Frohm, 1985). As will be seen in the following section on pathophysiological mechanisms, these findings have important implications for the mechanisms by which this attitudinal/behavioral style may translate into increased CHD risk.

Historically, the distinction between the related concepts of anger, hostility, and aggression has been blurred (Spielberger et al., 1985). As research efforts increase to establish these characteristics as risk factors for the development of CHD, the specific definition of these constructs becomes a critical issue. Spielberger has made a large contribution to resolving this conceptual confusion. The distinction he makes is based on level

of response - emotional versus cognitive versus behavioural. Spielberger's focus is both on the global Anger-Hostility-Aggression (AHA) syndrome and on its individual components. Within his model, anger is conceptualized at the emotional level. It is defined as a state that varies in intensity from mild irritation to fury and rage. Hostility occurs at the cognitive level, reflecting a complex set of attitudes that motivate behavioural aggressive responses. Hostile attitudes include animosity, resentment, and are a major component of chronic anger. Aggression occurs at the behavioural level. Included at this level are destructive or punitive acts that are directed toward other persons or objects.

Spielberger (1985) attributes a central role to anger within the global AHA syndrome and points to the need for continued research efforts focusing on the antecedents and consequences of anger. This emotional state is seen as underlying a cognitive style (hostility) which motivates a specific behavioural response (aggression).

One question that is currently receiving a great deal of attention in the adult coronary-prone literature is the role of means of anger expression. Specifically, researchers are beginning to address the question of whether the open expression of anger (anger-out) or the holding in of anger (anger-in/anger-suppression) is most pathonomic for CHD. Research by Charles Spielberger and his colleagues (Spielberger, 1989) suggests that these two modes of anger expression do not reflect opposite poles on a single

continuum. Rather, anger-in and anger-out appear to represent orthogonal dimensions such that an individual's status on one dimension does not determine his status on the other. Spielberger's research further suggests that, while some coronary prone adults may be high on anger-out, it is being high on anger-in that is more pathognomic for coronary heart disease.

Anger and Hostility: Possible Pathophysiological Mechanisms

Any attempt to relate behavioral/psychological factors to disease ultimately requires the identification of physiological pathways through which these factors can be translated into bodily effects. Williams (1984) has described plausible biobehavioral mechanisms which might link Type A behaviour and possibly also anger/hostility to increased CHD risk. First, Williams proposed that there are two major patterns of physiological response to psychosocial environmental challenge. Pattern 1, more commonly described as the fight/flight response, is characterized by increased cardiac output, increased muscle vasodilation, and increased secretion of epinephrine, cortisol and prolactin. This pattern occurs when the cognitive appraisal of a situation results either in a sense of danger or in the need for continued mental effort to understand and cope with its demands. In contrast, Pattern 2 is thought to result when the cognitive appraisal process leads to a decision that the environmental stimuli are interesting or that more information about the stimuli is needed. This latter pattern, associated with vigilance or motivated attention to environmental stimuli, is characterized at the physiological level

by muscle vasoconstriction and increased testosterone secretion.

The findings of excessive cardiovascular and neuroendocrine response to specific situations have important implications for the understanding of how being Type A, and perhaps also being hostile/cynical, places an individual at increased risk for CHD. First, being unable to anticipate good behavior from others, and in fact being on guard against the anticipated bad behaviour of others, Type As and hostile individuals would be expected to be more often in a state of vigilant observation of others. The physiological concomitants of this vigilant state are those of Pattern 2. Because of their vigilance, Type As and hostile/cynical individuals should excrete greater testosterone while awake, but not during sleep when vigilance is no longer required. This hypothesis received partial support in work by Zumoff and his colleagues (Zumoff, Rosenfeld, Friedman, Byers, Rosenman, & Hellman, 1984), who found that Type A men excreted significantly greater testosterone in their urine during waking hours than did Type Bs, although no significant group differences were found during sleep.

The increased secretion of epinephrine and cortisol that is characteristic of Pattern 1 might also play an important role in mediating the relationship between hostility and CHD in the following manner: it is known that the secretion of epinephrine and cortisol is increased during the experience of anger, and the experience of anger is expected to occur with both greater

frequency and intensity among hostile/cynical persons. The hypothesis that angry/hostile individuals show increased cortisol secretion is relevant to an understanding of disease mechanisms because cortisol is known to potentiate both the cardiovascular and the metabolic effects of the catecholamines; this in turn could accelerate the processes involved in endothelial injury. This hypothesized progression represents the most widely accepted model of atherogenesis (Ross & Glomset, 1976).

In one study (Williams, 1984), young male subjects, classified as Type A or Type B on the basis of both JAS and SI scores, were monitored during performance of either a mental arithmetic task (mental work) or a reaction time task (requiring vigilance or sensory intake). Results indicated that, regardless of Type A/B status, the physiological response set associated with the mental arithmetic task was consistent with Pattern 1 whereas performance on the reaction time task was consistent with Pattern 2. In comparison to Type Bs, subjects characterized as Type A showed greater physiological arousal during the performance of both tasks. These findings lend support to the existence of the two distinct patterns of physiological response proposed by Williams and point to the increased physiological responsiveness of Type As.

Measurement and Validation of the Type A Behaviour Pattern in Children

While important advances and refinements have been made in the adult literature on coronary-prone behaviours, there exists

another body of work which seeks to study such behaviours in early childhood. It has long been documented that the atherosclerotic process begins early in life (Marx and Kolata, 1978). Clearly, the earlier that the disease process can be identified, the more likely that lifestyle changes geared toward prevention and intervention will be successful. The importance of research on coronary-prone behaviour in childhood lies in achieving an understanding of how such behaviours are established and transformed into lifelong patterns. However, the only way in which potential atherogenic behaviours may be targetted and efforts toward preventing their development be established is to identify as clearly as possible exactly what it is that needs to be changed.

The following sections will examine the measures that have been developed to study coronary-proneness, or more specifically Type A behaviour, in children. The major behavioral and physiological correlates associated with each of these measures will be presented in turn. Following this, an examination of the concordance among child Type A measures will, in a similar fashion to the discussion of the adult literature on Type A, point to some of the limitations in the current work for an understanding of the development of coronary-prone behavior.

The Matthews Youth Test for Health (MYTH). The MYTH (Matthews and Angulo, 1980) is a 17-item teacher rating scale developed to assess Type A behavior in children between the ages of 5 and 13. The items are a series of statements describing overt

behaviors that are similar to those described as being typical of Type A adults. The child's classroom teacher uses a 5-point scale to rate how characteristic each statement is of the child's behaviour. These ratings are summed to yield a total score as well as scores on each of two factor-analytically derived subscales, Impatience-Aggression and Competitiveness. High MYTH total scores indicate that the child's behaviour is more Type A. Internal consistency of the MYTH total score and of MYTH factor scores is very high, ranging from .88 to .90 (Matthews & Angulo, 1980). Normative data have been reported on 485 children in grades K, 2, 4, and 6. Three month test-retest reliability ranged from .79 for Impatience/Aggression to .82 for both competitiveness and total Type A scores (Matthews & Angulo, 1980).

A number of laboratory studies have provided at least partial support for the validity of the MYTH as a measure of Type A. For example, Matthews and Angulo (1980) compared the performance of MYTH-identified Type A and MYTH-identified Type B elementary school children on a series of three tasks designed to tap response to frustration, competitiveness, and aggression. Behaviours coded from observations were signs of impatience such as number of expiratory sighs, interrupting the experimentor, and restlessness. On a star-tracing task designed to elicit frustration, MYTH-classified Type As, contrary to expectation, did not differ from MYTH-classified Type Bs (this failure to find group differences in frustration was attributed to the fact that the task had proved too difficult for all children). On a car-racing task, MYTH-classified

Type As were found to be more competitive than MYTH-classified Type Bs, but only when the child was competing against a female experimenter. The final task involved observing each child playing with a Bobo doll. The pattern of findings with the Bobo doll was as expected: MYTH-classified Type As aggressed against the doll earlier than MYTH-classified Type Bs. Finally, the observational data indicated that MYTH-classified Type A boys and girls in each grade exhibited significantly more behaviours typical of Type A adults than did MYTH-classified Type Bs: they sighed more, clicked their tongues more, and squirmed more. MYTH-classified Type As also tended to be more restless and to interrupt more than MYTH-classified Type Bs. Thus, the observational data suggested that MYTH-classified Type A children were more impatient than MYTH-classified Type Bs.

Murray, Matthews, Blake, Prineas, and Gillum (1986), reporting on a sample of 8- to 10-year-old children, found that MYTH-classified Type As had a greater ability to talk with adults, were more willing to try new situations, and showed greater self-confidence and assertiveness than MYTH-classified Type Bs. In addition, MYTH-classified Type As had higher activity levels and spoke in a stronger voice with more tension and animation in a group setting. Overt aggression was among the items that did <u>not</u> relate to Type A/B status in this study. However, MYTH-classified Type As did show a greater tendency to blame others when things went wrong, to lie, to steal, to prefer younger playmates, to be wound up and tense, and to have sleep disturbances.

Global and component MYTH scores have also been related to indices of achievement and intellectual ability. Matthews, Stoney, Rakaczky, and Jamison (1986) found that overall Type A scores in girls were related to achievement test scores and grades. In boys, only scores on the competitive subscale were related to these same indices of achievement. For both boys and girls, the correlations of Type A scores with achievement scores were found to be independent of IQ, supporting a view of the Type A individual, even in childhood, as being driven to succeed regardless of native ability.

Corrigan and Moskowitz (1983) have also reported data supporting the convergent and discriminant validity of the MYTH in a population of preschool children. In this study, Type A behaviours were significantly and positively correlated with aggression and impatience, but not with IQ. Type A children also responded faster than Type B children in a task with no time constraints and no incentives.

In summary, it appears that Type A behaviour in children can be observed reliably and is related to behavioural correlates of Type A very similar to those reported in adult studies. Specifically, MYTH-classified Type A children have been characterized as being more impatient and more competitive than MYTH-classified Type Bs.

The behavioral differences reported between MYTH-classified Type As and MYTH-classified Type Bs are important to the issue of coronary proneness only to the degree that they can be shown to

translate into increased physiological risk. In the adult literature it has been hypothesized that behaviours characteristic of the Type A behaviour pattern are expressions of an underlying adrenergic hyperresponsiveness to environmental stressors. This hyperresponsiveness is said to be characterized by elevations in blood pressure and heart rate in response to environmental stressors. Episodic elevations in blood pressure and heart might damage the inner layers of the coronary arteries, thereby increasing the likelihood of atherosclerosis and subsequent CHD (Matthews & Siegel, 1982). Support for this hypothesis has been equivocal (e.g. Dembroski, MacDougall, & Shields, 1977; Manuck & Garland, 1979): the presence or absence of findings has often been dependent on the Type A measure used and the nature of the task. In the child literature, tests of the physiological hyperresponsiveness hypothesis in MYTH-identified Type As have also yielded mixed results.

Lundberg (1983) has reported findings of greater task-induced systolic blood pressure reactivity among MYTH-classified Type As than among MYTH-classified Type Bs in a sample of 15 three- to six-year-old Swedish boys tested while children were running as quickly as possible. No significant group differences were reported on either diastolic blood pressure or heart rate reactivity. In addition, no group differences on these physiological measures were found when children were required to play an active, non-competitive pretend game with other children.

Matthews and Jennings (1984) conducted a series of experiments in which blood pressure and heart rate reactivity of fourth and fifth grade boys was measured in response to several tasks. In the first experiment, boys were required to play a computer ball game first against themselves (Task 1) and then with the computer as their opponent (Task 2). The only significant finding was a decrease in diastolic blood pressure from Task 1 to Task 2 among MYTH-classified Type As. No task effect on blood pressure was found for MYTH-classified Type Bs. In the second experiment, children were required to play three games under frustrating, difficult, and slow-paced conditions (star-tracing, serial subtraction, and reaction-time tasks). Under the conditions of this second experiment, MYTH-classified Type As, but not MYTH-classified Type Bs, showed substantial systolic blood pressure elevations across all tasks. Contrary to expectation, MYTH-classified Type As were found to have the lowest heart rate during the difficult mental arithmetic task. However, MYTH-classified Type As were also found to respond to increased exposure on all tasks with increases in heart rate. This pattern was not true of MYTH-classified Type Bs.

A second, somewhat similar, study by Jennings and Matthews (1984) assessed the relationship between the impatience component of the MYTH and task-induced heart rate changes among fourth and fifth grade boys. Subjects performed two versions of a computer pong game while heart rate was monitored. Results indicated that reasonably consistent physiological changes did discriminate

between groups high and low on impatience; however, the heart rate changes in response to this particular game were of such small magnitude that they would be unlikely to make any direct contribution to the pathophysiology of CHD.

Lawler, Allen, Critchner, and Standard (1981) assessed the reactivity of 18 male and 20 female sixth graders to an anagram task and a reaction time task. Heart rate and blood pressure were measured prior to and during the tasks. Results indicated that MYTH-classified Type A girls, but not boys, tended to have larger elevations in systolic blood pressure and heart rate during both tasks.

In summary, the literature on physiological differences in cardiovascular reactivity among MYTH-classified Type A and MYTH-classified Type B children suggests that group differences can be observed in young children. Whether group differences are found, however, appears to be related to the situational demands of the task and to the physiological index measured. Elements of perceived frustration, task difficulty, and competition appear to be important situational factors. The data also indicate that systolic blood pressure is the most reliable index of task-induced physiological differences among MYTH-classified Type A and MYTH-classified Type B children. The MYTH appears to be the most well-documented instrument of Type A in children and the measure of choice for use with this age group.

Hunter-Wolf A-B Scale. The A-B Rating Scale (Wolf, Sklov, Hunter, & Berenson, 1982) is a self-report measure of Type A that is completed by the child. The scale was developed as a downward extension of the adult Bortner Rating Scale. The scale consists of 26 items in the form of self-anchoring scales. Each scale is composed of two adjectives reflecting contrasting behaviours that are separated by a seven rung ladder (e.g. I eat fast. . . . . . I eat slow). Items are scored in the direction of Type A behaviours and are summed to yield an overall score ranging between 24 and 168. Five separate factor scores of Eagergy (Eagerness/Energy), Control (Desire for control), Hostility, Intensity, and Competitiveness can also be computed. These five factors were identified through a principal components analysis of Hunter-Wolf items. A six week test-retest reliability coefficient of .52 for the global Type A score has been reported on a sample of 10- to 17-year-old children (Wolf et al., 1982). However, several studies have reported that the factor structure of the Hunter-Wolf is unreliable (see Jackson & Levine, 1987). These findings remain problematic for the scale. The self-rating format of the Hunter-Wolf is an additional problem. Because of their vulnerability to social desirability response sets, self-ratings generally show little correspondence with ratings by other evaluators (Ledingham, Younger, Schwartzman, & Bergeron, 1982).

Wolf et al. (1982), using scores on the A-B Scale to classify A/B behaviour type, compared performance on a series of tasks and behaviors. A-B Scale identified Type As were found to outperform

Type Bs on a marble-dropping competition task played against the experimenter (i.e. Type As dropped significantly more marbles than Type Bs). On a crossing-out number task, A-B Scale Type As tended to cross out more digits than Type Bs. Behaviourally, Type As tended to eat faster and walk faster than Type Bs. These findings do provide support for the validity of the A-B Scale. However, there is very little research involving this scale that goes beyond the demonstration of basic validity to relate the scale to variables particularly relevant to coronary proneness. For example, there are no reports of the physiological characteristics of Hunter-Wolf A-B Scale scores. There are also no reports of the long-term stability of this scale. Finally, many benign behaviours appear to be assessed by the Hunter-Wolf. These behaviours, wanting to do well in school and doing things quickly, are emphasized much more in this scale than are the more toxic anger/hostility components of Type A.

The Adolescent Structured Interview. The ASI (Siegel & Leitch, 1981) is a downward extension of the Standardized Structured Interview used in adult studies of Type A. The interview consists of approximately 25 questions about the subject's characteristic manner of responding to a variety of situations. Situations were selected on the basis of their potential to elicit Type A behaviours in susceptible individuals. In the adult version of the interview, the interviewer deliberately challenges the subject in an attempt to elicit speech stylistics

indicative of Type A behaviour, but the ASI is not administered in a challenging manner, since pilot-testing of the interview suggested that virtually all children withdrew from this sort of challenge. Content of responses and, to a greater extent, the behaviours and speech stylistics observed during the interview itself are used to classify children; however, less Type A behaviour is required for a child than for an adult to be classified as Type A. As with the Structured-Interview, behaviour is classified into one of four categories: extreme Type A1, moderate Type A2, indeterminate Type X, and Type B.

Matthews and Jennings (1984) reported data from two experiments in which the physiological responses of ASI-classified Type As and Bs were compared on a series of tasks. In a first experiment, children played a computer ball game first against themselves (Task 1) and then with the computer as their opponent (Task 2). Across both tasks, ASI-classified Type As showed greater increases in heart rate than ASI-classified Type Bs. There were no significant group differences in blood pressure on Task 1. In Task 2, where the experiences of success and failure were particulary salient, greater systolic and diastolic blood pressure changes were found among ASI-identified Type As. In a second experiment, where children were required to perform tasks under frustrating, difficult, and slow-paced conditions, A/B differences in heart-rate and blood pressure variability were not found.

The relationship between ASI-assessed Type A and systolic blood pressure variability was examined by Siegel, Matthews, and

Leitch (1983) in a sample of 211 adolescents aged 13 to 18. In this study, ASI-identified Type As were found to show greater variability in systolic blood pressure but did not have greater mean blood pressure scores than ASI-identified Type Bs. As in the more recent adult literature, interview ratings of hostility and quickness of response were the strongest predictors of blood pressure variability. The Siegel et al. (1983) findings confirm previous data indicating that Type As do not universally have higher blood pressure readings than Type Bs. The two groups did, however, differ in their physiological response to certain types of laboratory stimulation, with Type As showing an exaggerated response.

The above findings suggest that physiological differences in heart rate and blood pressure variability can be detected between ASI-identified Type As and ASI-identified Type Bs. The strongest predictors of physiological variability appear to be indices of hostility and quickness of response. These characteristics are thoroughly assessed in the interactive situation of the ASI. In summary, there is evidence to support the validity of the ASI as a measure of Type A behaviour in children. However, these data were collected on adolescent samples and there is stronger evidence to support the MYTH, which is easier to administer, as a measure of Type A in children.

Concordance among Type A Measures in Children. No studies reported in the child Type A literature have used more than one

measure to classify subjects. Thus, little is known about the relative predictive power of these alternative measures of Type A behaviour in childhood (Kirmil-Gray, Eagleston, Thoresen, Heft, Arnow, & Brack, 1987). There is also little information about whether teacher ratings of observable classroom behaviours (MYTH), childrens' self-reports (A-B Scale), and interviewer assessments of the child in a one-on-one situation (ASI) all measure the same things. The importance of addressing this question of concordance has a precedent in the adult literature where the very same issue appears to have hampered understanding of the research. The few studies that have assessed the relationship between different measures of Type A in children have reported results that differ as a function of who rates the behaviour and what behaviours are assessed.

Jackson and Levine (1987) examined the relationship between teacher-rated MYTH Type A and Hunter-Wolf self-ratings of Type A in a sample of 300 elementary school children. The correlation between these two scales was weak ($r = .21$) and agreement between the measures on behavior type classification was only slightly above that expected by chance. To examine whether agreement between the two scales would improve if they had highly similar content, nine pairs of items, rated as similar by three independent judges, were selected for further analysis. For example, the MYTH item "This child likes to argue or debate" was compared with the Hunter-Wolf item "I like to argue". For seven of these nine similar item pairs the correlations ranged from .06 to .15,

suggesting that variability in content of items was not responsible for the lack of agreement between MYTH and Hunter-Wolf ratings. Only the correlations between the two item pairs assessing student leadership activity approached a moderate level of agreement.

Another explanation for the lack of agreement between measures besides differences in content is that students, as actors, and teachers, as observers, are basing their ratings on different sets of observations. Specifically, students when rating themselves have access to a much broader data base concerning their behavior and this data base covers a broader variety of situations and contexts than do teachers. Hunter, Parker, Williamson, Downey, Webber, & Berenson (1985) compared teacher and student Type A ratings using the same instrument. In this study, 55 teachers were asked to rate their students on the MYTH, and 339 elementary school children were asked to rate themselves on the Hunter-Wolf A-B Scale. In addition, teachers were asked to complete the Hunter-Wolf teacher form, a measure identical in content to the student form, with items rephrased to obtain teacher assessments of student behavior. This measure was included to allow for a more direct comparison of the MYTH and Hunter-Wolf using a common rater. Separate correlations were computed for males and females within each racial group. Correlations between the two Type A teacher forms were highly significant (ranging from .75 to .87) across all four race and gender groups. In contrast, the teacher Type A measures were only significantly related to self-assessed Type A ratings for white females. In all other groups, there was no

significant relationship between teacher-assessed and self-assessed Type A. These findings suggest that the MYTH and the teacher version of the Hunter-Wolf are measuring similar behaviours. It is noteworthy that the degree of agreement between these two different measures of Type A using the same rater was greater than that between two versions of the same measure (Hunter-Wolf teacher versus self). Evidence from the adult literature indicates that Type A ratings made by external observers are better than self-ratings in predicting CHD risk (Matthews & Siegel, 1982).

Kirmil-Gray et al. (1987) compared teachers' MYTH Type A scores to ASI ratings of behavior during the interview and to ASI content ratings. MYTH and ASI Behavior ratings of 120 elementary school children were moderately and significantly related, but there was no significant relationship between MYTH and ASI Content ratings. This same pattern of results was replicated in a larger cross-validation study (Kirmil-Gray et al., 1987). ASI Behaviour and MYTH ratings both rely on the assessment of specific behaviours and the moderate level of agreement between them suggests that similar behaviours are being observed. In fact, items composing the impatience/aggression subscale of the MYTH reflect similar behaviours to those evaluated during the ASI. The finding of little relationship between ASI Behaviour and ASI Content ratings in children suggests a striking parallel to the adult literature in which SI content and behaviour dimensions show little relationship. Studies with adult populations have also repeatedly shown that SI classifications are based primarily on a behavioural

factor composed of observable speech and psychomotor characteristics that are associated with signs of anger and hostility (Matthews, 1982). These components have been identified as critical in mediating the relationship with increased CHD risk.

One significant problem in Type A research with children relates to the apparent overlap between measures of Type A and measures of other childhood maladaptive behaviour patterns. In particular, very high overlap between measures of attention deficit disorder (particularly the impatient-aggressive component) and of Type A has been noted (Kirmil-Gray et al., 1987; Whalen & Henker, 1986). These findings point to the need for conceptual clarification of the relationship between the Type A construct and childhood psychopathology.

Stability of Type A Behaviours over Time

The issue of the stability of Type A behaviours over time is critical to the significance of the construct since, in order to establish a variable as a risk factor for a future outcome, evidence of its persistence over time must be documented. The status of global Type A as a stable pattern from childhood to adulthood is unclear. Matthews and Avis (1983) examined the stability of MYTH ratings over a one year period for children in kindergarten through grade 6. Stability coefficients ranging from .44 to .71 were reported, suggesting that global MYTH scores are relatively stable over one-year intervals during the elementary school years. Visintainer and Matthews (1987) investigated the

two-year and five-year stability of MYTH scores among elementary school children, and reported correlations of .38 and .39 respectively. Taken together, the data from these studies suggest that global MYTH scores show a moderate degree of stability throughout the elementary school years. However, these data do not address the issue of the stability of MYTH Type A scores over longer periods of time across different developmental periods.

Steinberg (1986) has shown that the relation between different components of Type A shifts with increasing age. During the elementary school years, positively-viewed achievement-striving and negatively-viewed impatience/aggression components of Type A were significantly and positively related. However, these dimensions were unrelated during adolescence and showed a significant negative relationship during adulthood. Although the components of Type A were not assessed using a well-established measure of Type A for childhood but rather compiled from existing interview data, these developmental changes suggest that global Type A classification in the elementary school years tells us little about adult status on the different components of Type A. Steinberg (1986) has hypothesized that the increasing differentiation with age of Type A components indicates that some young Type As will benefit from their competitiveness to maintain high levels of achievement and social recognition without suffering the potentially negative consequences of impatience, anger, and aggression.

The questionable findings regarding the long-term stability of global Type A do not necessarily compromise research concerned

with the early identification of coronary-prone behaviours. The increased focus in the literature on anger, hostility, and aggression as the critical "coronary-prone" characteristics of global Type A suggests that we should examine the stability of these characteristics rather than that of global Type A. The findings related to the stability of aggressive behaviours are very impressive. Aggression becomes stable quite early on in life (Moskowitz, Schwartzman, & Ledingham, 1985) and shows a level of stability similar to that of IQ. Olweus (1979), in a comprehensive review of the longitudinal studies of aggression, reported an average stability coefficient of .63 over ten- to fourteen-year periods from middle childhood to adulthood. Thus, if aggression is a component of global Type A that is highly related to coronary-proneness, it appears to reflect an enduring style that can be identified very early on in life.

Summary of Research on Coronary Prone Behaviour in Children

The search for a preventive strategy to CHD, together with the belief that in adults the Type A behavior pattern was an independent risk factor for the disease, provided the original impetus for Type A research in children. Several measures are currently available for the assessment of Type A in children; however, the degree of concordance between measures is generally low. This suggests that different measures of Type A are measuring different aspects of the construct. The various Type A measures are associated differentially both with A/B differences in

behaviour in response to specific tasks and with A/B differences in physiological reactivity to specific tasks. The most reliable group differences have been found on tasks that elicit frustration, competition, and conflict. High scorers on the MYTH and on the ASI Behavior ratings for anger and potential for hostility appear to be the most likely to be responsive, both behaviorally and physiologically, to these situational demands. At present, the ASI and the MYTH appear to be the best supported measures of Type A for children. Current problems in the child Type A literature, specifically the lack of concordance between measures and the differential association of measures and Type A components to behavioral and physiological indices, parallel the problems of studying Type A in adults.

Rationale for the Present Study

Global Type A assessment is based on a simple preponderance of Type A behaviors. Thus, children may be classified as Type A for different reasons. It is reasonable to hypothesize then that, as for adults, not all elements of Type A in children predict coronary-proneness to the same degree. In fact, several behaviors included in the definition of Type A are characteristics that are valued and promoted in our society (for example, wanting to do well in school).

Two major implications follow from the hypothesis that not all elements of Type A, as it is currently defined in children, are pathognomic. First, since it is known that different measures

of Type A operationalize the construct differently, the use of these different measures, which all purport to measure Type A, has probably made research findings in the area more difficult to interpret and resulted in contradictory patterns of results. Second, the continued belief that the global Type A construct is implicated in CHD may have led to the targetting for modification of certain behaviors that, in fact, are not positively correlated with coronary proneness but are rather benign aspects of Type A.

The efficacy of any preventive efforts is dependent upon the highly specific identification of true coronary-prone behaviours. Several researchers have suggested that Type A in children, as currently defined, is composed of both a positive and a negative dimension. In adults, anger and hostility (specifically cynical hostility), have been isolated as critical dimensions of Type A that are related to increased coronary risk. The primary issue addressed by the current study was whether a parallel to this finding with adults could be demonstrated with children. It may be that the inconsistent findings in the child literature are due to the fact that the various child Type A measures tap anger/hostility to differing degrees and that the tasks used in different studies also elicit these components to differing degrees. There is some evidence that interview-rated anger and potential for hostility are among the best predictors of physiological reactivity in children (Matthews & Siegel, 1982) and that the most reliable differences between Type A and Type B children are found when elements of frustration and perceived

conflict are salient (e.g. Matthews & Siegel, 1982; Murray et al., 1986; Saab & Matthews, 1986).

The present study sought to build on these findings by comparing two methods of classification, Type A/B and high/low anger, to determine which would show stronger relationships with variables found to be relevant in adults to a theory of coronary prone behaviour. The four major dependent variable categories of interest were peer perceptions of social behaviour, manner of anger expression, social problem solving skills, and blood pressure reactivity to frustration and interpersonal conflict.

Trait anger status was selected over hostility/cynicism for comparison with Type A status for a number of reasons. First, there is evidence to suggest that emotion plays a unique role as an organizer of cognitive processes and affect (anger) temporally precedes the cognitive component of hostile attributions in the causal pathway (Ledingham, 1990). Researchers have argued convincingly that emotion is not a simple epiphenomenon of thought and have pointed to the impact of emotion on such events as memory encoding and recall (Bower, 1981) and on interpretations made of the meaning of social acts (Sroufe, Schorck, Lawroski, & LaFreniere, 1984). A second reason for focusing on the affective rather than on the cognitive component is that hostility is believed to undergo important age-related shifts in elementary school aged children (Feshbach, Feshbach, Cohen, & Hoffman, 1984). Thus, it made less sense to classify subjects on the basis of a developing and shifting cognitive state (hostility).

It was thought that the current study would represent an important extension of knowledge about coronary-prone behaviours in children. The identification of critical behavioural or emotional styles that might increase a child's risk for future CHD is a crucial first step in designing appropriate intervention strategies. This identification process might be further clarified by specifying the salient situational parameters that encourage the manifestation of critical behaviours, cognitions, and emotions. Because the school environment represents one of the most important arenas of socialization for children, in which behaviours, cognitions and emotions are shaped and are most likely to be changed, the current study focussed on children in their school environment and on how they behaved toward and were perceived by their peers.

Social Behaviour Comparisons. Peer perceptions of the social behaviours of Type A versus Type B and of high versus low trait anger boys were investigated in order to assess whether these extreme groups were perceived as different by their peers. Peer ratings of aggression were of interest to help clarify whether children who rated themselves as high in trait anger expressed their anger behaviourally (i.e. did their peers consider them to be more aggressive) and whether Type A/B status or anger status was more useful in predicting peer ratings of aggression. Items asking about impatience/aggression form one subscale of the MYTH Type A assessment. However, several of these items reflect disruptive

behaviours in the classroom. These behaviours might be negatively valued by teachers but might not necessarily translate into peer perceptions of aggression.

Peer nominations of likeability were collected to address whether the social behaviours of "at risk" children made them less liked. High hostility/anger in adults has been found to be associated with greater conflict within the family, marital, and work environments (Smith, Pope, Sanders, Allred, & O'Keefe, 1988). Adults with high hostility and anger report more total daily hassles and perceive greater degrees of life stress (Hardy and Smith, 1988). Finally, hostile/angry men report fewer and less satisfactory social supports in both work and personal domains (Hardy & Smith, 1988). Being less liked might contribute to a cycle of negative interpersonal experiences and serve to perpetuate a possibly already-present hostile/cynical outlook toward life. Children who are less liked by their peers spend a significant portion of their lives in an environment in which the social supports are minimal (e.g. Saab & Matthews, 1986). The negative impacts on both physical and mental health of ineffective social support networks are well documented in the literature (e.g. House, Robbins, & Metzner, 1982; Medalie & Goldbourt, 1976). To the extent that children who are less liked by their peers continue to experience weak social supports through adolescence and adulthood, it may be hypothesized that the risk for later illness of these children will also be increased.

Peer nominations of behaviour were selected for use in the present study for a number of reasons. First, children's interactions with their peers are perhaps second only to interactions with their families in terms of social impact. Second, the classroom and broader school environment closely approximate the work, competitive, and social demands with which the children will later have to cope. Third, there is evidence to suggest that peers are more sensitive to early signs of pathology than are teachers (Cowen, Pederson, Babigian, Izzo, & Trost 1973). Finally, peer evaluations allow for an assessment of children in their real-life environment by multiple observers with whom they have different personal relationships (Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976).

Anger Expression Stylistics. Anger expression stylistics of Type A/B and high/low trait anger children were assessed in the present study. The role of anger expression has recently received a great deal of attention in the adult coronary-prone literature where a distinction has been made between three manners of anger-expression: anger-out, anger-suppression, and anger-reflection/control (Spielberger, Johnson, & Jacobs, 1982; Spielberger, Johnson, Russell, Crane, Jacobs & Worden, 1985; Spielberger, Johnson, Jacobs, Krasnor, Oesterle & Worden, 1986; Johnson & Schork, 1985). Anger-out refers to the open expression of anger and may include overt acts of aggression. Anger-suppression involves a denial and holding-in of the anger reaction. Anger-reflection, or anger-control, a recently identified third

manner of anger expression, refers to a more cognitive, less impulsive mode of successfully resolving the anger reaction.

Research with adults has shown that the different modes of anger expression are independent in that they do not represent points along a single continuum (Spielberger et al., 1985). The styles of anger expression are thus conceptualized as being independent yet dynamic and interactive (Jacobs, 1987). One issue of current controversy in the adult literature is whether anger-in or anger-out is the mode of anger expression most pathognomic for CHD. The literature increasingly suggests that, while anger-out may be characteristic of some at-risk individuals, it is anger-in that increases one's risk status regardless of status on anger-out (e.g. Dembroski, et al., 1985; Spielberger, 1989). The role of anger expression has yet to be examined in the child coronary-prone behaviour literature; however, this appears to represent an important avenue for research. The present study sought to address how anger suppression was related to children's Type A/B and trait anger status.

Social Cognition. Differences in the social cognitive processes of Type A/B extreme groups and of high/low trait anger extreme groups were assessed to determine the probability that these groups would interpret the motives of others in a hostile fashion during a hypothetical social situation where intent was ambiguous. In the adult research literature a tendency to be resentful, suspicious, and distrustful of others as measured by scores on the MMPI Ho scale (Smith & Frohm, 1985) has repeatedly

been found to be the strongest predictor of increased coronary atherosclerosis and CHD (e.g. Barefoot et al., 1983; Shekelle et al., 1983; Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980). The present study sought to determine whether a similar, generally negative cognitive outlook toward life, as evidenced by the tendency to infer hostile intent to others, was most related to Type A/B status or to degree of trait anger.

Expected outcomes for hypothetical situations were also examined as a function of Type A/B status and high/low trait anger status. This was done to assess whether children in different groups were equally likely to expect an aggressive behavioural outcome when hostile intent was attributed to the peer. The tendency to expect an aggressive response following an unambiguously hostile provocation is a well-documented finding in the child literature (e.g. Dodge, 1980; Dodge & Frame, 1982). However, aggressive children are more likely than other children to attribute a hostile motive to others in an ambiguous situation (Dodge & Coie, 1987) and to offer more aggressive behavioural solutions in response to their biased attribution of hostile intent (Dodge & Coie, 1987). Such a response to the unprovoked act sets the stage for a cycle of negative interpersonal relations. The question addressed by the present study was whether A/B status or high/low trait anger status would be more strongly associated with a similar hostile attributional bias and expectancies of aggressive outcomes.

Physiological Response to Frustration and Perceived Interpersonal Conflict. Extreme scorers on Type A/B and/or trait anger were asked to perform an experimental task which was designed to evoke frustration and interpersonal conflict. Children were monitored for systolic and diastolic blood pressure while engaged in the task. This procedure allowed for an assessment of whether being extreme on A/B status or whether being extreme on trait anger was a more important determinant of physiological reactivity. The observation of each child's on-task performance allowed for an assessment of behavior in a realistic situation. This sample of behavior was intended to evoke powerful, "hot" reactions of the child as opposed to the less intense "cool" reactions that are more likely to be observed in response to hypothetical problem-solving tasks or questionnaires. Blood pressure was selected as the index of physiological reactivity for two major reasons. First, empirical evidence has indicated that blood pressure reactivity is a stable characteristic in children (Sallis, Patterson, McKenzie, Buono, Atkins, & Nader, 1988). Second, a review of the child Type A literature suggests that A/B differences in blood pressure are very reliable (e.g. Matthews & Jennings, 1984; Lundberg, 1983; Siegel, Matthews, & Leitch, 1983).

Summary and Overview of Major Hypotheses:

The present study sought to compare two methods of classification that have been used in research concerned with the identification of individuals at risk for the development of CHD.

A review of the literature on coronary-prone behaviour led to the prediction that at-risk children would show a particular pattern of responding on each of the dependent variable categories assessed in the present study. Specifically, it was hypothesized that potentially at-risk children would differ from reduced risk children on anger expression, that they would show more hostile-aggressive biases in ambiguous interpersonal social situations, and that they would be more physiologically reactive in a frustrating interpersonal situation. Classification by Type A/B and classification by high/low trait anger were compared. The review of the literature led to the prediction that classification by high/low trait anger would result in greater differences than classification by A/B status on variables related to coronary proneness.

Thus, the major hypotheses of the current study were as follows:

Hypothesis 1: Overlap between A/B Status and Trait Anger Status

It was hypothesized that there would be significant overlap in classification between A/B status and trait anger status, since impatience/aggression, an anger-related construct, is one component of the Type A construct.

Hypothesis 2: Peer Perceptions of Social Behaviour

Extreme group classification by A/B status was expected to result in significant A/B differences on peer perceptions of aggression, since items asking about impatience/aggression form a

subscale of the MYTH. No a priori prediction was made about group differences in peer perceptions of social behaviour when classification by trait anger was used to identify extreme groups. Little is known about how trait anger in children is expressed behaviorally; however, it seems unlikely that all angry/hostile children translate these feelings into overt acts of aggression. One purpose of the current study was to address this question and to examine the possible interpersonal consequences of anger in young boys.

Hypothesis 3: Anger Expression

Extreme group differences in anger expression were predicted for classification based on high/low trait anger. An underlying hypothesis of the current study was that classification by trait anger level represents the critical distinction in trying to identify young boys at risk for the later development of CHD. If at-risk boys already behave in a manner similar to at-risk adult men, high anger boys would be expected to show significantly more signs of anger suppression. However, if anger suppression represents a developmentally later, perhaps more pathognomic, mode of dealing with extreme anger, high anger boys might be expected to endorse anger-out items significantly more often.

Hypothesis 4: Social Cognition

Extreme group differences in social cognition were predicted for groups identified on the basis of high/low trait anger. Specifically, high anger boys were expected to show a significantly greater bias than low anger boys to attribute hostile intentions

to an actor in a hypothetical, ambiguous intent peer provocation situation. Extreme group differences in the social cognitive processes of Type A/B boys were not anticipated because A/B status was not hypothesized to reflect the critical at-risk characteristic. Thus, while A/B differences in overt behaviour were anticipated, it was not hypothesized that these behavioural differences were motivated by an underlying, seemingly maladaptive, hostile cognitive style.

Hypothesis 5: Physiological Reactivity

Classification by trait anger was predicted to result in extreme group differences in systolic and diastolic blood pressure reactivity in response to the frustration and interpersonal conflict evoked by the experimental task. Because it was hypothesized that high anger reflected the critical at-risk characteristic, high/low anger group differences on physiological reactivity were expected to be significantly more substantial than group differences based on classification by Type A/B. Thus, only high anger boys were expected to manifest the entire behavioural - cognitive - physiological complex of at-risk phenomena.

Viability of a Peer-Nomination Method of Type A/B Classification

One minor purpose of the current study was to investigate the measurement of Type A vehaviour by someone other than a teacher. Traditionally, A/B status has been determined by self-ratings, ratings by teachers, or ratings by another observer. The MYTH has proven useful in research and is currently the Type A measure of

choice for children; however, there may be certain advantages to a version of this scale that is completed by peers rather than by teachers. Peers have access to a much broader base of a given child's behaviour - in the classroom, at recess, away from school - than do teachers. The context of teacher observations also differs from those of peers; since a teacher is an authority figure, a child may behave in a very different manner when the teacher is not present (Ledingham & Younger, 1985). In addition to the idea that peer raters benefit from observing a broader spectrum of a child's behaviour from many different perspectives, peer nomination procedures take less time than teacher ratings. Peer nominations, in contrast to teacher ratings, also reflect the observations of many individuals. This maximizes the number of behavioural samples contributing to the ratings while at the same time minimizing the biasing effects specific to any given rater (Ledingham et al., 1982).

This rationale led to the development of the Peer MYTH. The Peer MYTH contained items virtually identical to the traditional teacher version of the MYTH. For each item, children were asked to nominate up to five of their classmates who they felt best suited the characteristic or behaviour described. The number of nominations received by each child were totalled in order to obtain a global Peer type A score.

The Peer MYTH was included in the current study in order to assess the utility of peer nominations of Type A behaviour by evaluating the relationship between peer nominations and teacher

ratings. Ledingham et al. (1982) point out that the degree of agreement between raters often depends on the type of behaviour being rated. High magnitude behaviours, such as aggression, command more attention on the part of the observer and produce higher inter-rater agreement. For these behaviours deciding which type of rater to use is less of an issue. In the case of MYTH-assessed Type A, many of the behaviours assessed are high magnitude; however, many are specific to the classroom situation. This might suggest an advantage of teacher ratings on this specific measure. Pearson product-moment correlations were computed using peer MYTH scores, teacher MYTH scores, and trait anger scores. These correlations allowed for an assessment of whether teacher ratings or peer nominations of Type A/B showed a stronger relationship to trait anger. Multivariate and univariate analyses of variance using Peer MYTH scores to classify extreme Type A and Type B groups allowed for an examination of whether the resulting pattern of extreme group differences on the dependent variable categories was similar to that found using teacher MYTH ratings to select Type As and Bs.

Methods

Subjects

A total of 163 male and 160 female fourth, fifth and sixth grade students from six schools participated in the screening phase of the study. Two schools from each of the three major Ottawa-Carleton area school boards were contacted for subject participation. All school principals and staff that were contacted

agreed to participate in the study. Students were drawn from a total of twenty classrooms. Prior to any data collection, a letter of informed consent was completed by each parent/guardian (see Appendix A).

Of a total of 551 informed consent forms sent out with children, 427 (77.4%) were returned. Of the returned consent forms, 339 parents (79.3%) agreed to their child's participation in the study. The return rate and permission rate was very similar for both males (return rate = 77.1%; permission rate = 79.1%) and females (return rate = 77%; permission rate = 79.7%).

Students in the screening phase of the study completed the Pediatric Anger scale (the Trait Anger measure), the Pupil Evaluation Inventory, and the peer version of the Matthews Youth Test for Health. Female students were included in this phase of testing in order to obtain complete classroom peer ratings of behaviour. The anger scale was administered to females as a matter of convenience for the classroom teacher; however, these data were not of interest for the present study and were not analyzed further. Data were collected on a total of 163 boys (11 in grade 4, 77 in grade 5, and 75 in grade 6). The grade 4 boys were in mixed grade 4/5 classrooms. The decision to include boys only was based on the fact that the majority of studies on behavioural risk factors for the development of coronary heart disease have dealt with male populations. Although the incidence of CHD in females is increasing (Williams, 1989), the relationship of behavioural factors to risk for disease is less well established for females.

A total of twenty teachers (one per classroom) also participated in this study. Teachers completed the Matthews Youth Test for Health for each boy in their classroom for whom informed consent had been obtained.

A total of 66 grade 4, 5, and 6 boys who obtained a MYTH or trait anger score within the extreme range were invited to participate in phase II of the study. These boys were selected from the screening sample of 163 boys. The decision to select extreme scoring children for participation in phase II of the present study was based on a number of both practical and theoretical reasons. Phase II testing required an individual assessment of each child and each session was between 30 and 45 minutes in length. Testing the entire screening population would have presented a considerable inconvenience to the schools and to the teachers involved in the study and such a procedure would have been unacceptable to ethics committees. On a more theoretical level, the purpose of the screening phase was to identify children who might be at risk for the later development of CHD and to try to determine whether classification based on Type A/B or classification based on high/low trait anger was more informative in identifying such children. The use of extreme groups is common in both Type A research (e.g. Matthews & Jennings, 1984; Jennings & Matthews, 1984) and anger/hostility research (e.g. Williams et al., 1980). The research suggests that risk status does not increase in a simple linear fashion; rather, there appears to be a critical value above which one is considered to be at-risk. In

classifying subjects, the extreme range was defined as the top and bottom twenty scores, or approximately 12% at the top and 12% at the bottom of each distribution. These scores fell two standard deviations above or below the mean for each method of classification. A total of eleven boys obtained a score within the extreme range on both the Type A/B and trait anger distributions. Three boys moved before phase II testing, reducing the extreme group sample size to 63. This number included 20 Type As, 19 Type Bs, 18 high anger boys, and 17 low anger boys.

Power Analyses

Sample size was determined according to the method of calculating power described by Kirk (1982). The advantage of this procedure is that it does not require a priori knowledge of effect size (β). According to these analyses, the power associated with n=20 is just beyond the .80 level. Thus, the probability of rejecting a false null hypothesis for n=20 is just greater than .80.

Measures

Matthews Youth Test for Health Prediction (MYTH). The MYTH (Matthews & Angulo, 1980) is a 17-item teacher rating scale designed to assess Type A behaviour in school-aged children (see Appendix D). The MYTH yields a global Type A score and scores on two factor-analytically derived subscales of Impatience/Aggression and Competitiveness. Internal consistency of global and factor

scores is very high, ranging from .88 to .90 (Matthews and Angulo, 1980). Normative data have been reported for 485 children in grades K, 2, 4, and 6. Matthews and Angulo (1980) have reported three-month test-retest reliability coefficients ranging from .79 for Impatience/Aggression to .82 for both the Competitiveness and the global Type A scores. Several studies which have validated the MYTH as a measure of Type A in children aged 5 to 13 (e.g. Corrigan & Moskowitz, 1983; Matthews & Angulo, 1980; Murray, Matthews, Blake, Prineas, & Gillum, 1986; Matthews, Stoney, Rakaczky, & Jamison, 1986) have previously been described.

The format and items of the original teacher version were modified for administration as a peer-nomination instrument in the present study (see Appendix E). The 5-point rating scale used in the original version was replaced by 5 empty squares following each item. The instrument was completed by having children nominate up to five of their classmates whom they felt best fit each description by writing the names of these children in each of the 5 squares. Three original MYTH items were rephrased for the Peer version (items 5, 11, and 13). These three items were reverse scored in the teacher version, but this scoring procedure was incompatible with the peer nomination procedure. The peer MYTH was validated against the original teacher version in a pilot study of 80 children and 3 teachers from grades four through six enrolled in a private elementary school in Montreal, Quebec. For males (n=35), the resulting peer-teacher correlations were moderate, ranging from .42 for Competitiveness and .50 for global Type A, to

.59 for Impatience/Aggression. These findings were replicated in the current sample of 339 children and 20 teachers. For males (n=163), the peer-teacher correlations ranged from .47 for Competitiveness and .55 for Impatience/Aggression, to .58 for global Type A. Peer nominations of Type A were used in the present study to examine the relationship between peer and teacher perceptions of Type A behaviours. However, since adequate reliability and validity data are not yet available for this tool, it was not used as a primary classification measure.

Pediatric Anger Scale (PANG). This 19-item self-report scale, a relatively new instrument, is one of the only measures of anger in children and is unique in providing a brief rating scale measure of both state and trait anger in children (Jacobs & Blumer, 1984). The PANG, modelled after the State-Trait Anger Inventory (Spielberger, Johnson, Russel, Crane, Jacobs & Worden, 1985; Spielberger, Jacobs, Russel, & Crane, 1983), yields two separate scores: a trait anger score (10-item scale) that relates to the frequency with which anger is usually experienced, and a state anger score (9-item scale) that relates to the intensity of the anger experience. Factor analyses have supported the division of the scale into the two components of state and trait anger. There are normative data available for two separate samples (Jacobs & Blumer, 1984; Jacobs, 1987). The PANG state and trait anger scales have high internal consistency, with alpha reliability coefficients ranging from .77 to .81 for trait anger and from .81 to .88 for

trait anger. Only the trait anger subscale of the PANG (see Appendix F) was used in the present study.

Pupil Evaluation Inventory (PEI). This instrument, developed by Pekarik and his colleagues (Pekarik et al., 1976), obtains peer nominations on 34 individual items which tap three dimensions of social behaviour: aggression (20 items), likeability (5 items), and withdrawal (9 items). Factor analyses have supported the existence of these three relatively homogeneous dimensions, and, internal consistency of the three factors is high. Pekarik et al. (1976) have reported test-retest reliabilty coefficients exceeding .80 for each of the three factor scores. Concurrent validity of the PEI has been demonstrated using both teacher-ratings and self-ratings of behaviour (Pekarik et al., 1976) and the instrument has also shown good predictive validity (Ledingham & Schwartzman, 1984). Appendix G presents the PEI.

Pediatric Anger Expression Scale (PAES). This 15-item self-report questionnaire (see Appendix H) was developed by Gerard Jacobs and his colleagues (Jacobs, Phelps, & Rohrs, 1987) as a child measure of anger expression stylistics, and was modelled after the Anger Expression scale developed by Charles Spielberger (Spielberger et al., 1985; Spielberger et al., 1986) for use with adult populations. The PAES identifies three modes of anger expression: anger-out (5 items), anger suppression (5 items), and anger reflection/anger control (5 items). Children indicate the frequency with which they employ each style of response when angry or very angry by rating each item on a 3 point scale (hardly ever,

sometimes, often). The PAES is a trait measure (Jacobs, 1987) which assesses a child's typical manner of responding to an anger-provoking stimulus event. Anger-out is defined as the open expression of anger including overt acts of aggression (e.g. "I lose my temper"). Anger suppression is defined as the holding-in and possible denial of anger (e.g. "I'm afraid to show my anger"). Anger reflection/anger control is defined as a more cognitive, less impulsive means of controlling anger which successfully resolves the anger reaction (e.g. "I talk to someone until I feel better").

There are normative data on this scale for a sample of 102 fourth-through seventh-grade children living in a rural impoverished area (Jacobs, 1987). Initial validation data have supported the three factor solution of the PAES (Jacobs, Phelps, & Rohrs, 1987).

Social Problem Solving Interview (SPSI). This interview was developed by Bream and her colleagues (Bream, Hymel, & Rubin, 1987) as a method of assessing the variables that mediate the social problem solving process in children. The complete interview consists of a series of 9 hypothetical vignettes that are read aloud to the child by the interviewer. The stories were developed for use with fourth through sixth graders. The child is asked to imagine himself in each situation. Each story involves a potential interpersonal conflict. The initiating events involve either a possible peer physical provocation, a possible peer verbal provocation, or a possible peer rejection. Because differences in children's responses to an ambiguous peer provocation were of

interest to the present study, the interview included only the four peer provocation vignettes (see Appendix I). Although each initiating event has the potential of stimulating interpersonal conflict, both the actual intent of the actor and the outcome of the story are left ambiguous so that the appropriate manner of responding to the event is not defined. This allows for an assessment of both the child's own interpretation of the story and of the actor's motives.

After the story had been read, children were asked a series of specific questions that involved projecting the outcome of each problem situation (expected outcome), describing their own affective reaction to the situation (affect) and rating the intensity of their affective reaction, making an inference of intent to the hypothetical actor (inference), and suggesting possible behavioural solutions (solutions) that they might use to resolve the story dilemma. The questions were standard and specified in the interview protocol (see Appendix I). Possible prompts and probing strategies are also highlighted in the interview manual (Bream et al., 1987). The SPSI was audio-taped to allow for a verbatim transcription of each child's responses.

Data obtained from the SPSI were used to obtain 4 individual scores for each child: the outcome expected to result from each of the hypothetical peer provocation vignettes (Expected Outcome), the affect evoked by each of the hypothetical peer provocation vignettes (Affect), the intensity of the reported affect for each of the hypothetical peer provation vignettes (Intensity), and the

attributions of hostile versus accidental intentions to the actor in each of the hypothetical peer provocation vignettes (Intent).

Although little evidence is available for the validity of this particular instrument as a measure of intentionality, hypothetical vignettes have been used by other researchers to assess social problem solving in children. Inferences about others' intentions have repeatedly been found to be the best predictor of the type of behavioural solutions offered. Clear differences between groups of children (e.g. aggressive versus non-aggressive) have been reported in studies requiring the interpretation of situations where the actor's intent is ambiguous (e.g. Dodge, 1980; Dodge & Frame, 1982). These studies indicate that children's responses to hypothetical vignettes involving ambiguous social situations can be used to identify reliable attributional biases and differences in attributional style.

Blood Pressure. Systolic and diastolic blood pressure were monitored prior to the experimental task (baseline) and immediately after each trial in this task. Blood pressure was recorded using a Tycos Handle model aneroid sphygmomanometer (Sybron/Taylor Medical Products) and a standard, manually inflatable pediatric cuff which was placed around the subject's arm. Reliability data is unavailable for this specific measure.

Procedure

Peer nomination procedures (the Pupil Evaluation Inventory and the Peer MYTH) and the self-report questionnaire (Trait Anger Scale-Feelings Questionnaire) were completed by all children for

whom informed consent was obtained during the fall semester of the 1988-1989 school year. These measures were administered on consecutive days in two 30 minute sessions. The order of test administration was randomized across classrooms, except that the two peer nomination scales were not completed on the same day. Teacher MYTH ratings were obtained by providing teachers with the appropriate forms approximately one week prior to classroom testing. This allowed teachers to complete the forms at their convenience.

Boys scoring within the top or bottom twelve percent of the Type A/B (Teacher MYTH) or trait anger (PANG) distributions were scheduled for an individual testing session. An individual testing session typically lasted between 30 and 45 minutes. Each child was escorted to the testing room by the experimenter who was blind to the child's group membership. The initial few minutes were spent making the child comfortable. Children were then told that they would be involved in three different activities: they would complete a short questionnaire (the Anger Expression Scale), listen to a series of short stories about which they would be asked several questions, and finally play a guessing game. At this time it was made clear to each child that the testing was not of an academic nature, that the questions they would be asked required only a statement of their opinion, and that there were no right or wrong answers. Children were also made aware that they were free to discontinue testing at any time and that they were free to choose not to respond to any question. The Anger Expression scale

was then completed and was followed by the administration of the Social Problem Solving Interview. All individual interviews were tape recorded to allow for later coding of responses. Following this the experimental task and use of the blood pressure monitor was then fully explained to the child and any questions or concerns answered before the task was introduced (see Appendix J for a full description of the experimental task). This task, developed for the present study, was modelled after the work of Krauss and Weinheimer (1964) on referential communication.

The task requires that two children, who cannot see one another, communicate about a series of novel, ambiguous figures. One partner assumes the role of speaker while the other assumes the role of listener. Each player has before him a set of six cubes each printed with one of six novel ambiguous figures. The listener's task is to earn as many points as possible by correctly reproducing the speaker's sequence of cubes with his own set of cubes from the description given by the speaker. Thus, players depend on one another's verbal clues for earning points.

Normally, in this type of cooperative game, the speaker does not intend to deliberately confuse or mislead his listener. However, to ensure that a potentially frustrating situation was fostered, the outcome of Trial 2 was influenced by having each subject, unknowingly, play the game with a confederate child partner. Subjects were informed at the outset of the game that they would not see their partner. In fact, the "partner" in each case was a male child actor reading a tape-recorded script. Each

subject was told that he would assume the role of speaker for Trial 1, providing clues for his listener to earn points, but that in Trial 2 he would be given the opportunity to take on the role of listener, trying to earn his own points based on his partner's clues. Subjects were told that roles would be reversed again for each of Trials 3 and 4. In fact, only trials one to three were of interest and the game was discontinued after Trial 3. As an incentive for earning points, subjects were told at the outset that points earned could be exchanged for hockey, baseball or football cards (one point = one card) once the game had been completed.

Prior to beginning the game, each subject engaged in two practice/demonstration trials with the experimenter (in one as speaker and in one as listener), using a practice set of stimulus cubes different from those to be used in the actual game. The playing of these practice trials achieved several purposes. First, the practice trials ensured that the subject understood the game. Second, by ensuring a positive outcome for the subject in the role of listener, while receiving the experimenter's clues, the subject's confidence in his ability to do well in the actual game was expected to increase. The subject's poor performance against his confederate partner in the actual game should have come as a surprise given his positive past experience. The subject was then expected to attribute this state of affairs to his partner's poor performance, his partner's intention not to "play fair", his own performance, or the fact that the real game was more difficult than

the practice trials. The final purpose of the practice trials was to allow baseline measures of blood pressure to be obtained.

At the conclusion of Trial 1 of the actual game, the experimenter announced that the listener/confederate had earned 5 of a possible 6 points. Roles were reversed for Trial 2. The tape-recorded script was started and the confederate provided the subject with idiosyncratic, ambiguous, non-discriminating clues based on those given by preschoolers (Glucksberg, Krauss, & Weinberg, 1966).

Immediately on completion of the testing session each child was fully debriefed about the experimental manipulation and was rewarded for his participation. Each child was asked not to discuss the task or the interview with his classmates and was then accompanied back to his classroom by the experimenter. In order to minimize possible contamination effects, the testing of subjects within any classroom was scheduled so as not to overlap with a recess or lunch break when communication among children would be more likely. Teachers were also enlisted to discourage communication between children about the experiment. They reported that little, if any, discussion did occur.

Results

Distribution of Scores on Type A and Trait Anger

The mean MYTH Type A score for boys in the screening sample was 49.88; the mean trait anger score was 17.67. These MYTH and trait anger scores are comparable to the normative values obtained

by Matthews and Angulo (1980) for the MYTH ($\bar{X}$ = 51.4) and by Jacobs (1987) for the Pediatric Anger Scale ($\bar{X}$ = 18.12).

Univariate ANOVAs were conducted to test whether MYTH and trait anger scores differed significantly by grade (see Table 1) or by school (see Table 2). There were no significant differences in MYTH Type A scores across grade, $F(2, 162) = .872$, $p > .05$ or school, $F(5, 162) = .475$, $p > .05$. Trait anger scores did not differ significantly across grade, $F(2, 162) = .068$, $p > .05$, but did differ significantly across schools, $F(5, 162) = 2.76$, $p < .05$. However, because the mean scores of the screening sample were so similar to the values obtained for the normative samples, and because school differences on trait anger were not seen as theoretically important, a decision was made to use the same cutoff for all grades and schools in selecting extreme scoring subjects for Type A/B and high/low trait anger groups. This procedure avoided problems associated with selecting extreme scoring subjects within each classroom when in some classrooms the participation rate for males was very low.

Relationship between Measures of Type A and Trait Anger

A total of eleven children fell within the extreme groups on both teacher MYTH and trait anger. The breakdown of the overlap was as follows: four Type A boys were also high anger (36.3% of overlap); two Type A boys were also low anger (18.2%); two Type B boys were also high anger (18.2%); and three Type B boys were also low anger (27.3%).

TABLE 1: MEAN TEACHER MYTH AND TRAIT ANGER SCORES BY GRADE

	GRADE LEVEL		
MEASURE	Grade 4	Grade 5	Grade 6
MYTH	48.55	51.26	48.67
Trait Anger	17.27	17.75	17.64
n	11	77	75

TABLE 2: MEAN TEACHER MYTH AND TRAIT ANGER SCORES BY SCHOOL

	SCHOOL					
MEASURE	1	2	3	4	5	6
MYTH	48.29	51.50	52.27	48.36	49.38	50.25
Trait Anger	16.54	17.83	17.20	18.18	20.13	16.86
n	35	18	30	28	24	28

The mean MYTH score of Type A subjects was 69.55 and the mean MYTH score of Type B subjects was 30.16. This falls within the range of scores reported for Type As and Type Bs by other researchers (e.g. Matthews et al., 1986). The difference between the average MYTH scores of Type As and Type Bs was significant at the .001 level (t = 65.00, p < .001). Type A and Type B extreme groups did not differ significantly on trait anger (mean trait anger for Type As = 17.7, mean trait anger for Type Bs = 16.6; t = 1.00, p > .05).

The mean trait anger score of high anger subjects was 26.06 and the mean trait anger score of low anger subjects was 12.23. The difference between the average trait anger scores of high and low trait anger subjects was significant at the .001 level (t = 33.00, p < .001). High and low trait anger subjects did not differ significantly on Type A (mean MYTH Type A score for high anger subjects = 52.0, mean MYTH Type A score of low anger subjects = 48.0, t = 1.45, p > .05).

The relationship of Type A and of Type A factor scores to trait anger was further assessed by computing Pearson product-moment correlations between global MYTH Type A, MYTH competitiveness, MYTH impatience-aggression, and trait anger scores from screening sample data. Table 3 presents these correlations. The global teacher MYTH Type A score was significantly related to trait anger. The relationship between MYTH competitiveness scores and trait anger was not significant; however, the relationship

TABLE 3: CORRELATIONS BETWEEN TEACHER MYTH AND TRAIT ANGER SCORES

MYTH SCORE:	SCREENING SAMPLE (N = 163)
Global Type A	.173 *
Competitiveness	.004
Impatience/Aggression	.27 ***

* p < .05
** p < .01
*** p < .001

between MYTH impatience-aggression scores and trait anger was highly significant.

A chi square analysis was conducted to test the hypothesis that Type A and trait anger were independent. In order to classify subjects into a 2 x 2 contingency table, Type A/B and high/low trait anger were defined as scores above or below the median value for each distribution. The use of a median split to define Type A/B and high/low trait anger in the screening sample resulted in the distribution presented in Table 4: 70.2% of Type As were high anger, 62% of Type Bs were high anger, 55% of high anger children were Type A, and 46% of low anger children were Type A. The chi square analysis was not significant, indicating a lack of significant association between the two variables, $\chi^2(1, N=163) = 1.23$, $p > .10$.

Multivariate Analyses of Extreme Group Differences

The major hypothesis of the current study was that classification by trait anger would produce more marked differences on the dependent measures than classification by A/B status. A MANOVA with Type A/B as the independent variable showed no significant main effect for A/B status $F(16,22) = 1.66$, $p > .05$. A similar MANOVA with trait anger status (high versus low) as the independent variable, was highly significant $F(16,18) = 4.58$, $p = .001$.

TABLE 4: DISTRIBUTION OF HIGH AND LOW TRAIT ANGER BOYS IN TEACHER-RATED TYPE A AND TYPE B GROUPS IN THE SCREENING SAMPLE (N = 163)

	TYPE A	TYPE B
HIGH ANGER	59	49
LOW ANGER	25	30

Univariate Analyses of Extreme Group Differences

One-way analyses of variance (ANOVAs) were conducted on each of the four dependent variable groups for each method of classification. Results of these ANOVAs and means for the extreme groups are presented in Tables 5 and 6.

Peer Perceptions of Social Behaviour. Hypothesis 2 predicted significant extreme group differences in peer perceptions of social behaviour as a function of classification by A/B status. The only significant univariate effect for classification by Type A/B was found for peer perceptions of aggression. Type A boys were rated by their peers as significantly more aggressive than Type B boys. Significant univariate effects for classification by high/low trait anger were found both for peer ratings of aggression and for peer ratings of likeability. High anger boys were nominated significantly more often as aggressive by their peers than were low anger boys. High anger boys were also nominated significantly less often on likeability items by their peers than were low anger boys.

Anger Expression Stylistics. Hypothesis 3 predicted that classification by Type A/B would not result in significant extreme group differences on the anger expression variables, while classification by high/low trait anger was expected to result in significant extreme group differences in anger expression. No significant univariate effects for classification by Type A/B were found for any of the anger expression variables. However, high and

TABLE 5: UNIVARIATE EFFECTS FOR CLASSIFICATION BY TYPE A/B

VARIABLE	MEANS TYPE A (n = 20)	TYPE B (n = 19)	F(1,37)
Peer Perceptions of Social Behaviour PEI			
PEI - Aggression	4.232 (3.56)	.855 (.240)	16.316****
PEI - Likeability	.510 (.456)	.586 (.581)	.219
Anger Expression			
Anger-out	9.000 (1.92)	8.370 (2.19)	1.010
Anger-suppression	9.100 (3.23)	10.420 (1.23)	3.692
Anger-reflection/control	10.200 (2.11)	10.790 (1.74)	.791
Social Problem Solving			
Expected outcome	7.850 (2.20)	8.680 (2.02)	1.784
Affect	7.600 (4.01)	6.790 (2.87)	.640
Intensity of affect	10.200 (1.75)	9.260 (2.31)	3.335*
Intent - Forced choice	6.050 (1.70)	6.370 (.905)	1.564

TABLE 5 (cont'd):

Blood Pressure (BP) Reactivity			
Systolic BP-baseline	104.200 (5.98)	104.840 (9.34)	.066
SBP-pre-frustration	105.200 (6.30)	105.680 (8.90)	.039
SBP-post-frustration	105.400 (6.46)	106.320 (8.41)	.146
Diastolic BP-baseline	68.900 (6.37)	68.530 (6.25)	.034
DBP-pre-frustration	70.000 (6.19)	67.680 (6.25)	1.723
DBP-post-frustration	71.000 (8.27)	68.420 (6.09)	1.218

* p < .10
** p < .05
*** p < .01
**** p < .001

Note: Numbers in parentheses represent standard deviations

TABLE 6: UNIVARIATE EFFECTS FOR CLASSIFICATION BY HIGH/LOW TRAIT ANGER

VARIABLE	MEANS HIGH (n = 18)	LOW (n = 17)	F(1,33)
Peer Perceptions of Social Behaviour PEI			
PEI - Aggression	3.157 (2.34)	1.379 (1.87)	6.122**
PEI - Likeability	.313 (.281)	.905 (.626)	13.287****
Anger Expression			
Anger-out	10.110 (2.17)	7.590 (2.26)	11.343***
Anger-suppression	9.830 (.209)	10.820 (1.84)	2.193
Anger-reflection/control	9.610 (2.03)	11.290 (2.39)	5.051**
Social Problem Solving			
Expected outcome	6.720 (1.18)	8.880 (1.49)	22.673****
Affect	5.560 (2.09)	7.760 (3.61)	4.966**
Intensity of affect	11.056 (1.63)	9.410 (2.48)	5.449**
Intent - Forced choice	5.830 (.786)	6.590 (.870)	7.269***

TABLE 6 (cont'd):

Blood Pressure (BP) Reactivity			
Systolic BP-baseline	103.670 (7.17)	102.350 (7.26)	.291
SBP-pre-frustration	103.670 (7.17)	103.410 (6.42)	.012
SBP-post-frustration	104.780 (7.58)	104.230 (6.33)	.053
Diastolic BP-baseline	67.220 (5.05)	66.940 (4.09)	.033
DBP-pre-frustration	68.110 (6.30)	68.120 (4.78)	.000
DBP-post-frustration	69.890 (6.11)	68.710 (5.56)	.354

* p < .10
** p < .05
*** p < .01
**** p < .001

Note: Numbers in parentheses represent standard deviations

low trait anger extreme groups differed significantly on two of the three anger expression variables. Significant univariate effects were found for anger-out, with high anger boys endorsing significantly more outward signs of anger than low anger boys, and for anger reflection/anger control, with low anger boys endorsing a significantly greater number of these strategies for resolving anger than high anger boys. High and low anger groups were not significantly different on anger suppression.

Social Cognition. Hypothesis 4 predicted extreme group differences in social cognition for classification by high/low trait anger but not for classification by Type A/B. While Type A/B extreme groups did not differ significantly on any of the variables related to social cognition, significant univariate effects for high versus low trait anger extreme groups were found for all four of the measures derived from the Social Problem Solving Interview. All effects were in the predicted direction. High anger boys were more likely to expect that a negative outcome would ensue following a hypothetical peer provocation than were low anger boys. High anger boys were significantly more likely to report that they would experience a negative affect, particularly anger, in response to a hypothetical peer provocation than were low anger boys. High anger boys rated their emotional experience in response to the hypothetical peer provocation as significantly more intense than did low anger boys. Finally, high anger boys were more likely to attribute hostile intentions to the actor in the hypothetical peer provocation vignettes than low anger boys, who

were more likely to interpret the actor's motives and behaviour as benign and accidental.

Physiological Response to Frustration and Interpersonal Conflict. Hypothesis 5 of the current study predicted that extreme group differences in blood pressure reactivity to frustration and perceived interpersonal conflict would result for classification by high/low trait anger but not for classification by Type A/B. However, neither Type A/B extreme groups nor high/low anger extreme groups differed significantly on either systolic or diastolic blood pressure at any of the three measurement points.

Peer MYTH Type A/B Classification

The relationship between peer and teacher rated Type A scores was assessed by computing Pearson product-moment correlations between peer nomination MYTH scores and teacher rating MYTH scores. Teacher-peer correlations were also computed for the two MYTH factor scores of competitiveness and impatience/aggression on the screening sample data.

Peer nominations of Type A were highly and significantly related to teacher ratings of Type A for the global Type A score ($r = .58$, $p < .001$), the competitiveness score ($r = .53$, $p < .001$) and the impatience/aggression score ($r = .62$, $p < .001$).

Relationship Between Peer MYTH Scores and Trait Anger

Pearson product-moment correlations were computed to assess the relationship between Peer MYTH global Type A scores, Peer MYTH

competitiveness scores, Peer MYTH impatience/aggression scores and trait anger in the screening sample.

In contrast to results using teacher MYTH scores, Peer MYTH global Type A scores were not significantly related to trait anger (r = .142, p > .10). The relationship between the competitiveness factor of the Peer MYTH and trait anger was also not significant (r = -.068, p > .10). However, the impatience/aggression factor of the Peer MYTH was significantly related to trait anger (r = .304, p < .001).

Peer MYTH Type A/B Differences

To examine the utility of extreme group classifiction using peer MYTH scores, a MANOVA was conducted on the four main dependent variable categories in which extreme Type A/B groups were identified as scores above or below the median value of the Peer MYTH distribution. The median Peer MYTH value obtained for the screening sample was used to classify subjects. This median split analysis had the benefit of generating a larger sample size, including all subjects from the extreme groups sample. Results of the median split analysis pointed to a significant multivariate main effect for peer-identified Type A/B status $F(16,21)$ = 2.67, p = .005. Univariate analyses were used to further examine significant multivariate effects (see Table 7). The results of these analyses were consistent with results obtained using Teacher MYTH classification. Specifically, the only significant difference that emerged between peer-identified MYTH Type As and peer-

TABLE 7: UNIVARIATE ANALYSES FOR MAIN EFFECT OF MEDIAN SPLIT PEER MYTH TYPE A/B CLASSIFICATION

VARIABLE	MEANS TYPE A (n = 34)	MEANS TYPE B (n = 28)	F(1,59)
Peer Perceptions of Social Behaviour PEI			
PEI - Aggression	3.903	.625	29.857****
PEI - Likeability	.556	.506	1.672
Anger Expression			
Anger-out	9.176	8.214	1.674
Anger-suppression	9.853	10.143	.045
Anger-reflection/control	10.529	10.714	.030
Social Problem Solving			
Expected outcome	7.559	8.571	3.878*
Affect	6.618	6.679	.081
Intensity of affect	10.353	9.750	.947
Intent - Forced choice	6.088	6.214	.062
Blood Pressure (BP) Reactivity			
Systolic BP-baseline	104.588	103.429	.222
SBP-pre-frustration	104.824	104.000	.083
SBP-post-frustration	105.941	104.000	1.054
Diastolic BP-baseline	68.294	67.357	.298
DBP-pre-frustration	68.765	67.571	.579
DBP-post-frustration	70.294	67.714	1.974

* p < .10
** p < .05
*** p < .01
**** p < .001

identified MYTH Type Bs for each of the four dependent variable groups compared was on peer perceptions of aggressive behaviour: Type As were rated as significantly more aggressive than Type Bs.

Discussion

The most important findings of the current study concerned the relationship between method of subject classification and scores on variables related to coronary proneness. The results of the current study suggest that targeting anger status as a means of identifying children who might be at risk for the later development of CHD may lead to better predictions of later coronary risk than targetting A/B status. The fact that the findings related to Type A classification were virtually identical regardless of whether traditional teacher ratings or the more exploratory peer nominations were used to identify extreme Type A/B groups suggests that these results were not dependent on who assessed the Type A behaviours. The results of the current study indicated that Type A and Type B extreme groups were highly similar on all variables except peer nominations. Specifically, Type A boys differed only in being perceived by their peers as more aggressive than Type B boys. Post-hoc analyses performed for each measure indicated that the effect sizes of the non-significant Type A/B comparisons were small to nill. In contrast, boys high and low in trait anger differed in many important respects. Given that anger classification was based on self-report versus teacher

reports for Type A/B classification and since several of the dependent measures also relied on self-report data, the relationship of the dependent measures to anger relative to Type A/B may have been overestimated solely because of the similarity in source of evaluation. Nonetheless the findings appear robust with effect sizes of significant comparisons, assessed post-hoc, ranging from moderate to large. In the behavioural domain, extreme groups identified by trait anger scores were also distinguished on peer reports of aggression. Boys scoring high on trait anger were viewed by their peers as substantially more aggressive than boys low in trait anger. However, the findings further suggested that peers held a more globally negative view of high anger boys. These boys were rated as significantly less liked than boys low in trait anger.

Findings related to anger expression pointed to a similar pattern of extreme group differences for classification by trait anger but not for classification by Type A/B. Boys high in trait anger were more prone to expressing their anger directly, suggesting a relative lack of cognitive/reflective skills for dealing with angry feelings in this group. Rather than reinterpreting, discussing, or rechanneling their anger, these boys are apparently more likely to respond to anger-inducing stimuli impulsively and perhaps indiscriminately.

The extreme group comparison results on social cognition extended the pattern of Type A/B similarities and high/low trait anger differences. Boys high in trait anger differed from boys

low in trait anger on each of the Social Problem Solving Interview variables assessed. When presented with a series of hypothetical, ambiguous peer provocation vignettes, boys high in trait anger were more likely to assume that the outcome of the interpersonal encounter would be negative or, more specifically, that a problem would ensue. The neutral position held by boys low in trait anger was qualitatively different from a denial of affect which was rarely voiced by children in any of the groups. Boys high in trait anger also reported a much more intense emotional experience than boys low in trait anger, and were more likely than boys low in trait anger to interpret the motives of others as hostile. The findings suggest that these boys were less likely to give others the "benefit of the doubt" and that they believed instead that others had purposefully caused the negative outcome. In contrast, the responses of boys low in trait anger suggested that they had no such established "set" to automatically guide their appraisals of ambiguous situations.

The differences in social cognition of boys high and low in trait anger are nicely illustrated by their typical responses to one of the hypothetical vignettes. In the vignette, the subject was asked to imagine himself in a situation in which a second child knocked a jar of paint over a painting the subject had just completed. It was unclear in the vignette whether the actor had intentionally or accidentally ruined the subject's completed art work. In response to this vignette, boys low in trait anger typically reported feeling a little upset or sad that their

painting had been ruined. However, they believed that paint spill was accidental (the other child had tripped or his hand had slipped) and they did not anticipate a negative outcome or problem to result from the incident. In fact, these boys most often proposed a cooperative solution such as cleaning up the mess together or asking the actor to help make a new picture. The typical responses to this same vignette of boys high in trait anger were quite different. High trait anger boys typically reported being very angered by the paint spilling incident. The other child's behaviour was interpreted as purposeful (e.g. "he wanted to spoil it"; "mine was better than his"), and the subject believed that the situation would escalate into a conflict. The results of the present study thus suggest that extreme high trait anger has several important behavioural, cognitive, and social correlates. The angry/aggressive responses of high anger boys are likely to be perceived by others as unjustified, leading to their being less liked by their peers and more likely to be the targets of negative behaviour. Together, these factors probably serve to initiate and perpetuate an escalating cycle of negative interpersonal interactions for high trait anger boys.

Although Type As were seen as more aggressive than Type Bs, one might speculate that the aggression of Type As is qualitatively different from that of high anger boys. The aggressive behaviour of Type A boys might be of a more assertive, instrumental variety, motivated more by a desire to be involved and eliminate obstacles, to get things done, but lacking the cognitive component of cynicism

and hostility toward others and the emotional component of extreme anger.

The results of the present study failed to confirm the hypothesis that extreme group differences in physiological reactivity would be observed in response to perceived interpersonal conflict and frustration. Several plausible explanations for the failure to detect extreme group difference in physiological reactivity can be suggested; these include the sensitivity of the experimental task, problems inherent in the use of blood pressure as an index of heightened reactivity in young children, and the sensitivity of the measurement device.

First, it is possible that the task used in the study failed to elicit frustration in any of the subject groups, despite the fact that pilot testing of the task with behaviour-disordered children had elicited a broad range of responses including little emotionality, mild disappointment, and intense anger. In the current study, a wide range of responses was observed, but the intensity of emotional reactions appeared to have been attenuated. Most boys appeared quite engaged by the testing procedures but not overwhelmed by them, in spite of the fact that every possible attempt had been made to create as much frustration as possible. For example, following the first trial subjects were informed of how many prize cards they had helped their partner win and were coaxed to show "how well they could do". Immediately after the failure trial, as the blood pressure cuff was being attached to the subject's arm, his own poor performance was emphasized by the

examiner, who inscribed a score of "5 to 0", in favour of the partner, on the coding sheet in full view of the subject. Any additional attempts to induce frustration would not have been ethically feasible. However, it remains possible that, since the boys did in general find the task enjoyable, the task may have failed to engage at-risk boys, thus reducing the chance of detecting group differences in heightened physiological reactivity.

A second possible explanation for the failure to detect extreme group differences in blood pressure reactivity is that blood pressure in young boys may not yet reflect stable, individual differences in physiological hyperreactivity to situational stress, despite the fact that blood pressure in young children has been documented as a stable, individual difference characteristic (e.g. Sallis et al., 1988). Finally, practical limitations, specifically the use of relatively unsophisticated measurement instruments and blood pressure readings taken by a novice administrator, might have compromised the collection of physiological data. Every attempt was made to optimize the collection of blood pressure data within the financial and practical constraints of the study. The examiner was trained in the use of blood pressure equipment by two nurses from the University of Ottawa-Ottawa Civic Hospital Heart Institute. Nonetheless, the optimal situation would have involved having an established health professional collect blood pressure data. Blood pressure instruments that are routinely used for clinical purposes were used in the current study. While these were the best available instruments, their reliability and sensitivity

for research purposes might be considered less than optimal (Berenson, McMahan, Voors, Webber, Srinivasan, Frank, Foster, & Blonde 1980). In view of these factors, the issue of group differences in physiological reactivity to interpersonal conflict may not have received its strongest test here.

Consistent with the findings of previous studies (e.g. Matthews & Angulo, 1980; Jose & Langer, 1989; Parfenoff & Hanson, 1989), the two factors of the MYTH were moderately and positively correlated with one another in the present study. Steinberg (1986) has suggested that the positive correlation between Type A factors is unique to the early elementary school years, that the two components are unrelated during adolescence, and that they become negatively correlated in adulthood. One implication of this is that global Type A status in the elementary years is predicted equally well by either factor. However, if it is assumed that only certain aspects of the total Type A behaviour pattern are critical to the issue of CHD risk, global Type A after childhood becomes an imprecise indicator. Thus, in older children, some children may score high on Type A only because they are competitive, and may have relatively low scores on impatience/aggression. If only impatience/aggression is relevant to coronary proneness these children would have been incorrectly identified as high risk. However, this issue of false positives should not be a problem when Type A is assessed in young children.

An interesting result that emerged from the study was the finding that global Type A and trait anger classifications appeared

to be independent. A modest relationship between the two measures had been predicted because aggression and anger are linked theoretically (Spielberger et al., 1985). However, there was a significant correlation found between the MYTH impatience/aggression factor and trait anger scores, although scores on the MYTH competitiveness factor were unrelated to trait anger. This finding emphasizes the importance of recognizing the different patterns associated with the distinct factors included in the Type A measure.

One minor purpose of the present study was to compare two different methods of measuring Type A behaviour. Overall, the pattern of results obtained using peer MYTH scores to classify Type A/B subject groups was virtually identical to the findings obtained from analyses using teacher MYTH ratings to classify boys as Type A or Type B. This finding, taken together with the finding of high and significant correlations between peer MYTH and teacher MYTH scores, provides no convincing basis for suggesting that alternative methods of assessing Type A behaviour in children should be explored.

Overall, the major implication of the present findings is that, with children as with adults, anger and anger-related variables appear critical to the prediction of "coronary proneness". The findings further suggest that the Type A construct is too heterogeneous and at older ages has low internal consistency. Several items that contribute to global Type A scores describe what appear to be benign behaviours or characteristics

that are valued in Western cultures. For example, the literature indicates that Type As are more likely to strive to do well and that they tend to achieve more in spite of having intellectual capacities that are similar to their non-Type A counterparts. The consequences of having these positively viewed characteristics should be more benign than the consequences of having less positively viewed behaviours such as aggression and anger.

Smith and his colleagues (Smith & Frohm, 1980; Smith & Anderson, 1988; Hardy & Smith, 1988) have proposed a model of interpersonal relations that helps to integrate the findings related to high hostility in adults. They suggest that resentful, suspicious attitudes of hostile adults encourage them to form and hold negative expectations toward other people. These negative expectations result in more unfriendly and antagonistic behaviours toward others and elicit hostility in the people they encounter, resulting in more frequent and severe interpersonal conflicts and fewer social supports. The findings of the present study fit well into this model. Both boys high in trait anger and angry/hostile men seem to show a similar cognitive set or interpretive bias and a similar behavioural style. These features should serve to make them more frequent initiators of and targets of negative interpersonal encounters.

In the present study, boys high in trait anger were significantly more aggressive than boys low in trait anger. These boys tended to express their anger outwardly and were not more likely to suppress angry feelings. In contrast, the adult

literature suggests that males who are at risk for CHD show a tendency to hold their anger in. The discrepancy between findings in childhood and adulthood may be explicable in terms of a developmental change in the expression of anger from boyhood to adulthood.

The stage at which anger-in becomes a critical factor for increased CHD risk is open to debate. Some investigators attribute an important role to anger-in early on in the developmental progression of coronary risk status. In support of this argument, data from studies showing the negative physiological consequences of extreme, repeated, and persistent anger suppression are cited (e.g. Diamond, 1982; Dembroski et al., 1985), and some more recent studies have related anger-in to extent of coronary atherosclerosis (e.g. Barefoot et al., 1983). While the evidence for physiological consequences of extreme anger suppression appears strong, there are several reasons why it might be premature to conclude that the inappropriate and extreme expression of anger is not important to an individual's overall coronary risk profile. For example, results from a number of well-designed, prospective studies have shown that extreme and inappropriate overt anger expression is associated with several indices of physiological reactivity, including increased blood pressure and heart rate, and with extent of coronary atherosclerosis (e.g. Matthews et al., 1977; Williams et al., 1980). Dembroski & Costa (1987) have argued cogently that the association between anger-in and CHD variables might be artifactual and the result of methodological differences between

studies. Their argument is based on the observation that most studies showing an increased risk associated with anger-in base their conclusions on data from known cardiac patient populations. The identification of anger-in as a premorbid risk factor in this population is problematic, in that anger-in can just as readily be viewed as a consequence of the disease process rather than a cause. It is likely that cardiac patients are routinely warned by their physicians about the importance of "calming down" and controlling their emotions. Further, it is likely that these individuals are vigilantly watched over by family and friends to ensure that emotions are kept under control. Thus, the increased anger-in that is evidenced by these patient populations could be conceptualized as the result of a conscious censoring process necessitated post-illness by lifestyle/behavioural modifications.

The relative "toxicity" of anger-in versus anger-out remains unresolved. However, what is apparent is that both boys who are high in trait anger and hostile/angry men are forced to rely on less sophisticated methods of dealing with anger, be it extreme suppression or overt expression. In the current study, the data pointed to a lack of adaptive and effective means of cognitively reframing and dealing with angry feelings among boys high in trait anger. Evidence of a similar poverty in adaptive skills for dealing effectively with negative emotions has been alluded to in the adult literature (e.g. Smith & Frohm, 1985). It is interesting that one prominent physiological risk model relating hostility/ cynicism/ anger to CHD (Williams et al., 1982; Williams, Barefoot,

& Shekelle, 1985) makes little reference to a specific mode of anger expression, but, instead, relates the entire behavioural, cognitive, emotional complex that characterizes hostile/cynical individuals to a pathonomic physiological profile. This model has received considerable support.

The most important limitation of the present study was that the design studied children at only one point in time. Given the results, it is very tempting to conclude that trait anger in young boys is a better predictor than Type A/B status of coronary proneness in adult males. The behavioural, emotional, and cognitive correlates of high trait anger in boys indicate a psychosocial profile almost identical to that reported to be characteristic of coronary-prone adult males. However, the current design did not provide a direct test of the connection between high trait anger in childhood and increased coronary risk in adulthood. Thus, in the absence of clear data from long-term follow-up studies, it has not been definitively demonstrated that high trait anger in young boys translates to high anger/ hostility/ cynicism in adulthood or that high trait anger boys are at increased risk for various CHD endpoints. The present study also did not address the question of what factors might contribute to the development of high trait anger in young boys. The future investigation of several plausible factors such as temperament and the modelling of inappropriate attribution and conflict resolution styles in the family environment could prove especially relevant for early intervention programs.

The findings of the current study have direct implications for the conceptualization, measurement, and study of the developmental precursors of coronary proneness. The most fundamental conclusion to draw is that research in this area should move in a direction similar to that seen in research with adult populations. Specifically, there is a need to subdivide the global Type A construct in order to make finer discriminations which will help identify which specific aspects of the behaviour pattern are most toxic.

The data from the present study represent an important contribution to the process of redefining the construct of coronary proneness in children. This was the first known research to relate anger in children to a known adult psychosocial risk profile. It demonstrated that anger and anger-related variables are associated more strongly than global Type A with a negative psychosocial profile in children. These variables appear to represent the more critical indices of coronary proneness; however, much work remains to be done on the bootstrapping of the Type A construct. Future areas of research might involve determining whether aggressive behaviour, anger, or hostility/ cynicism in children is most strongly related to adult coronary status.

Regardless of their future coronary risk, boys high in anger might also be expected to benefit from an intervention program because of the fact that they are more aggressive. Aggression in childhood is well documented in the literature as a risk factor for future psychopathology (e.g. Robins, 1966; Olweus, 1987). The

negative outcomes for highly aggressive children include poor interpersonal relations, poor marital relations, increased alcoholism, and increased likelihood of both serious and minor criminal offenses (Eron, 1987; Kohlberg, Lacrosse, & Ricks, 1972; Robins, 1972). In this sense, anger when accompanied by aggression may be a risk factor for both physical and psychological problems in adulthood.

The practical implications of the present study relate to the identification of children who would most benefit from some form of intervention. Targets of intervention might include helping "at-risk" children develop effective anger control skills, teaching more adaptive means of coping with intense negative emotions, and promoting the process of searching for alternative perspectives on situations that are judged negatively. This process would be particularly valuable for dealing with ambiguous interpersonal situations. The advantage of such a program is that it could be readily incorporated into any educational environment. For example, children could be provided with a problem-solving task in which the clues appear to point to a obvious solution but in which the correct solution actually requires a more subtle reading with greater attention to nuances. Involving the entire peer group in such an intervention would simplify the implementation of the program (it could be conducted in the classroom as part of regular activities with an additional discussion period) and would avoid the problem of labelling. All children would likely accrue some benefit from the sort of program described and there are no

contraindications for participation. Consistent with the approach that has been recently suggested in the literature (Keltikangas-Jarvinen & Joliken, 1989), what is being advocated involves shifts in educational practice and cultural traditions. With children, the need for changes in entrenched lifestyle patterns, which is the difficult task confronting adults, seems much less important.

The strong social consequences of high anger suggest that social relations may be relevant to later coronary risk status. Perhaps improving children's social relationships might serve as a protective factor for later physical health. Given the recent literature on the important impact of the peer group and peer perceptions on perpetuating and maintaining a child's social status (e.g. Hymel, 1986), a program which targets the entire peer group might prove to represent a most critical and powerful form of intervention.

The literature contains several examples of intervention programs that were developed to modify aggressive behaviours and teach social problem solving skills. The theoretical rationale for these programs stresses the importance of cognitions as a focus of intervention. The results of the present study suggest that an equally important focus of intervention is the emotions. Intense emotional states, such as anger, can colour the individual's perception of benign or ambiguous events thereby influencing the cognitive appraisal process.

The most pressing need at the present time is for longitudinal studies to document the progressions that occur in behavioural,

emotional, cognitive, social, and physiological development from early childhood to adulthood. Findings from the present study strongly suggest the importance of emotional states for the prediction of later coronary risk.

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A P P E N D I C E S

APPENDIX A

PARENT/GUARDIAN INFORMATION LETTER

PARENT/GUARDIAN INFORMATION LETTER

Dear Parent or Guardian:

Dr. Jane Ledingham of the Department of Psychology at the University of Ottawa and I are conducting a research to examine which behaviour patterns and attitudes may leave some individuals vulnerable to health problems in adulthood. The purpose of the present study is to determine whether attitudes, similar to those identified in adults, are already present in elementary school-aged children and, if so, how they are expressed both behaviourally and physically.

We wish to request your cooperation in this study which has been approved by the Ottawa Board of Education Advisory Research Council and by the principal of your child's school. Only children who have their parent's permission will participate. This will involve the following:

1. Completing 3 questionnaires to be administered in two 30-minute session in the classroom with the other students. The items on two of these questionnaires describe social behaviours. Children will be asked to select among their classmates those who best suit the behavioural description. For the third questionnaire, children will be asked to report on their own behaviour and feelings.

2. The teacher will be asked to complete a behavioural rating scale for each participating child.

3. A smaller group of children will be selected to participate in an individual testing session, of about 30 minutes to take place outside of the classroom. During this time, an interview and a guessing game will be administered. The interview will involve listening to a series of short stories about children interacting with one another and then providing an opinion about the characters in the story. The guessing game will involve taking turns providing and listening to descriptions of a series of novel shapes. The way children behave during this relatively challenging game will allow us to assess how children respond to experiences of success and failure. Children's physical response to the challenge of the game will be measured by monitoring blood pressure, using a standard inflatable cuff, while the game is being played. There is no risk or discomfort associated with this procedure.

The individual testing is a very important part of the study as it will allow us to examine how children's attitudes are expressed behaviourally and physically. However, because individual testing of all children would be too time-consuming, only a small sample will be selected. These children will receive a small reward for participating.

All testing will be scheduled at the convenience of the classroom teacher to minimize any interference with the daily routine. Results of the study will be described only for groups of children. No child will be individually identified ensuring complete confidentiality. In addition, any child who wishes to discontinue participating at any time may do so. Participation is voluntary and is not in any way related to a child's grades at school or to receiving any service at the school. We expect that most children will enjoy participating in this study.

Your cooperation with this research project would be greatly appreciated. If you have any further question please do not hesitate to contact me at 564-2249 or Dr. Ledingham at 564-9263. Your interest is certainly welcomed! Once the data are analyzed we would be pleased to provide you with a summary of the results.

Whether or not you decide to allow your child's participation, please complete the attached form and return it to the school as soon as possible. It is anticipated that testing will begin in November.

Thank-you in advance for your help.

Renee Sananes
Ph.D. Candidate
University of Ottawa

Jane E. Ledingham
Ph.D. C.Psych.
University of Ottawa

PARENT/GUARDIAN INFORMED CONSENT

I have read and understand the request for my child's participation in this research project. I understand that the investigators are interested only in group data and not in individual responses. In this regard, complete confidentiality of my child's responses is assured.

_____ I give permission for my child's participation.

_____ I do not give permission for my child's participation.

Name of child: _____
(please print)

Signature of Parent/Guardian: _____

Child's Signature: _____

Date: _____

APPENDIX B

TEACHER INFORMATION LETTER

APPENDIX B: TEACHER INFORMATION LETTER

Dear Teacher:

Dr Jane Ledingham of the University of Ottawa and I are conducting a study in which you are being asked to participate. The study is concerned with identifying behaviours and attitudes in children that might leave them vulnerable to heart disease in adulthood. This project is stimulated by research showing that hostility and cynicism in adults is related to an increased incidence of coronary heart disease. We are trying to determine whether similar attitudes are already present in children. We are also interested in understanding how children who display these attitudes differ from their peers on the following three variables: physical responses; attributional style; and peer-perceived social behaviour.

As a teacher, your role in this study would be to complete a 17-item rating scale, the Matthews Youth Test for Health, for each boy in your classroom. Each questionnaire takes no more than 5 minutes to complete. In order to minimize any inconvenience to your schedule you will be provided with the questionnaires to complete at your leisure. Testing of the children will involve two visits of about one-half hour each to your classroom. Children will be asked to complete 3 questionnaires: the Matthews Youth Test for Health - Peer version; the Pupil Evaluation Inventory; and the Feelings Questionnaire. Testing will be scheduled at your convenience to take place on consecutive days. A group of children (about 8 from your class) will then be selected to participate in Phase II of the study. This will involve one individual testing session, of about 30 minutes, during which an interview and a guessing game will be administered. Again these individual sessions will be scheduled at your discretion to minimize any disruption to the daily classroom routine. We anticipate that children will enjoy participating in this study.

Should you desire any further information about the study I would be pleased to meet with you to answer any of your questions. I can be reached at home at 237-9680 or at the University at 564-2249. Once all the data are analyzed I would look forward to coming back to the school and discussing the results of the study with you.

Thank-you for considering this project.

Renee Sananes
Ph.D. Candidate
University of Ottawa

Jane E. Ledingham
Ph.D. C.Psych.
University of Ottawa

APPENDIX C

ETHICAL CONSIDERATIONS

ETHICAL CONSIDERATIONS:

The primary ethical concerns associated with the current study included the use of peer-nominations, the deceptive nature of the experimental task, and the time-commitment for teachers.

The concern associated with the use of peer-nominations was that their use might encourage children to focus on certain negative aspects of their classmates' behaviour. Available empirical evidence suggests that this does not, in fact, occur (e.g. Hayvren & Hymel, 1984). However, in order to minimize the possibility of any negative labeling, the following precautions were taken. First, children were provided with a list of their classmates' names for use in completing the peer-nominations. This was done to discourage talking, staring or pointing to classmates. Second, children were told that, because their own opinion only was being sought and that there were no correct answers, they were not to discuss their responses with their classmates. To further discourage the possibility of discusssion among classmates during free-time, peer-nomination measures were not administered just before recess or just before the end of the school day. Additionally, full confidentiality of responses was assured.

Some degree of deception was required in the current study in order to create the perception of conflict and frustration as a means of optimizing blood pressure reactivity. This issue is important to the understanding of what environmental factors are particularly "reactive" for Type A and/or high trait anger in children. Children were assured full confidentiality of all responses and of the freedom to withdraw from the study at any

time. No enduring negative effects were anticipated and none were observed. In fact, all children appeared to thoroughly enjoy all aspects of the testing and several children commented out loud that they enjoyed themselves. Children were fully debriefed immediately following task performance and rewarded for their participation.

The time commitment to teachers involved the completion of a MYTH rating scale for each boy in their classroom. This was minimized by providing them with the appropriate forms in advance, thereby allowing them to complete the forms at their convenience.

APPENDIX D

MATTHEWS YOUTH TEST FOR HEALTH

INSTRUCTIONS: MATTHEWS YOUTH TEST FOR HEALTH

Please complete a questionnaire for each boy in your classroom. Indicate, next to each item on the 5 point scale ranging from extremely uncharacteristic to extremely characteristic, the degree to which the description given is characteristic of the child being rated. Thank you!

Child's Name: _____ Subject No.: _____

MYTH

	extremely uncharacteristic				extremely characteristic
1. When this child plays games, he is competitive.	1	2	3	4	5
2. This child works quickly and energetically rather than slowly and deliberately.	1	2	3	4	5
3. When this child has to wait for others, he becomes impatient.	1	2	3	4	5
4. This child does things in a hurry.	1	2	3	4	5
5. It takes alot to get this child angry at his peers.	1	2	3	4	5
6. This child interrupts others.	1	2	3	4	5
7. This child is a leader in activities.	1	2	3	4	5
8. This child gets irritated easily.	1	2	3	4	5
9. He seems to perform better than usual when competing against others.	1	2	3	4	5
10. This child likes to argue or debate.	1	2	3	4	5
11. This child is patient when working with children slower than he is.	1	2	3	4	5

	extremely uncharacteristic				extremely characteristic
12. When working or playing, he tries to do better than other children.	1	2	3	4	5
13. This child can sit still long.	1	2	3	4	5
14. It is more important to this child to win, rather than to have fun in games or schoolwork.	1	2	3	4	5
15. Other children look to this child for leadership.	1	2	3	4	5
16. This child is competitive.	1	2	3	4	5
17. This child tends to get into fights.	1	2	3	4	5

APPENDIX E

PEER VERSION - MATTHEWS YOUTH TEST FOR HEALTH

INSTRUCTIONS: PEER MYTH

The list of items on the following pages describe different ways that children behave. Next to each sentence are 5 empty squares. For each sentence we would like you to choose up to 5 of your classmates who you feel best fits the description. Only write down the names of children in your classroom. Do not choose friends in other classes. You do not have to put down any children's names for a question if you do not want to. You can use the same child's name for more than one question. If, at any time, you do not want to continue filling out the form you do not have to. There are no right or wrong answers to these questions.

Please fill in the boxes on your own without discussing the questions with your classmates. Thank you!

Subject No.: _____

Name: _____ Date: _____

P-MYTH

1. Those who are competitive when playing games.					
2. Those who work quickly and with lots of energy rather than slowly and carefully.					
3. Those who become impatient when they have to wait for others.					
4. Those who do things in a hurry.					
5. Those who get angry easily with other children.					
6. Those who interrupt others.					
7. Those who are a leader in activities.					
8. Those who get irritated easily.					
9. Those who do better than usual when competing against others.					

10. Those who like to argue.

11. Those who are not patient when working with children slower than they are.

12. Those who try to do better than other children when working or playing.

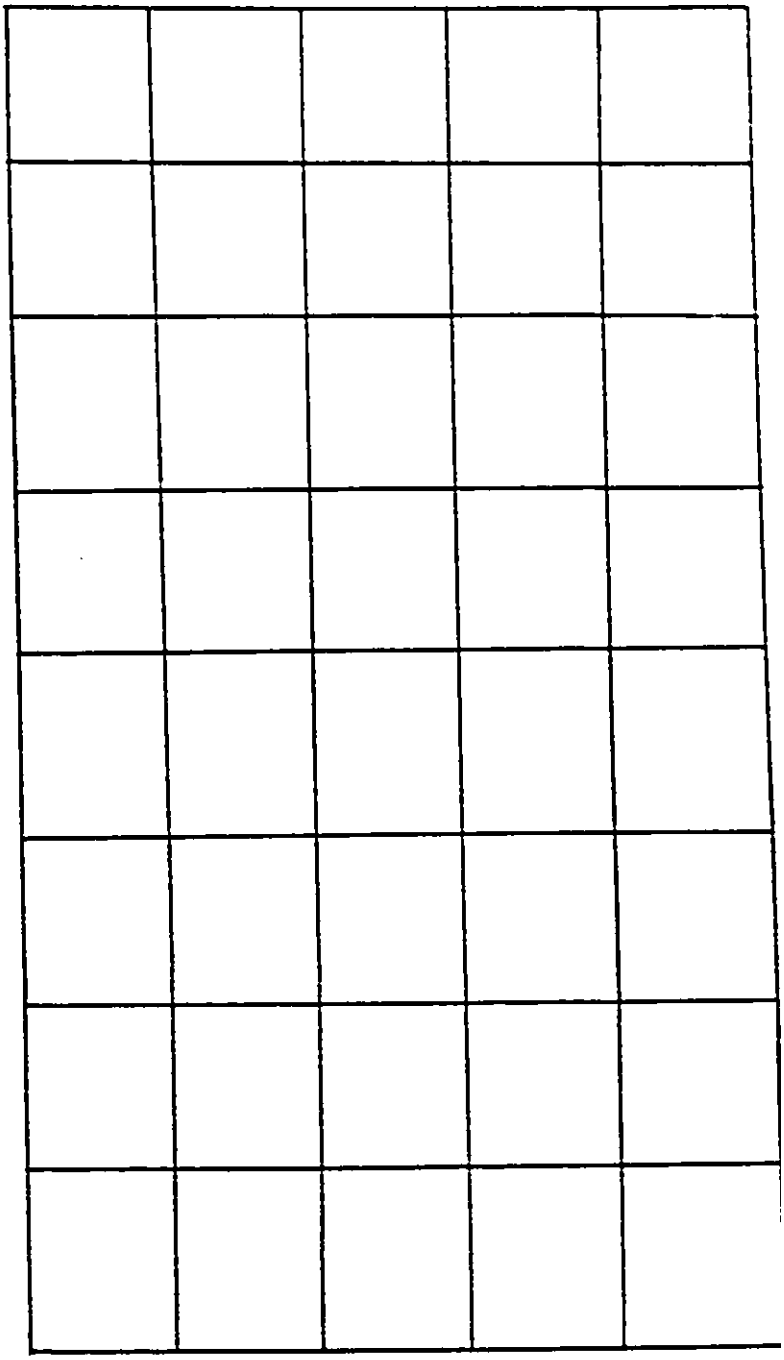
13. Those who cannot sit still long.

14. Those for who it is more important to win than to have fun in games or schoolwork.

15. Those who others think are leaders.

16. Those who are competitive.

17. Those who often get into fights.



APPENDIX F

FEELINGS QUESTIONNAIRE

Subject No.: _____

Name: _____ Date: _____

APPENDIX F: FEELINGS QUESTIONNAIRE

Instructions: Below is a list of statements that boys and girls often use to describe themselves. Read each statement carefully and decide if it is HARDLY EVER, or SOMETIMES, or OFTEN true for you. Then for each statement, put an "X" in the box below the word which seems to describe you best. There are no right or wrong answers. Do not spend too much time on any one statement. Remember, choose the word which seems to describe how you usually feel.

	Hardly Ever	Sometimes	Often
1. I get angry quickly.			
2. I have a bad temper.			
3. I get angry when I have to wait for someone because they have made a mistake.			
4. When I get mad I say nasty things.			
5. I get angry very quickly.			
6. I feel bothered when no one notices I did something well.			
7. I get mad too quickly.			
8. I get angry when I'm told I'm wrong in front of others.			
9. When I get so angry I don't know what to do, I feel like hitting someone.			
10. I feel mad when I do something well and my parents or teacher say I didn't do a good job.			

APPENDIX G

PUPIL EVALUATION INVENTORY

INSTRUCTIONS: PUPIL EVALUATION INVENTORY

The list of items on the following pages describe different ways that children behave. Next to each sentence are 5 empty squares. For each sentence we would like you to choose up to 5 of your classmates who you feel best fits the description. Only write down the names of children in your classroom. Do not choose friends in other classes. You do not have to put down any children's names for a question if you do not want to. You can use the same child's name for more than one question. If, at any time, you do not want to continue filling out the form you do not have to. There are no right or wrong answers to these questions.

Please fill in the boxes on your own without discussing the questions with your classmates. Thank you!

Subject No.: _____

Name: _____ Date: _____

PEI

1. Those who are taller than most.					
2. Those who help others.					
3. Those who can't sit still.					
4. Those who try to get other people into trouble.					
5. Those who are too shy to make friends easily.					
6. Those whose feelings are too easily hurt.					
7. Those who act stuck up and think they are better than everyone else.					
8. Those who play the clown and get others to laugh.					
9. Those who start a fight over nothing.					

10. Those who never seem to be having a good time.

11. Those who are upset when called on to answer questions in class.

12. Those who tell other children what to do.

13. Those who are usually chosen last to join in group activities.

14. Those who are liked by everyone.

15. Those who always mess around and get into trouble.

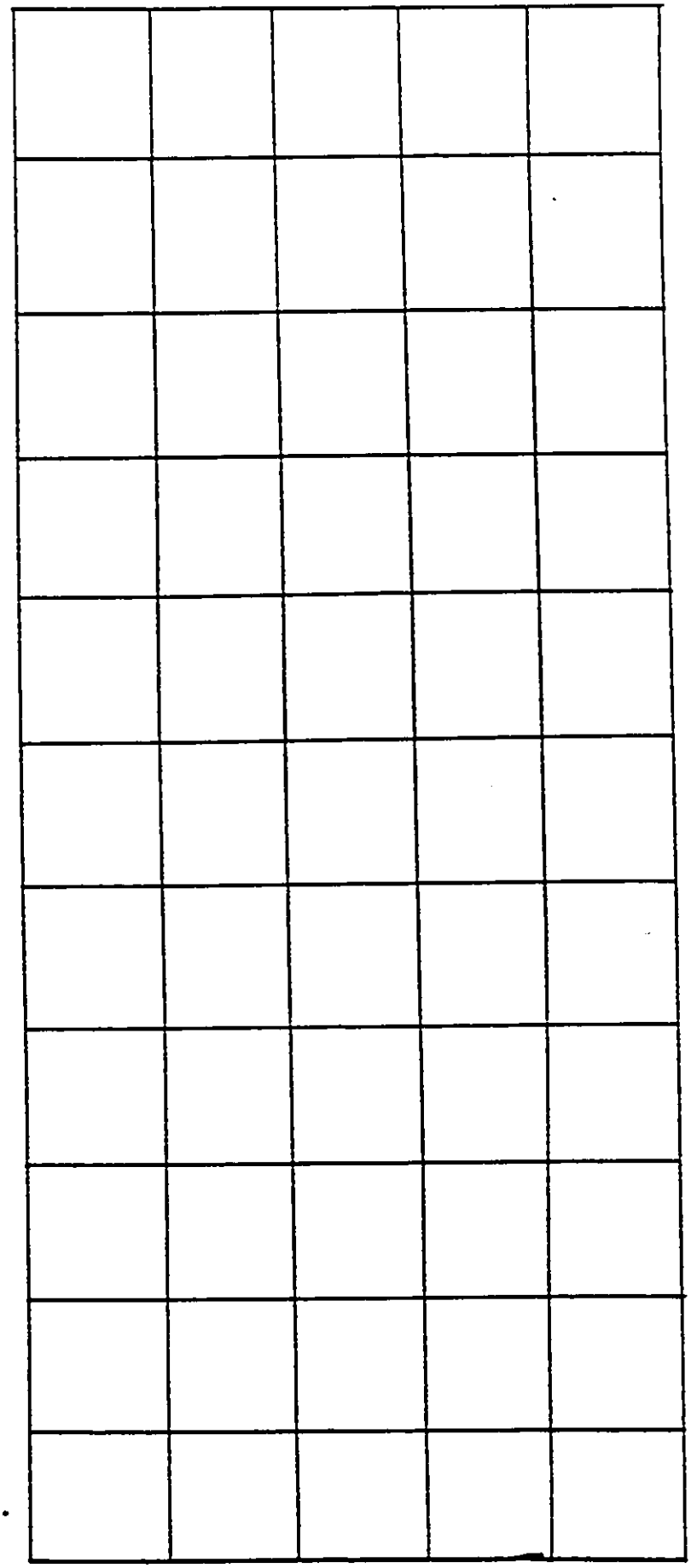
16. Those who make fun of people.

17. Those who have very few friends.

18. Those who do strange things.

19. Those who are your best friends.

20. Those who bother people when they are trying to work.



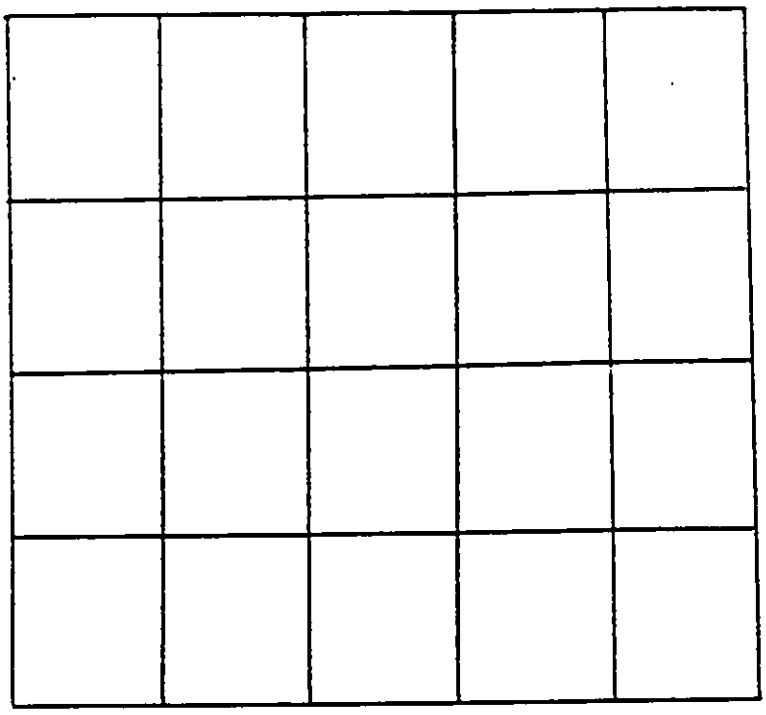
21. Those who get mad when they don't get their own way.					
22. Those who don't pay attention to the teacher.					
23. Those who are rude to the teacher.					
24. Those who are unhappy or sad.					
25. Those who are especially nice.					
26. Those who act like a baby.					
27. Those who are mean and cruel to other children.					
28. Those who often don't want to play.					
29. Those who give dirty looks.					
30. Those who want to show off in front of the class.					
31. Those who say they can beat everybody up.					

32. Those who aren't noticed much.

33. Those who exaggerate and make up stories.

34. Those who complain, nothing makes them happy.

35. Those who always seem to understand things.



APPENDIX H

PEDIATRIC ANGER EXPRESSION SCALE

FEELINGS QUESTIONNAIRE
PAES-3

Name_____

DIRECTIONS: A number of statements which boys and girls use to describe themselves when they feel angry or very angry are given below. Read each statment and decide if it is hardly ever, or sometimes, or often true for you. Then for each statement, put an "X" in the space in front of the word that seems to describe how you feel or act when you are angry or very angry. There are no right or wrong answers. Do not spend too much time on any one statement. Remember, choose the word which seems to describe how you usually feel.

1.	I control my temper.....	___	hardly-ever	___	sometimes	___ often
2.	I show my anger.....	___	hardly-ever	___	sometimes	___ often
3.	I hold my anger in	___	hardly-ever	___	sometimes	___ often
4.	I talk to someone until I feel better.....	___	hardly-ever	___	sometimes	___ often
5.	I do things like slam doors	___	hardly-ever	___	sometimes	___ often
6.	I hide my anger.....	___	hardly-ever	___	sometimes	___ often
7.	I keep my cool.....	___	hardly-ever	___	sometimes	___ often
8.	I attack whatever it is that makes me very angry	___	hardly-ever	___	sometimes	___ often
9.	I get mad inside but I don't show it	___	hardly-ever	___	sometimes	___ often
10.	I do something totally different until I calm down.....	___	hardly-ever	___	sometimes	___ often
11.	I say mean things	___	hardly-ever	___	sometimes	___ often
12.	I can stop myself from losing my temper.....	___	hardly-ever	___	sometimes	___ often
13.	I try to calmly settle the problem.....	___	hardly-ever	___	sometimes	___ often
14.	I lose my temper	___	hardly-ever	___	sometimes	___ often
15.	I'm afraid to show my anger.....	___	hardly-ever	___	sometimes	___ often

APPENDIX I

SOCIAL PROBLEM SOLVING INTERVIEW
-Vignettes
-Coding Manual

Story Order:_____ Date:_____

Child's Name:_____ Grade:_____

Subject Number:_____ Interviewed By:_____

Ball

Situation: Pretend that it's recess and you are out on the playground. You see some of your friends and you start to walk over to them. As you are walking toward them you get hit hard in the back with a ball. You turn around and see some boys/girls with balls in their hands.

A) Expectation: What do you think will happen? Do you think there will be a problem between you and those boys/girls or do you think there won't be a problem.
(P) What about with most boys/girls?
(P) What will happen most of the time?

A) Expected Outcome:
_____will
_____maybe
_____won't

B) Affect: How would you feel if that happened?
(P) Would you feel more mad or sad?

B) Affect:_____
_____
_____

C) How _____ (repeat child's affect) would you be with the boys/girls in the story?

_____

C) Inference: Why do you think they did that? Why do you think those boys/girls hit you in the back with the ball?
(P) Why would they hit you for that reason?
(FC) Do you think they hit you by accident or do you think the boys/girls did it on purpose?

C) Inference: _____
_____
_____
_____

Forced Choice:
____ accident
____ purpose

D) Solution: What sorts of things would you do if that happened?
(P) What else might you do?
(P) Would you do anything else?

D) Solution: _____
_____
_____
_____
_____
_____
_____

Story Order:_____ Date:_____

Child's Name:_____ Grade:_____

ID:_____ Interviewed By:_____

Being Knocked Down

Situation: Pretend you are waiting in line to get a drink of water. All of a sudden a boy/girl comes running up behind you and smashes right into you, knocking you down on the ground.

A) Expectation: What do you think will happen? Do you think there will be a problem between you and that boy/girl or do you think there won't be a problem.
(P) What about with most boys/girls?
(P) What will happen most of the time?

A) Expected Outcome:
_____will
_____maybe
_____won't

B) Affect: How would you feel if that happened?
(P) Would you feel more mad or sad?

How _____ (repeat child's affect) would you be with the boy/girl in the story?

B) Affect:_____
_____
_____

_____

C) Inference: Why do you think he/she did that? Why do you think the boy/girl smashed into you?
(P) Why would he/she smash into you for that reason?
(FC) Do you think he/she smashed into you by accident or do you think they did it on purpose?

C) Inference: _____
_____
_____
_____

Forced Choice:
____ accident
____ purpose

D) Solution: What sorts of things would you do if that happened?
(P) What else might you do?
(P) Would you do anything else?

D) Solution: _____
_____
_____
_____
_____
_____
_____

Story Order:_____ Date:_____

Child's Name:_____ Grade:_____

Subject Number:_____ Interviewed By:_____

Poster

Situation: Pretend that one day in school everyone in your class is making a poster in art. Your teacher says it is almost time to clean up. One of the boys/girls in your class comes over and reaches for a jar of paint but bumps into you and spills paint all over your poster.

A) Expectation: What do you think will happen? Do you think there will be a problem between you and that boy/girl or do you think there won't be a problem.
(P) What about with most boys/girls?
(P) What will happen most of the time?

A) Expected Outcome:
_____will
_____maybe
_____won't

B) Affect: How would you feel if that happened?
(P) Would you feel more mad or sad?

How _____ (repeat child's affect) would you be with the boy/girl in the story?

B) Affect:_____
_____
_____

_____

C) Inference: Why do you think he/she did that? Why do you think the boy/girl bumped into you and spilt paint on your poster?
(P) Why would he/she bump into you and spill the paint for that reason?
(FC) Do you think he/she bumped into you and spilt the paint by accident or do you think they did it on purpose?

C) Inference: _____
_____
_____
_____

Forced Choice:
____ accident
____ purpose

D) Solution: What sorts of things would you do if that happened?
(P) What else might you do?
(P) Would you do anything else?

D) Solution: _____
_____
_____
_____
_____
_____
_____

Story Order:_____ Date:_____

Child's Name:_____ Grade:_____

Subject Number:_____ Interviewed By:_____

Teasing

Situation: Pretend it's recess and you are playing a game of tag with some boys/girls in your class. You are "it" but you can't catch anyone. The other boys/girls start laughing.

A) Expectation: What do you think will happen? Do you think there will be a problem between you and that boys/girls or do you think there won't be a problem.
(P) What about with most boys/girls?
(P) What will happen most of the time?

A) Expected Outcome:
_____will
_____maybe
_____won't

B) Affect: How would you feel if that happened?
(P) Would you feel more mad or sad?

B) Affect:_____

How _____ (repeat child's affect) would you be with the boys/girls in the story?

_____

C) Inference: Why do you think they did that? Why do you think those boys/girls started laughing?
(P) Why would they laugh about that?

C) Inference: _____

(FC) Do you think they didn't mean to laugh at you and it was an accident or do you think they were laughing on purpose?

Forced Choice:
____ accident
____ purpose

D) Solution: What sorts of things would you do if that happened?
(P) What else might you do?
(P) Would you do anything else?

D) Solution: _____

SCORES DERIVED FROM THE SPSI

Interview Segment	Scores Derived
A. Expectations (Expected outcome)	Child's expectations for positive and negative social outcomes
B. Affective reaction	Affect categorization (e.g. angry, sad)
Intensity of Affect	4-point rating scale
C. i. Open-ended causal inference	Ratings of perceived actor responsibility
ii. Forced-choice intentionality inference	Ratings of percieved actor intentionality (i.e. purposeful; accidental)
D. Behavioural solution	Categorization of behavioural solution (e.g. passive avoidance; prosocial; hostile; seek other activity)

APPENDIX J

EXPERIMENTAL TASK
- -Instructions
- -Stimulus Figures
- -Confederate's Script

EXPERIMENTAL TASK: Instructions

I am interested in finding out how boys of different ages go about playing certain types of "guessing" games. What I'm going to have you do is play a guessing game with a boy from another school. His name is Steven. Because this is a guessing game one of the rules is that you and Steven can not see one another. I will explain the game to you in here. My partner, Elizabeth is explaining the game to Steven in the next room.

The two of you are going to play a game using these 9 blocks (show blocks). You see each block has a funny shape printed on it. Steven has exactly the same set of blocks. To play the game you will each be given a different picture showing 6 of these blocks laid out in a special order. The picture will look like this one (show picture of target sequence). What you two are going to do is take turns giving clues to each other to try and figure out the order that the other person has.

You and Steve will play the game together 4 times. Each time you will switch positions as clue giver and listener. For the first game you will be the clue giver. Only you will get to see the special order of 6 blocks and you will give Steven clues about this special order so that he can pick out the right 6 blocks and order them in exactly the same way. For each time that Steven is correct in picking out the right block and putting it in the right position he will earn one point. The most possible points a listener can win in one game is 6 right?

For the second game you and Steven will switch positions. He will be shown a new, different special order of 6 blocks and will give you clues about his blocks, you will be the listener. So in this second game you will have to pick out the right blocks and place them in the right position. This will be your chance to win up to 6 points. For the third game you will again be giving clues to Steven about a new special order and once again he can earn up to six points. Finally, for the last game Steven will be giving you the clues so that you can have a chance to earn up to six more points. Remember that each time the game is played a different special order of cubes will be used. To make the game more fun, at the very end of the game we will total up all the points that each of you has won and you will each be allowed to exchange each point you have won for one of these hockey, baseball, or football cards. One point equals one card, five points equals five card, zero points equals zero cards (emphasis added). Do you have any questions?

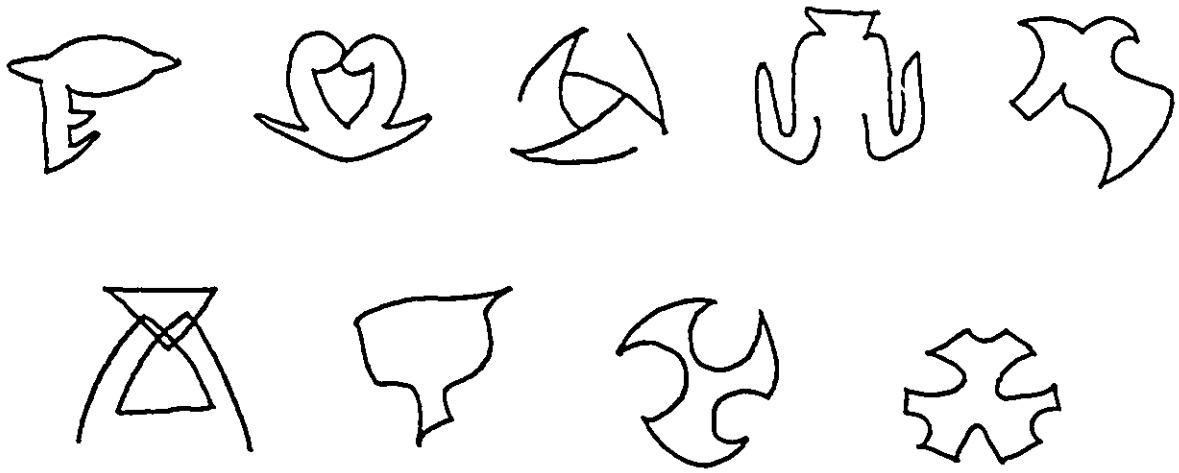
In case you are a bit confused about how you and Steven will be giving each other clues, this is how it will work. You will each be making a tape-recording of your clues using this tape-recorder. When you have made up your set of clues I will take them over to Elizabeth and she will let Steven listen to them. Afterwards, Steven will make up a tape for you. Elizabeth will bring Steven's tape over and at the same time let us know how Steven did with your clues.

Before we start the game there are a few more things I need to tell you. First of all, one of the other important things I am trying to find out is whether I can tell what a person thinks of

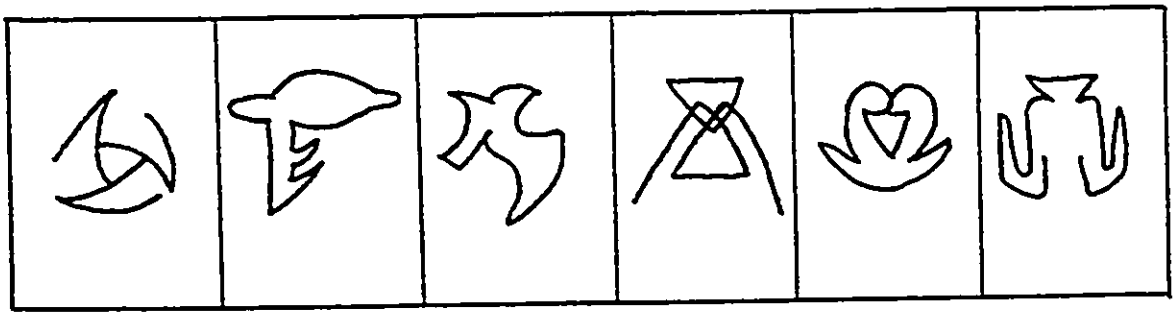
a game (likes it or not, finds it easy or hard) by his physical responses during the game. To do this, I will be taking your blood pressure during the game by placing this inflatable cuff around your arm. This will not hurt at all - let me show you how it works. This machine will tell me about your physical response to the game, but, in order to find out how you feel about the game I will be asking you some questions about it from time to time. While I am doing all this with you, my partner is in the next room with Steven doing exactly the same thing with him. Do you have any questions about any of this?

Ok. before we start the real game for points, you and I will play a few practice trials with these other blocks just so that you can get used to the cuff around your arm and also to make absolutely certain that you have gotten the right idea about how to play. Steven is also practicing in the other room.

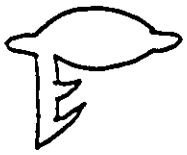
SET OF NINE AMBIGUOUS STIMULUS FIGURES



SAMPLE TARGET STIMULUS SEQUENCE



CONFEDERATE'S SCRIPT

FIGURE	CONFEDERATE'S DESCRIPTION
	man's legs
	lion
	somebody's running
	dog
	knife
	mother's dress

* adapted from Glucksberg, Krauss, and Weisberg (1966)

APPENDIX K

MEDIAN SPLIT ANALYSES OF TEACHER MYTH AND TRAIT ANGER VARIABLES

UNIVARIATE ANALYSES FOR MAIN EFFECT OF MEDIAN SPLIT TEACHER MYTH TYPE A/B CLASSIFICATION

VARIABLE CATEGORY	MEANS TYPE A (n = 31)	MEANS TYPE B (n = 32)	F(1,59)
1. Peer Perceptions of Social Behaviour PEI			
a. PEI - Aggression	3.812	1.042	17.964****
b. PEI - Likeability	.473	.589	.222
2. Anger Expression			
a. Anger-out	9.387	8.156	4.428**
b. Anger-suppression	9.516	10.406	2.676
c. Anger-reflection/control	10.097	11.094	3.066*
3. Social Problem Solving			
a. Expected outcome	7.613	8.406	2.496
b. Affect	7.290	6.094	5.161**
c. Intensity of affect	10.452	9.688	1.740
d. Intent - Forced choice	6.032	6.250	.923
4. Blood Pressure (BP) Reactivity			
a. Systolic BP-baseline	104.000	103.875	.010
b. SBP-pre-frustration	105.226	103.563	.606
c. SBP-post-frustration	106.129	103.875	1.188
d. Diastolic BP-baseline	68.065	67.688	.004
e. DBP-pre-frustration	68.258	68.063	.005
f. DBP-post-frustration	70.000	68.250	.409

* $p < .10$
** $p < .05$
*** $p < .01$
**** $p < .001$

UNIVARIATE ANALYSES FOR MAIN EFFECT OF MEDIAN SPLIT HIGH VERSUS LOW TRAIT ANGER CLASSIFICATION

VARIABLE CATEGORY	MEANS HIGH (n = 37)	LOW (n = 26)	F(1,59)
1. Peer Perceptions of Social Behaviour PEI			
a. PEI - Aggression	3.189	1.288	8.532***
b. PEI - Likeability	.371	.760	9.064***
2. Anger Expression			
a. Anger-out	9.432	7.808	7.776***
b. Anger-suppression	9.541	10.577	2.614
c. Anger-reflection/control	9.946	11.538	8.384***
3. Social Problem Solving			
a. Expected outcome	7.676	8.500	2.289
b. Affect	5.973	7.692	7.509***
c. Intensity of affect	10.432	9.538	2.864*
d. Intent - Forced choice	5.865	6.538	10.295***
4. Blood Pressure (BP) Reactivity			
a. Systolic BP-baseline	105.081	102.308	2.087
b. SBP-pre-frustration	105.189	103.231	.863
c. SBP-post-frustration	105.622	104.077	.487
d. Diastolic BP-baseline	68.486	67.000	1.098
e. DBP-pre-frustration	68.595	67.538	.562
f. DBP-post-frustration	69.892	68.000	1.112

* p < .10
** p < .05
*** p < .01
**** p < .001