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Date December 1, 1988

AUTONOMIC REACTIVITY TO TELEVISION VIEWING IN PRESCHOOLERS AND ITS RELATIONSHIP TO THEIR ANGER ASSESSMENT INVENTORY SCORE

A Thesis

Presented for the

Master of Science

Degree

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Michelle Deanne Howell

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DEDICATION

To my parents, Martha and David, whom without their constant encouragement and support, this project would have never become a reality.

To my brothers, Pete, Andy and Chris for giving me their "brotherly advice" and encouraging me to "grin and bear it."

To my dear friends, near and far, for standing by me while sacrificing our friendship time for my education. Thank you!

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ABSTRACT

The purpose of this study was to examine the effect television may have on several physiological responses mediated by the autonomic nervous system and to assess the relationship between anger and these responses. A sample of preschoolers (N=18), ages 4-6 years enrolled in day care programs in Knoxville, Tennessee were assessed with a 15-item Anger Assessment Inventory Scale by their teachers. This was followed by viewing approximately 10 minutes of network television programming consisting of both neutral and violent, aggressive content.

The mean age of the children was 4.6 years with 55.6% being male and 44.4% being female. Ninety-four percent of the population was black. The mean AAI score achieved on the scale was 36.5 +/- 3.8, with a median split of AAI scores yielded the two groups with means of 23.7 +/- 2.1 and 49.2 +/- 4.0.

The results of the study showed a significant main effects of condition in HR, condition and time in ST, and time alone in SBP. The main effect of condition (television content) supports the hypothesis that children are reactive to television and its content. The effect of time was also significant, although this probably was a result of habituation over the television viewing period. However, in the measurements observed in the split AAI groups (N=9/9) score was a main effect in both HR and SBP. These results suggest high anger children

tend to be more reactive. Time and score were also a main effect in DBP, although Tukey's analysis failed to show the source of the interaction.

Overall, the study did show autonomic reactivity in the children in response to the television programming they viewed, with and without the effects of anger, and suggests that high anger children may be more reactive.

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CHAPTER I

INTRODUCTION

Research examining the role of anger in the etiology of hypertension (HTN) has received considerable attention in the past few years. There is evidence to suggest that the emotional response of anger is associated with alterations in physiological parameters, including elevated blood pressure (BP) (Ax, 1953; Diamond, Schneiderman, Schwartz, Smith, Vorp & Pasin, 1984; Dimsdale, Pierce, Schoenfeld, Brown, Zusman, & Graham, 1986; Holroyd & Gorkin, 1983; Schachter, 1957; Schwartz, Weinberger & Singer, 1981; Siegel, 1984). It has been argued that anger is a risk factor that may be predictive of HTN in later years, although there have been no definitive conclusions. Anger occurs ubiquitously among the population to varying intensities, and the recognition of this emotion in young children may become increasingly important in predicting HTN in the adult years.

In addition to the role of anger, research has suggested excessive cardiovascular reactivity in response to emotional arousal may predate or increase one's risk for cardiovascular problems in later life (Krantz & Manuck, 1984; Obrist, 1983; Steptoe, 1981). Although studies have not reached a definitive conclusion, there is speculation linking the exaggerated physiological responses such as elevations in heart rate (HR), BP and excessive catecholamine release

contributory to the atherosclerotic process (Krantz & Manack, 1984). For this reason, this research study was designed to observe the physiological responses to television viewing in preschool children, as well as to note the role anger plays as a behavioral characteristic in this reactivity.

Purpose of the Study

The purpose of this study was to measure preschoolers' physiological responses while watching television and to examine the relation of Anger Assessment Inventory scores (AAI) (Appendix A) with these responses during television viewing. These responses consisted of HR, BP, and skin temperature (ST) measurements, all of which are mediated by the autonomic nervous system. The following research questions will be considered:

1. Is there autonomic reactivity in response to viewing violent, aggressive television?
2. Is there a relationship between a child's score on the AAI and his/her autonomic reactivity to television viewing?

Operational Definitions

Anger: a child's score on the AAI as assessed by day care/preschool teachers

Autonomic Reactivity: response of the autonomic nervous system supplying smooth and cardiac muscle and glands in the body to an external stimuli in the environment in a direction consistent with that triggered by sympathetic nervous system activity.

Measures of Autonomic Reactivity:

1. Heart rate: physiological parameter assessed once per minute with the aid of a pulsemeter and recorded as the number of beats per minute.
2. Blood pressure: physiological parameter assessed by an electronic sphygmomanometer approximately every two and a half minutes and recorded as systolic/diastolic measurements.
3. Skin temperature: physiological parameter assessed once a minute through an Apple IIe computer biofeedback software program measuring skin temperature changes from baseline.

Television programming:

A. Neutral: programming without violent or aggressive content to produce relaxation and calm and to allow baseline measurements to be recorded.

B. Violence/Aggression: depicting overt expressions of physical force with intent to hurt or kill, or actually depicting hurting and killing.

Assumptions

It was assumed that all subjects had normal access to a television and spent a minimum of 10-15 hours/week watching network programming. The national average for television viewing at this age group is approximately 28 hours per week (Hoffman, 1988).

Hypotheses

1. Violent, aggressive television content will cause reactivity changes from baseline in ST, HR, and BP.
2. A preschool child's AAI score will be related to his/her autonomic reactivity while watching television.

Theoretical Framework

Sister Callista Roy

The theoretical framework for this study is based on the Roy Adaptation Model (Roy, 1976). This theory incorporates individual functioning as an adaptive system. The individual is the focus of the theory and the controller of the adaptive system. For this reason the term "biopsychosocial being" is utilized to identify the biological and social components of the individual (Fawcett, 1984, p. 251). To maintain equilibrium as an adaptive system the individual has two major internal regulator subsystems: the regulator and the cognator

(Roy & Roberts, 1981). It is with the two regulatory systems that function as complimentary units that individuals are able to perceive, process, and participate in the body's adaptational changes. The regulator system consists of physiological functions such as neural, endocrine, and perception-psychomotor systems working through the autonomic nervous system to set up a reflex action which enables the person for coping. This system facilitates physiological changes with internal stimuli. The cognator system identifies, stores, and relates stimuli so that symbolic responses can be made. Although the theory may not appear to be holistic, the two work synergistically to produce appropriate adaptation to adverse stimuli. It is necessary to have both the regulator and cognator systems functioning in syncrony to encourage effective coping. This system allows the individual to act consciously by means of thought or decision or unconsciously through defense mechanisms to facilitate changes. In order to safeguard healthy functioning the individual must adapt to environmental stimuli. The methods by which this adaptational process is facilitated includes four subsets of the adaptive mode: (1) physiological--body's basic needs and ways of dealing with adaptation; (2) self concept--composite of beliefs and feelings that one holds on to; (3) role function--performance of duties based on a given position in society dependent upon interactions with the other in a given situation; and (4) interdependence--one's relationship with significant others and support system. These modes are either effectors or activators of adaptive responses connected to the

regulator and cognator systems and maintain integrity and the functioning of the working unit (Duldt & Giffin, 1985).

This research study examined the physiological adaptive response of the individual. The series of changes the individual undergoes in an attempt to maintain his/her equilibrium are called coping mechanisms. The television clips provided the environmental stimuli (focal stimuli) which are the stimuli immediately confronting the individual that elicits responses from both the regulator and cognator systems. The regulator system is activated through the sympathetic nervous system (SNS) to set up reflex actions to ready the individual for coping. Aggression and violence may elicit catecholamine releases and subsequent elevations in HR and BP and decreases in ST.

If the television stimuli are perceived as stressors, the individual manipulates this stimuli so that it will fall within the zone of the individual's adaptive level. The adaptive level is the "zone that indicates the extent of stimuli that will elicit a positive response" and helps to determine whether the response to a changing environment will be adaptive or maladaptive (Roy & Roberts, 1981, p. 45). However, if the individual is unable to manipulate the stressor into his/her adaptive zone, the physiological arousal experienced may be potentially pathological. This response is dependant upon the cognators "intellect" and the response this elicits in the regulator system. The physiological arousal may be manifested as HR rises and BP elevations which may be associated with hypertension or cardiovascular disease. To alleviate the stressors or to decrease

their response to the stimuli, the cognator system must act either consciously or unconsciously to identify, store, and relate stimuli so symbolic responses can be made. If the television content is perceived as violent and aggressive, it is the role of the primary adaptive mechanisms to return the body to an adaptive level via the adaptive modes.

Adaptation is the process of coping with stressors, the end product of which is effective coping to promote "survival, growth, reproduction and self mastery" (Roy & Roberts, 1981, p. 43). This includes all the individual's interactions with the environment and begins with changes that lead to need deficits or excesses. These changes themselves are stressors which may cause adaptations of ineffective responses.

Within Roy's framework, anger is considered an adaptation via the regulators response to the cognators appraisal of the situation. If this response is inappropriate arousal in response to violent television programming, due to an interaction between the regulator and cognator anger and sympathetic systems, the individual never reaches an adaptive level nor does he/she utilize effective coping mechanisms. Those children with labile autonomic nervous systems which are easily aroused, may have serious deleterious effects to their cardiovascular systems in later life due to uncontrolled physiological responses.

This research study, while not directly assessing the role of the regulator and cognator systems, will indirectly evaluate a child's

ability to adapt to external environmental stimuli. This adaptation will be measured in changes from baseline in HR, BP, and ST.

CHAPTER II

REVIEW OF THE LITERATURE

The literature reviewed suggests two possible complications in individuals with both high levels of anger and labile autonomic nervous systems. These complications are HTN and cardiovascular disease (CVD). The development of HTN will be discussed first, followed by the discussion of the Type A Behavior Pattern (TABP) and the subsequent development of coronary vascular disease.

Review of the literature reveals several risk factors influencing the development of HTN. Those most frequently described include physical variables of age, sex, obesity, heredity and psychosocial variables such as anger. Although there have been several studies assessing anger and autonomic reactivity in adults, few studies have looked at children and none were discovered that focused exclusively on preschool children.

Borderline HTN is defined as a "condition of elevated BP with readings in the range of 140/90 to 160/100 mmHg in adults" (Julius & Esler, 1975, p. 685). This condition does exist in younger individuals (early adulthood) and is thought to be predictive of elevated BP in later years (Julius & Schork, 1978). Hypertension does exist in children as well; by definition, children of a normative sample pool will yield 5% who have BP in excess of the 95th percentile for their age (deSwiet, 1986). Autonomic reactivity due to the arousal

of the autonomic nervous system is believed by some to cause the initial BP elevation in many individuals (Folkow, 1982; Obrist, 1981; Chesney, Goldston & Rosenman, 1984). Studies suggested psychosocial behaviors such as anger and Type A behavior may affect an individual's autonomic reactivity and may predispose an individual to HTN (Dimsdale et al., 1986; Gentry, Chesney, Gary, Hall & Harburg, 1982; Holroyd & Gorkin, 1983; Hunter, Wolf, Sklov, Webber, Watson & Berenson, 1982; Matthews, 1982; Schwartz et al., 1981; Siegel, 1984; Siegel & Leitch, 1981; Siegel, Matthews & Leitch, 1983).

Psychosocial behaviors such as those stated above can be detrimental to an individual's health. In the early 1970's Lee Madow (1971) stated that:

> Man is an extremely complex emotional organism, and the way in which he copes with his emotions is what separates him most widely from the rest of the animal kingdom. His greatest pleasures in life come from the realistic fulfillment of his emotional drives. If his emotions are mishandled, however, this not only can lead to unhappiness but may actually interfere with the normal functioning of his body. One of the emotions that can cause the greatest harm is anger (p. 71).

Anger, a psychological and emotional expression found in individuals of all ages, has been suggested as an implicating factor influencing excessive autonomic nervous system arousal in response to environmental conditions (Ax, 1953; Dimsdale et al., 1986; Gentry et al., 1982; Harburg, Erfurt, Hauerstein, Chape, Schull & Schork, 1973; Holroyd & Gorkin, 1983; Schachter, 1957; Siegel, 1984). Ax (1953) proposed that anger is a mixed epinephrine-norepinephrine like response resulting in diastolic blood pressure (DBP) rises, heart rate

(HR) falls, galvanic skin responses and muscle tension increases in the angered individual without a history of HTN. Schachter (1957) also suggested that anger elicited a mixed epinephrine-norepinephrine like response in individuals; however, he conducted comparison studies between normotensive and hypertensive individuals. His results showed all subjects to have a cardiovascular response to anger provocation, and observed an even greater response in those classified as hypertensive.

Several possible pathways have been identified as the mechanisms for the development of HTN through anger. The first pathway, a psychosomatic theory described by Alexander (1939), suggested HTN to be a conflict between intense, aggressive hostile impulses and passive, dependent tendencies. This "hypertensive personality" is confronted with conflicts during interactions with other people, and passively inhibits or suppresses these hostile tendencies when confronted with their own anger. This inability to find socially acceptable vents for their feelings may elicit a flight or fight response which may stimulate the sympathetic nervous system and be deleterious.

This idea was later studied by Dimsdale et al. (1986) in which they found an association between suppressed (inhibited) anger and elevated BP. Their study was performed on unemployed adults in Massachusetts and included collecting a brief health history and information to assess anger in/anger out and guilt. "Anger in" is defined as suppressed anger, where as "anger out" is defined as free

expression of anger. Blood pressure was obtained approximately three times and averaged and the results showed a significant relationship between suppressed anger and systolic blood pressure (SBP) ($p<0.008$) after controlling for covariates of age, race, social class and obesity. No relationship was found to exist between suppressed anger and DBP. Gender and racial differences were significant in addition, as suppressed anger and SBP were significant for white males and exhibited a trend for black males. It is thought that the chronic elevation of BP seen in some individuals may be an effect of the inhibition of these hostile tendencies.

Another plausible pathway researched sympathetic responses of individuals to environmental challenges which is thought to exert a pathological effect by causing excessive autonomic reactivity in response to these challenges or stimuli presented. This sympathetic response to challenge may promote injury to the inner wall of the coronary vessels due to the hemodynamic forces at bifurcations and other stressed points to create "shear stress." These stresses may cause a series of events that may ultimately result in an atheromatous plaque by accumulation of smooth muscle cells which contain and surround cholesterol deposits (Ross & Glomset, 1976).

Several studies have suggested that anger may be related to the development of HTN; however, few studies have assessed the role of anger in this process. With no definitive answers presented in the literature, anger and its role in the etiology of cardiovascular pathogenesis clearly needs further research.

In a study done by Schwartz et al. (1981) cardiovascular patterns associated with anger, sadness, happiness and fear were examined while subjects were seated and while they exercised. The desired state was evoked through the use of affective imagery. The subjects (college students) were instructed to close their eyes and select a situation from the past or future that would elicit these types of feelings. Their results demonstrated that high DBP was associated with a high SBP during anger and, in turn, elevated SBP was associated with decreased HR. This relationship suggested that the rises in SBP were mediated by increases in peripheral resistance and as a result activated inhibition of the HR through the baroreceptor mechanisms. Following exercise, significantly greater increases in pulse rate and slower recovery of SBP were observed. Anger in the absence of exercise produced a unique vasoconstrictive response resulting in high peripheral resistance with activated baroreceptor mechanisms. However, anger in the absence of movement was associated with high SBP and DBP and relatively low HR. Therefore anger without exercise may elicit baroreceptor inhibition of HR while other central mechanisms maintain vasoconstriction. The results from this study were similar to the results reported by Ax (1953) and Schachter (1954). All three studies reported DBP rises, while Schwartz (1981) and Schachter (1957) observed HR rises. Systolic BP was found to increase in all the studies, although Ax (1953) found it not to be significant in his study.

Diamond et al. (1984) and colleagues studied the anger-related variables of harassment and goal blocking in college students. Expression of anger, a self report of hostility, and the preferred mode of expressing anger were all examined. Blood pressure and HR were obtained during manipulation of the anger related variables during a Super Pong video game. Among students with high scores on the hostility self report (Anger in r= -.50 and Anger out r= .33), there was a significant association with changes in SBP in response to game competition. Anger out (hostility) was also positively correlated with HR changes among these high scorers (r= .44), but negatively correlated with HR change among the low scores (r= -.24). It is hypothesized that those scoring high on the anger scale have more reactive autonomic nervous systems to a wide range of stimuli.

Harburg et al. (1973) examined a large population of married men from Detroit in an attempt to describe the social distribution of types of coping patterns (e.g., anger, hostility) and to relate such patterns to their health consequences. Living conditions such as socioeconomic status, crime rates and population density in addition to BP, measurement of skin color as a measure of genetic mix, and a measure of coping patterns with the Harburg Anger in/Anger out scale provided the researchers with the data needed to complete the study. The results showed that components of suppressed hostility (keeping anger in when attacked and feeling guilty if one's anger is displayed when attacked) were associated with high BP levels and percentage of hypertensive individuals for black high stress and white low stress

males. For all blacks involved in the study (approximately 51%), darker skinned men from high stress areas with suppressed hostility from anger in and guilt had the highest overall BP. In summary, those males characterized as having anger in as their coping mechanism had significantly higher DBP and more evidence of hypertensive disease than did their anger out counterparts. Overall, those classified as anger in individuals had a 19% hypertension diagnosis rate as compared to 12.25% for anger out individuals. This supports the hypothesis that suppressed anger may elicit DBP readings greater than 90mmHg.

In a similar study done by Gentry et al. (1982) the effects of race, sex, socioecological stress and anger-coping styles on BP levels were examined. This study included approximately 1000 individuals living in metropolitan Detroit from areas of both high and low socioecological stress and were further classified on the basis of race, sex, and mode of anger expression. Although the study confirmed many facts associated with HTN, the most important results indicated higher DBP and SBP levels in those individuals who suppress their anger than their counterparts who express anger frequently. Black men are more likely to have higher BP readings and the risk for being classified hypertensive was independently associated with all four classification variables, those most at risk being black males living in high socioecological stress areas and expressing their anger infrequently. These results indicate those most at risk may wish to attempt to change one or more of their classification variables, such

as decreasing their socioecological stress or adopting a more therapeutic method of anger ventilation, and as a result receive some physical benefit by decreasing their risk for HTN.

Holroyd and Gorkin (1983) conducted research with college aged men to study the effects of two HTN risk factors: 1) a positive family history of essential hypertension and 2) anger inhibition. Heart rate and BP were recorded and measurements of emotion with the Novaco anger scale and role play assertiveness scores were obtained. Those individuals classified as anger inhibitors had an overall higher mean HR. In addition, an analysis of variance examining the factors of family history, anger management, and type of role play revealed anger management and family history as significant main effects. An ANOVA performed on diastolic blood pressure revealed no significant main effect for anger management. The effect of family history was found to be significant for both DBP and SBP, those with a positive family history having elevated BP levels over their negative family history counterparts. In conclusion, this study adds strength to the correlation between anger and BP and suggests this has a relationship to family history.

Although the previous studies implicated the expression or lack of expression of anger in the role of BP regulation, these studies were all performed on adult subjects. Very few studies have looked at the effect of anger in children. One of the only studies examining anger in children was done by Siegel in 1984. Her study investigated the relationship between anger and cardiovascular risk among

adolescents. The subjects ranged in age from 13-18 years, and by using this age group she controlled the potential for the anger measured being due to the diagnosis of cardiovascular disease. The study assessed physical risk factors including blood lipids, BP, health habits, obesity, and physical activity level. Psychological risk factors were also assessed in addition to the anger index (developed by Siegel) and included anxiety, life dissatisfaction, life events, self concept and Type A behavior.

The adolescent who experienced frequent anger episodes has the following physical and personality characteristics: Type A behavior, overweight, and sedentary lifestyle. Data analyses reported an association between negative life events, life dissatisfaction, and low self esteem. The anger index allowed two measurements to be made: frequent anger out (FAO) and anger situations (AS). Those individuals with higher FAO scores had elevations in SBP ($F= 6.39$, $p<.01$) and DBP ($F= 2.83$, $p<.05$) with sex and age entered into the regression equation. Systolic blood pressure yielded a significant interaction when entered on the sex-by-anger interaction and was accounted for primarily by male adolescents. Siegel offered no explanation for the significant interaction in male subjects, but it could be suggested that boys more frequently direct their anger outward as their primary method of coping.

These results suggest that anger is associated with increased BP and may be predictive of cardiovascular disease in later life. However, further research in this area is necessary before definitive conclusions can be made. Since very few studies have been done on children, it becomes necessary to look at research on children involving the Type A behavior pattern (TABP) and the effect this behavior pattern may have in later life. Many researchers believe this behavior pattern may exist in childhood and is antecedent to that behavior pattern found in adults (Matthew & Angulo, 1980; Siegel, 1984; Siegel, Matthews & Leitch, 1983). The importance of exploring TABP and its effects in adulthood offers another perspective on the deleterious consequences emotions can have on an individual's health.

Anger and Type A Behavior Pattern

Anger is thought to be a component of TABP characterized by time urgency, aggressiveness, achievement striving and increased hostility (Rosenman, 1964). Several studies have examined the relationship between TABP and elevated BP variability. In order to understand the psychological and physiological concomitants related to HTN and cardiovascular disease, TABP must be explored.

Both the Tacoma study (Siegel & Leitch, 1981) and the Bogalusa Heart study (Hunter et al., 1982) published in the early 1980's found that adolescents who possessed certain Type A behavioral characteristics had elevated BP levels, making them candidates for

HTN. The Tacoma study collected behavioral variables including anxiety, self concept, life satisfaction, anger, TABP, and personality trait information on individuals in grades seven through ten. For each adolescent with an elevated BP above the 90th percentile, a normotensive student of the same school, age, class, and Quelelet index ((weight/height)^2) was selected. Overall, the results showed adolescents with an elevated BP differed from normotensive adolescents on a cluster of behavioral characteristics mainly associated with Type A behavior. Those individuals with high BP (above the 90th percentile) scored higher on the anger scale than individuals with low BPs. However, this study also found a correlation between elevated BP and weight status. Excessive weight may be contributed to elevated BP and anger, or anger may lead to a weight problem or vice versa.

In a separate study published by Siegel, Matthews and Leitch (1983), the data obtained from the Tacoma study found more BP variability in adolescents classified as extreme Type A (fully developed Type A) than their less developed Type A or Type B counterparts. Sex or age of the subject had no effect on the relationship, but weight again was implicated as a significant covariate. The Bogalusa Heart study (1981) examined children ages 8-17 years in a biracial community in the Southeastern United States. Physical risk factors (anthropometric measurements, BP, and serum cholesterol) were measured and psychological risk factors were assessed by the Hunter-Wolf A-B rating scale. The study found Type As had more elevated lipid levels than their Type B counterparts. Type A

white females had elevated DBP and Type A black males had elevated SBP as compared to those who were Type B. Hunter et al. (1982) stated the need for more research in this area to elucidate the pathophysiological mechanisms involved in childhood and to assess the predictive nature of behavior and lipid interactions for the future health status of adults.

Lawler, Allen, Critcher, and Standard (1981) examined TABP and physiological responsiveness to certain challenges. Sixth grade students were used as subjects and BP, HR, and skin conductance were measured via a polygraph. The challenge presented to the subjects involved responding to a light as quickly as possible. If the criterion for the challenge was met, positive feedback (display of money earned) was received. If the criterion was not met, no positive feedback was received. A second challenge consisted of unscrambling words in a limited time period, and positive reinforcement (money) was again used. A Bortner assessment was completed on each subject as well as a Matthew Youth Test for Health (MYTH) by their teacher.

The results of the study showed gender differences. Female Type As showed a larger increase from baseline in BP and HR in response to challenge. Blood pressure and HR were initially elevated in Type A individuals. These results may be explained by the maturation level possessed by some of the subjects at this age and therefore may show a relationship between TABP and autonomic reactivity similar to that seen in adults. This may support the theory that HTN does, in fact, begin in the childhood years. Physically some sixth graders are

similar to an adult, as they may have begun the maturational process complete with hormonal functioning. Sixth graders are more similar to adults than are preschoolers.

In a separate study by Lawler and Allen (1981) no direct relationship was found between TABP and a higher than average BP. In this study, 11-13 year olds were examined and BP, HR, and skin conductivity were obtained in addition to a family history questionnaire. The children were classified according to parental history of HTN and their own resting BP. The results showed children of hypertensives having elevated SBP and resting HR coupled with greater DBP reactivity. However, it did not show a relationship between TABP and family history of elevated BP. This may suggest that different pathogenic mechanisms are responsible for hypertension risk factors in children, TABP not being one of them.

The only study to date examining preschool children was done in 1983 by Lundberg. His study compared the MYTH results with BP and HR changes during challenge and rest. After obtaining MYTH scores, he found boys to have significantly higher scores than those of the girls measured (boys = 73.3 and girls = 52.2). Due to this rather large difference in MYTH means, only the data from the boys was included. Two groups of boys were formed on the basis of their median splits, those with high MYTH score (Type A) and those with low MYTH scores (Type B). The results showed a significant increase in SBP, DBP, and HR in all the boys during the challenge. Data analysis showed Type A boys had increased their SBP response to challenge significantly

higher than those classified Type B. No significance was found between DBP and HR during challenge or rest. His results give strength to the notion that Type A characteristics do exist in the very young, and that their autonomic reactivity is affected according to their behavioral characteristics and classification.

Television and Autonomic Reactivity

The previous studies attempted to demonstrate a Type A behavior pattern/anger response resulting in a cardiovascular response link in children. In addition, this excessive autonomic nervous system arousal has been suggested as the possible mechanism for the development of HTN. One plausible environmental condition that may stimulate the arousal is television viewing.

Television has become an integral part of the lifestyles of nearly all children in the United States' society. Approximately 98% of all American households own at least one television, and more than 28 hours per week are spent watching various programs by children two to five years old (Hoffman, 1988, p. 361-362). Most of today's television programming is enhanced by sound effects, action scenes and special musical effects to heighten a child's attention. The rapid changes within television programming content is an effort by media producers to elicit high levels of emotional reactivity in their viewers (Palmer & Dorr, 1980). Tannenbaum and Zillmann (1975) have suggested this excessive emotional reactivity may produce a more

generally aroused state and increase the chances of an aggressive response after watching television. The overall conclusion of research studies in an update in the Report to the Surgeon General (Rubinstein, 1983) proposes television to have a large impact on child development in five categories:

1. Cognitive and affective aspects of television;
2. Violence and aggression;
3. Social beliefs and social behavior;
4. Television and social reactions; and
5. Television and health.

The National Institute of Mental Health in 1982 suggested violence on television encouraged aggressive behavior in children (Rubinstein, 1983). Young children, especially, are not able to comprehend the "moral" of most television programs, and may view outward displays of anger as acceptable behavior. If seen as acceptable, anger may become a learned behavior and consequently may be frequently exhibited by some children. This excessive display of anger, verbal or physical, may cause sympathetic nervous system arousal in some children with labile autonomic nervous systems. The hormonal response to their anger is the release of epinephrine and norepinephrine, which evoke a myriad of physical and psychological reactions. It is these reactions that may predispose a child to HTN in later life.

It is important to note that not all preschool children are developmentally equivalent. Children of the same age and sex differ in their acquisition of language skills, retention of facts and understanding of abstract and concrete concepts (Stevenson, 1972). Television viewing has different effects on individual children. Therefore, generalizations about preschool children's attitudes about television in this area of research is very difficult, although television has been shown to elicit physiological arousal in children. Lazarus and Alfert (1964) performed one of the first studies measuring physiological reactivity while adults subjects viewed an anxiety provoking film depicting a bloody ritual in a primitive tribe. The subjects HR and skin conductivity increased significantly in response to the violent anxiety-provoking content of the film.

Osborn and Endsley (1971) researched reactivity in preschoolers exposed to aggressive, violent television programming consisting of human and cartoon violence and nonviolence and measured their galvanic skin response while viewing television programming. Their results suggested children responded more emotionally to all the violence portrayed in the television segment as shown by greater increases in galvanic skin response.

In the past 20 years, some researchers have studied the effects of habituation to television stimuli in individuals. Cline, Croft and Courrier (1973) studied boys between the ages of 7 and 14 and classified them as low and high television exposure subjects. Both

violent and nonviolent segments were shown with skin conductance and blood volume pulse amplitude responses measured. Both groups responded equally to the nonviolent segments, although a significant difference was noted after viewing the violent segments. The low television exposure boys showed greater emotional arousal through the amplitude of the skin conductance and blood volume pulse amplitude. These results suggest a possible habituation to violence or desensitization effect for those classified as heavy television watchers. This was, however, a small study and used only one violent film, so the external validity of the results is questionable.

Thomas, Horton, Lippincott and Drabman (1977) attempted to test the hypothesis that exposure to violence in television drama decreases the subject's emotional responsivity to portrayals of real life aggression. The subjects were boys and girls aged eight to ten years and reactivity was again measured through skin conductance. A segment of a police show viewed by the subjects contained shootings, violence and physical aggression and was followed by a videotape segment portraying preschool children fighting. However, the subjects were led to believe this fighting was occurring down the hall in another room at the time. The results of this study give considerable strength to the conclusion reached by Cline et al., (1973). These researchers found that repeated observations of violent acts may blunt a child's sensitivity to similar aggressive acts seen in person.

These children were not significantly aroused physiologically to the videotape of fighting children as those who did not see the violent program.

The question of television violence increasing the propensity for an individual to exhibit aggressive behavior has been the catalyst for many years of heated debate among governmental administrators, public officials, and health interest groups (Huesmann & Eron, 1986). In some children, watching any program on television such as a comedy, drama, or action packed cartoon may elicit this excessive sympathetic nervous system arousal. It is this so-called "harmless" television viewing that may actually cause considerable problems for individuals with an excitable autonomic nervous system. Heightened arousal, which may include blood pressure rises, heart rate increases, and muscle tension changes may promote HTN. Rubinstein's (1983) study of the Surgeon General's Report on Television and Social Behavior also suggested that television can heighten a state of general arousal in children and may induce certain behaviors.

If HTN actually begins in childhood, it is important to examine the relationship that exists between anger and HTN in children and important to remember the impact television has on children in today's society. Violence monopolizes almost 81% of all programs, with an average of 5.2 acts of violence per hour (Signorelli, Gross & Morgan, 1982, p. 46). It is interesting to note that media violence sells through advertising and most programs depend entirely on revenue from their advertising income for their survival in the network world.

Violent programs capture a high percentage of the viewers in today's society and advertising during these programs proves to be very lucrative for these companies. In addition, violence is considerably less expensive to produce. The story line can be dull as long as there is violence to keep the viewer's attention. Although the ads don't necessarily support the violence, it is the product sales that encourage producers to keep these shows on the air. As a result, there does not seem to be a decrease in the amount of violence portrayed on television.

Keeping all the above in mind, it is important to evaluate the impact television has on young children and their autonomic reactivity and the effect this arousal may have on cardiovascular functioning in later life.

CHAPTER III

DESIGN AND METHODOLOGY

Research Design

The research design for this experiment involved a true experimental design. A group of children was tested with manipulation of the independent variable employed by the researcher. The independent variable included the content of the television programming which potentially could elicit changes in the physiological parameters and included neutral and violent program content. For this reason, this group of children actually served as their own controls. The children were classified by their AAI scores as 'high' and 'low' anger subjects group depending on their individualized anger score.

The dependent variables in the study were the physiological parameters influenced by autonomic reactivity and included BP, HR, and ST. Several other studies have been conducted which employed similar research designs to assess physiological reactivity in response to an external stimuli. Among these are studies by Lawler, Allen, Critcher and Standard (1981); Lawler and Allen (1981); and Schwartz et al., (1981). All of these studies employed a single group of subjects who were exposed to some type of external stimuli to provoke autonomic

reactivity. The television content was chosen by the researcher to achieve the desired results and thus these studies are classified as true experiments.

Operational Definitions

The child's anger has been operationalized as the numerical score received on the AAI as assessed by their teacher. These scores ranged from a possible high score of 75 to a possible low score of 15 and suggest the propensity of anger in these preschoolers. This measurement is subjective as the score is derived from the teacher's behavioral assessment of the child in relation to written statements with a Likert scale type evaluation. A stipulation was enforced by the researcher which demanded the teacher to have been familiar with the child for at least six months to attempt to ensure accurate information and evaluation of the child.

Autonomic reactivity is defined changes in the physiological measurements of BP, HR, and ST. Blood pressure is defined as the amount of blood entering the arterial system and the resistance of the vasculature to blood flow. Systolic blood pressure occurs at the time of peak ejection flow into the arterial system. The closing of the aortic valves results in a decreased blood flow and a decline in pressure. The diastolic blood pressure measured was this lowest arterial pressure occuring just before the next cardiac cycle (Obrist. 1981).

Heart rate was defined as the number of heart beats per minute. When the SNS is activated, there is a release of the catecholamines, epinephrine and norepinephrine. The result of this cascade is an accelerated and more vigorous beat which is detected through changes in the heart rate baseline from the normal state (Vander, Sherman & Luciano, 1980).

Skin temperature was defined as the surface temperature of the skin and is an indirect measure of peripheral blood flow. This was measured by means of an external temperature sensor. An increase in the SNS constricts arterioles and precapillary sphincters, by contracting the smooth muscle fibers, subsequently decreasing the perfusion to the tissue. This decrease in circulation results in a decrease in ST and is observed as a change in the ST from baseline recordings (Groer & Shekleton, 1983; Vander, Sherman & Luciano, 1980).

The content of the television programming shown to the subjects was the only manipulation of variables in the experiment. The content was of two types, one being neutral programming and the other aggressive, violent programming. The neutral programming content was taken from a portion of "Mr. Rogers' Neighborhood" and included his traditional opening song, a brief introduction to the topic of the day (opera), followed by approximately 3.5 minutes of an example of an opera aimed at a preschooler's cognitive developmental level.

The aggressive, violent programming content consisted of a clip from "G.I. Joe" cartoon series seen every weekday afternoon in Knoxville, Tennessee. The clip portrays the "Joes," who are the good guys, fighting the "dregs of society" in a futuristic setting. The scenes include air combat with laser fighter planes as well as frightening exchanges including verbal and physical violence between the leaders of both sides.

Subjects

The sample utilized in the research consisted of 18 children between the ages of 4 and 6 years who participate in area day care/nursery school programs in the Knoxville area. One 6 year old child was included because at the time of consent, the child was 5 years old. Approval from the University of Tennessee was received with consent obtained from all participating faculty administrators. Approximately 75 consent forms were sent out by the day care facility to all prospective subjects' parents (children between the ages of 4 and 5 years) with a full description of the research and their child's involvement in the experiment (Appendix B). Twenty-seven consent forms were obtained for a return rate of 36%. Four parents refused to allow their child to participate, and 3 children were no longer enrolled in the day care center at the time of testing. Two children were extremely frightened by the research and refused to participate. As a

result, a total of 18 children took part in the study. Confidentiality was guaranteed and the participants were given the freedom to withdraw at any point in the study.

The demographic data of the subjects included the following information. The entire group consisted of 18 children; 55.6% were female and the remaining 44.4% were male. The mean age was approximately 4.6 years. 94.4% of the group fell between 4 and 5, with one 6 year old child included for previously mentioned reasons. Ninety-four percent of the subjects were black.

Anger Assesment Inventory

The instrumentation utilized in this study was modified from the anger index employed by Siegel (1984) in her research of the relationship between anger and elevations in cardiovascular risk among adolescents. However, her tool was a self-report instrument filled out by the adolescents themselves, which was not practical to use with preschoolers. Therefore the instrument was modified to be applicable to the preschool years and to be utilized as a teacher report tool.

The tool itself consisted of 15 questions assessing the behavior displayed by the child in everyday interactions with himself and others. The child was evaluated on a Likert scale ranging from 1 (never displays this behavior) to 5 (displays this behavior in nearly every situation). The questions dealt with the child's behavior when angry and focus on his method of anger such as throwing things,

raising his/her voice, or hitting other children and his/her ability to manage frustration when provoked. Siegel's (1984) tool was a modified composite of questions from the Edwards Personality Inventory (Edwards, 1966) and the AAI included a few original questions from the researcher. The data analysis of Siegel's research indicated a standardized alpha for internal consistency of .75. To date there has been no published data analysis of the scale's validity in her research.

Pilot Study for Validity

A pilot study was initiated by the researcher in an attempt to establish construct validity of the modified scale. Convergent validity was tested on ten children aged four to five at the University of Tennessee Child Development Lab. The MYTH index is a measure of Type A behavior determined to be valid and reliable in investigational studies (Matthews & Angulo, 1980; Murray & Bruhn, 1983; Murray, Bruhn & Bunce, 1983). The AAI and the MYTH were completed for each of the ten children by their teachers. A subscale of the MYTH was used to more specifically assess the child's impatience and hostility. A score was derived for each child from both the MYTH and the AAI and were compared statistically. It was rationalized that children displaying an impatient, hostile behavior should also display anger. It is for this reason these two instruments were chosen to establish validity.

The data consisted of results from both instruments and included age, sex, AAI score, total MYTH (TMYTH) scores and impatience/hostility (AMYTH) subscores. The TMYTH scores were the overall scores computed from the instrument and the AMYTH scores were computed from a number of predetermined questions utilized to measure inpatience/hostility. A correlation of .96 ($p<.0001$) was found between the AMYTH and the TMYTH. A correlation of .66 ($p<.03$) was found between the AAI and the AMYTH and .70 ($p<.02$) between the AAI and the TMYTH. These results give strong support to the construct validity of the AAI's measurement and its use in the study.

Measurement

The Biofeedback Microlab program employed in the study was developed by Human Relations Media for use with an Apple IIe computer. Biofeedback employs the use of sensitive electronic instrumentation to detect subtle changes in physiological parameters.

The program was loaded into the computer with the parameters modified for the study. These included setting the trial duration as well as the temperature intervals to be measured. The temperature sensor was then attached to the underside of the middle or second finger or one of the toes and secured with paper tape. The Biofeedback Microlab was then calibrated and ready for use.

Blood pressure measurements were recorded with the use of an electronic sphygmomanometer fitted with a child's cuff. The cuff was placed over the brachial artery on the left arm. Blood pressure readings were taken initially to record a baseline measurement and were then taken at the midpoint of the Mr. Rogers' segment, once during the return to baseline period, and at both the midpoint and end of the cartoon. The baseline was assessed by relative stability observed on the computer output. A total of five BP readings were taken.

The children's heart rates were measured with a Carolina pulsemeter. The light sensor was placed on the second finger of the left hand. A light flashed with each heart beat and the meter registered a HR per minute value. This instrument's validity was evaluated by manual pulse measurement and found to be accurate. An initial baseline HR was taken during the baseline segment with readings taken every minute during the entire Mr. Rogers' clip. A single reading was taken during the return to the baseline period when the computer showed a relatively stable ST. Readings were also obtained every minute during the G.I. Joe segment.

Procedure

The research took place in the Spring and Summer of 1988. Upon arriving at the testing site, the equipment was set up. calibrated and organized before the first subject was tested. At this point, one

child was brought to the testing area, which was in an area separate from the rest of the children. The research was explained to them briefly, and they were told that while they watch television their BP, HR and ST would be measured. The sensors and cuffs were applied after allowing the child to inspect them and offering an explanation as to how they work. They were encouraged to ask questions and the initial "hook up" was done slowly. If they seemed apprehensive, they were put at ease and if they resisted, they were given the opportunity to stop the testing at that point. Upon connection and application of all the necessary equipment, the videotape was started. The Mr. Rogers clip was shown first and lasted approximately five minutes. Upon its completion the child was allowed to return to baseline as assessed by stable ST readings. When baseline was reached, as determined by a stable ST, the G.I. Joe clip was started, lasting approximately five and one half minutes. HR and BP values were obtained as previously discussed and ST readings were obtained throughout the testing period, about every 30-45 seconds.

The teacher involved in assessing the child's anger index was given the child's form to complete during his testing period and he/she completed only one form at a time. This form was collected when the next child was brought to the "testing center" and a new form was left to be filled out for the next child.

When the child completed the testing session, he/she was given a small gift for their participation and was returned by the researcher to their classroom. The test scoring and data analysis were completed at the University of Tennessee, Knoxville Campus, with the Statistical Analysis System on the VAX computer.

CHAPTER IV

RESULTS

This chapter presents the results of the study. Data was analyzed by using the Statistical Analysis System on the VAX computing system. Each of the hypothesis are stated, followed by descriptive and inferential statistics, including figures to illustrate the findings of the study.

Testing of the Hypothesis

This was a true experimental study and the data were analyzed as interval level data by parametric techniques to test the hypotheses. Analyses of variance (Appendix C) as well as graphic displays of the changes observed were included. A significance level of $p < 0.10$ was chosen to use with all statistical analyses due to the small number of subjects (N=18), which offered a liberal range in which to find significance in the study. For this reason, the researcher has included several figures to facilitate complete illustration of the major trends observed in this study in support of the hypotheses.

Hypotheses and Results

Hypothesis I

Hypothesis I stated: The violent, aggressive content will cause changes in all the physiological parameters measured. These changes will be consistent with SNS arousal. An ANOVA assessing overall variability in HR, BP, and changes from baseline in ST were performed at every measurement taken (time) (excluding baseline measurements) between the conditions of control and experimental television content.

For the purpose of simplifying the understanding of the figures included in this paper, the following is an abbreviation key to the figures as well as a brief description of the content of the television clips during each of the testing intervals.

Baseline 1 (B1)- Offers an initial period of familiarization with the equipment and allows the children to assess their surroundings. Baseline parameters were measured.

Mr. Roger's 1 (M1)- Television on, videotaped introduction by the researcher followed by Mr. Roger's traditional opening song.

Mr. Roger's 2 (M2)- Continuation of the opening song, introduction by Mr. Roger's to the subject of the opera and the characters and plot of the opera to be viewed.

Mr. Roger's 3 (M3)- Beginning of the opera, singing to slow and soothing music, Miss Kitty requesting a star for her birthday.

Mr. Roger's 4 (M4)- Continuation of opera, exchanges between Miss Kitty and Half Moon about her birthday wish.

Mr. Roger's 5 (M5)- Miss Kitty picks her star, thanks Half Moon, and says goodnight.

Baseline 2 (B2)- Television turned off, subject allowed to reach a stable baseline before beginning experimental television content (time to reach baseline was approximately 30-60 seconds).

G.I. Joe 1 (G1)- Videotaped introduction by the researcher to GIJ, opening song of cartoon portraying lasers, fighting, and the role of the 'Joes'.

G.I. Joe 2 (G2)- Planes heading for a target (enemy military base) and using lasers and missiles to shoot down other planes and those on ground. People fighting people and asking for help.

G.I. Joe 3 (G3)- "Joes" to the rescue, using missiles to shoot down the bad guys.

G.I. Joe 4 (G4)- People taking cover from lasers, missiles, and bullets, bad guys are outnumbered and leave the area.

G.I. Joe 5 (G5)- Scene in a cave with a hostage gypsy queen. She has frightening voice and there are skeletons and mice around, adults are verbally fighting and demanding the gypsy queen to perform her magic against her will.

End of programming (End)- End of G.I. Joe clip with gypsy gazing into her crystal ball.

Heart Rate:

The HR assessed during the Mr. Roger's (MR) content had an overall mean of 95.2 +/- 12.4 beats per minute (b/m), compared to an overall mean of 98.9 +/- 10.8 b/m observed during the G.I. Joe (GIJ) content.

When statistically compared with an ANOVA, condition (television content) was a main effect ($F(1,34)=6.36$ $p<.02$). Figure 1 illustrates the pulse averages of all the children during the entire television viewing period and represents support for this hypothesis. The children did appear to be more reactive to the violent television content.

Skin Temperature:

Mean ST changes during the testing session are shown in Figure 2. Visual inspection of these data suggest there is a difference between the MR and GIJ segments and the overall mean ST changes assessed during the MR and GIJ did reveal a small difference. The mean change for all the children during MR was 1.2 +/- 0.5 degrees Fahrenheit (degrees F) compared to a mean ST change of 0.4 +/- 0.9 degrees F during the GIJ content. The results of the ANOVA indicate both condition and time to be significant main effects, $F(1,34)=3.64$ $P<.07$ and $F(1,34)=2.52$ $p<.05$, respectively.

The main effect of the condition of television content with ST suggest autonomic reactivity in response to the GIJ content as evidenced by a subsequent decrease in ST as a result of the stimulation of the SNS. Inspection of the time interaction with a Tukey's analysis (HSD=1.3) revealed no significant interactions between the time measurement interval when these values were combined, averaged and compared. Therefore this significance value is probably

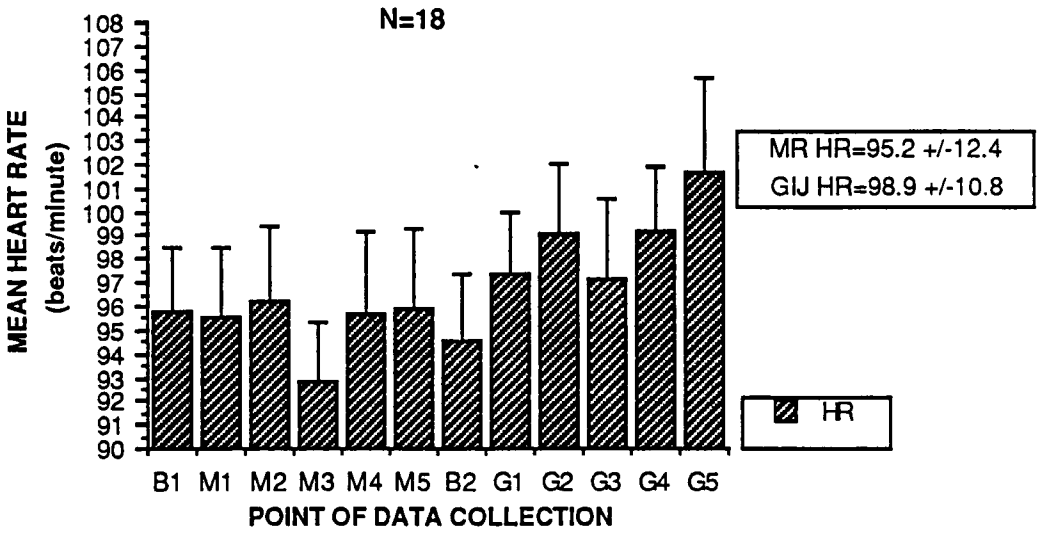

Figure 1. Mean Heart Rates in Response to Television Viewing.

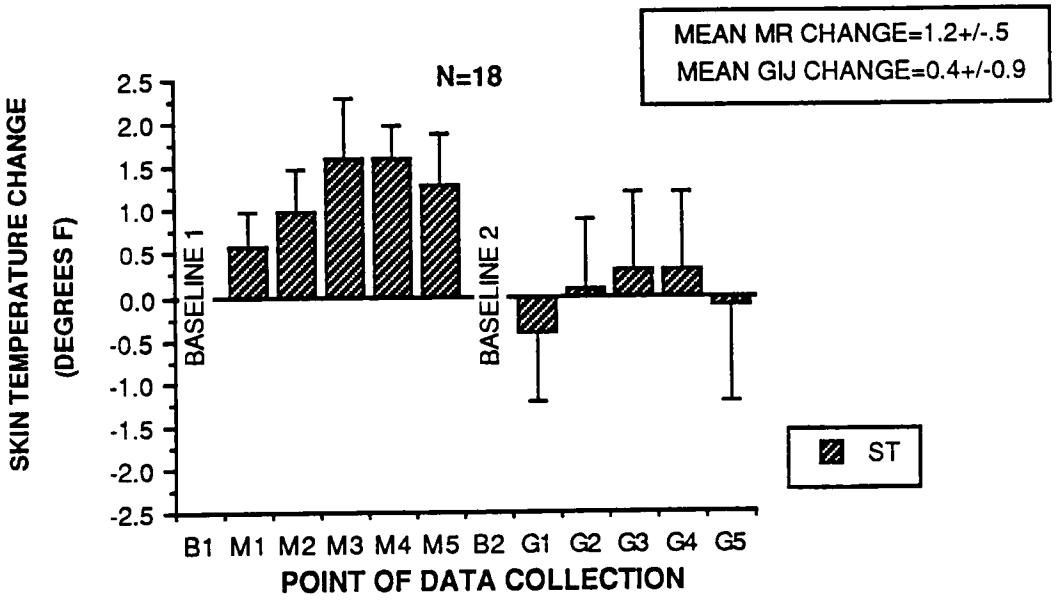

Figure 2. Mean Skin Temperature Changes in Response to Television Viewing.

due to the children becoming habituated over time to the television content.

Systolic Blood Pressure:

Figure 3 illustrates the mean SBP observed in all children in response to the television content. The mean SBP during the MR content was equal to 97.0 +/- 9.7 mm Hg, that during the middle of GIJ was observed to be 95.1 +/- 1.8 mm Hg, and the final GIJ reading was 101.3 +/- 3.0 mm Hg. A main effect for time was found ($F(1,24)=3.13$ $p<.06$); however Tukey's analysis revealed no significance between the measurement intervals.

Diastolic Blood Pressure:

Figure 4 illustrates the mean DBP observes in all the children in response to the two conditions in the study. The average MR DBP was 56.3 +/- 2.5 mm Hg, 54.9 +/- 2.2 mm Hg in the middle of GIJ, and 57.6 +/- 2.4 mm Hg at the end of the experimental content. An ANOVA revealed no significant main effects of condition and/or time in DBP.

Hypothesis II

Hypothesis II stated: A child's AAI score will be positively correlated with his/her autonomic reactivity while watching television. The ANOVA assessed the main effects of score, condition and time and the interactions these variables may have had in producing autonomic reactivity in these children.

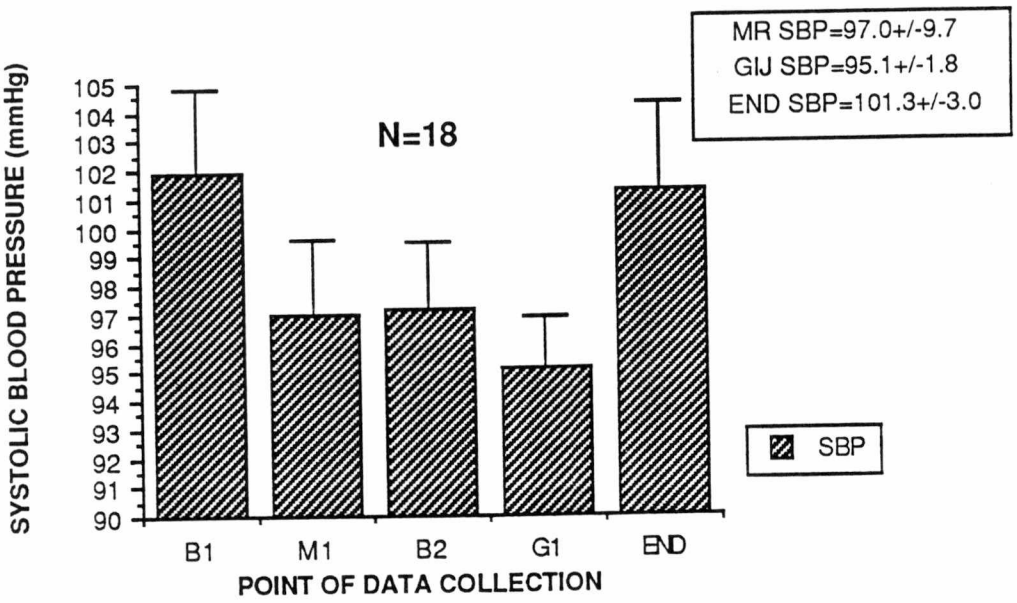

Figure 3. Mean SBP in Response to Television Viewing.

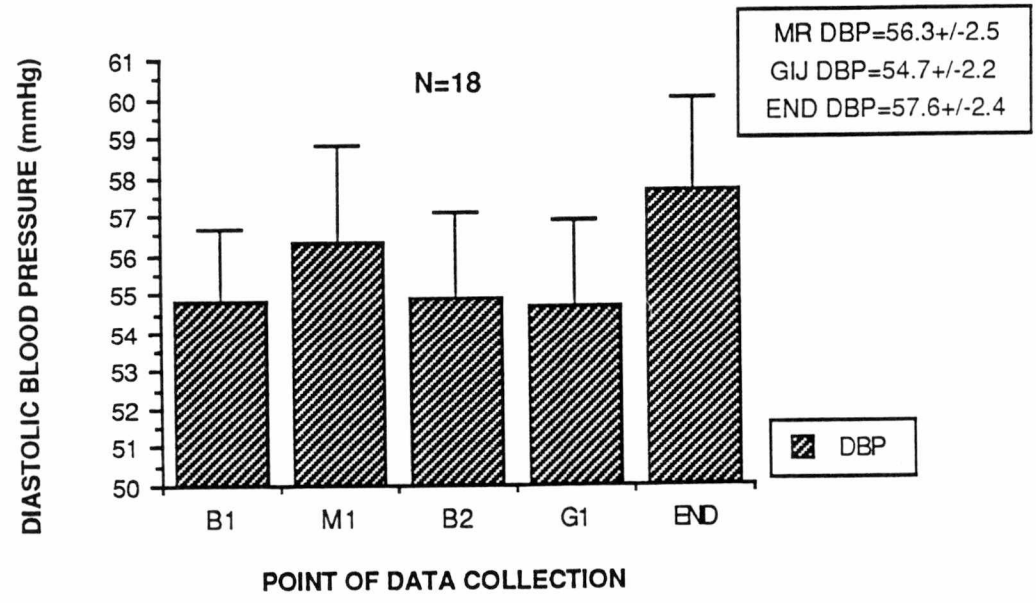

Figure 4. Mean DBP in Response to Television Viewing.

Visual presentation of the data did show evidence of changes in HR, BP, and ST. The overall AAI mean of the entire group was 36.1 +/- 3.8. The subjects were divided into high and low AAI score groups with all those scoring higher than or equal to 33 on the AAI placed in the high group and those less than 33 placed in the low group. The scores in this study ranged from 15-65. A 9/9 group split was achieved with the mean AAI of the low group equal to 23.7 +/- 2.1 and the mean of the high AAI group equal to 49.2 +/- 4.0.

Heart Rate:

Figures 5 and 6 illustrate the pulse averages of the high and low AAI scorers respectively. The overall mean pulse for the low AAI scores was 101.8 b/m compared to 92.3 b/m in the high AAI scorers. Fluctuation in HR was evident in both groups, with the high AAI scorers producing a more pronounced variability pattern. A score main effect was present ($F(1,34)=3.76$ $p=.07$) and suggests there was a difference between the high and low anger groups and their HR reactivity. A main interaction effect between condition, time and score was interpreted to be significant ($F(1,34)=2.05$ $p=.09$). To further examine the main effect of score, an additional ANOVA was performed on only the high AAI scores and the interaction between time and condition. However this value was found to be non significant.

Skin Temperature:

Figures 7 and 8 represent measurements of low and high AAI scorers and their changes in ST from baseline. Although the figures

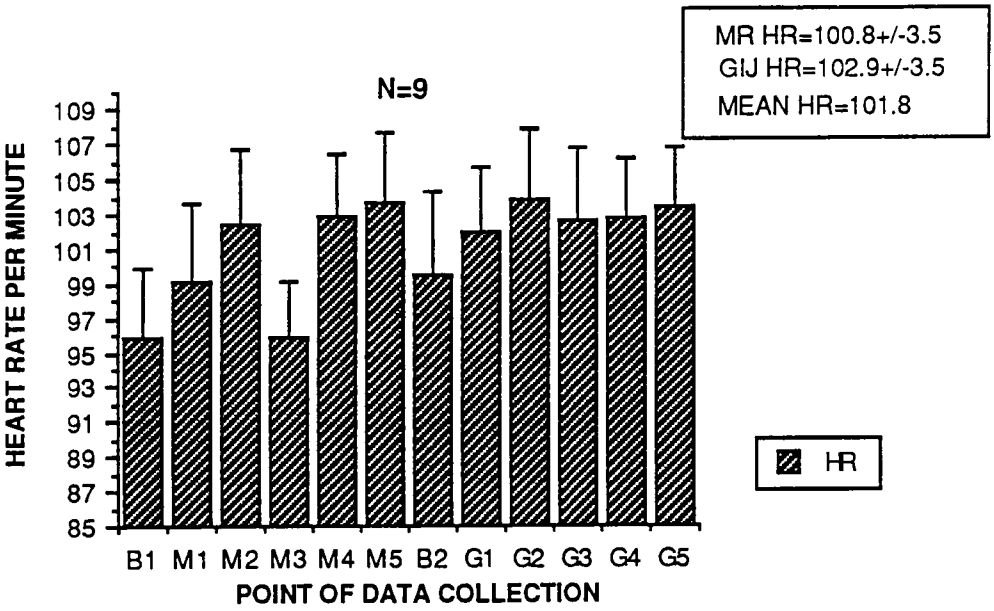

Figure 5. Low AAI Scorers and Mean Heart Rate in Response to Television Viewing.

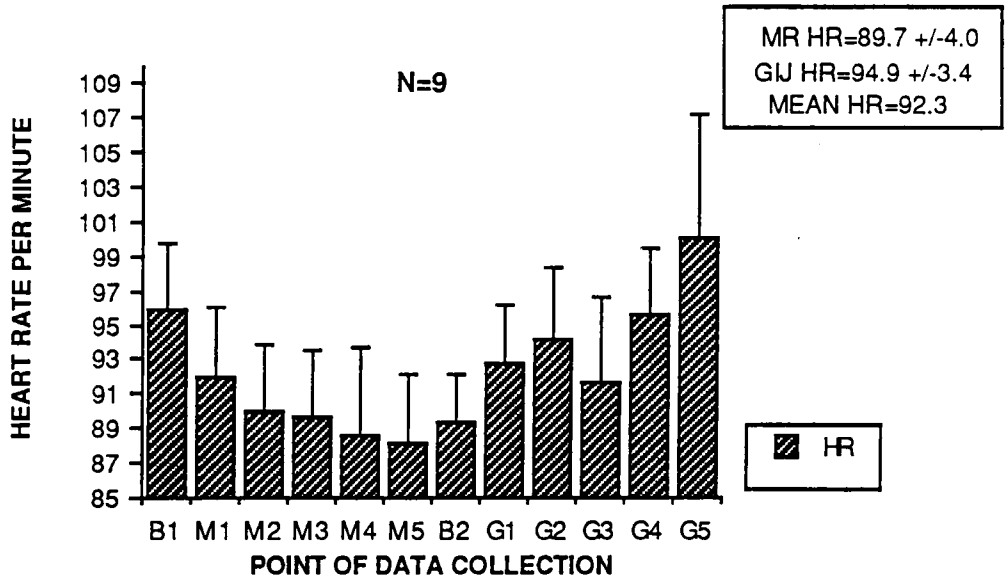

Figure 6. High AAI Scorers and Mean Heart Rate in Response to Television Viewing.

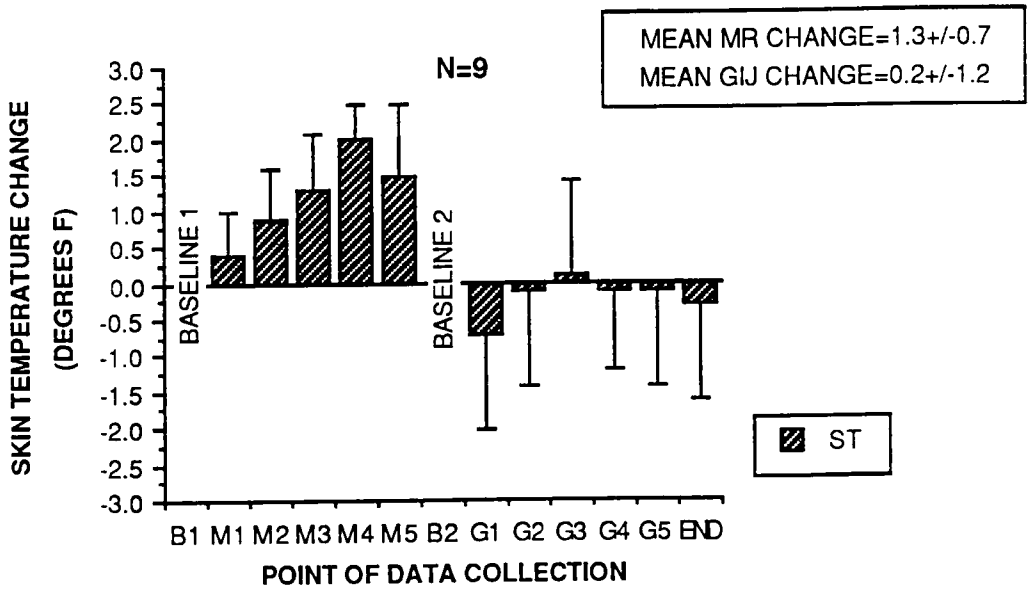

Figure 7. Low AAI Scorers and Changes in Skin Temperature in Response to Television Viewing.

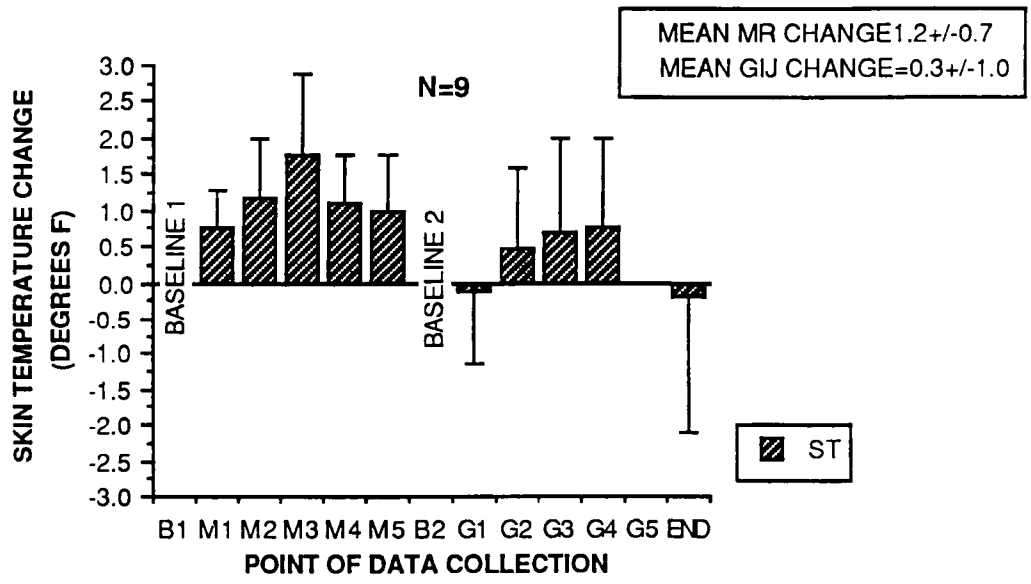

Figure 8. High AAI Scorers and Changes in Skin Temperature in Response to Television Viewing.

illustrate changes during the television programming, no main effects were found to exist between the two groups.

Systolic Blood Pressure:

The effects of television content on SBP between the high and low groups are illustrated on Figures 9 and 10. The ANOVA revealed a main effect of score ($F(1,27)=3.15$ $p=.10$. The differences between the low and high anger scorers for the three time measurements include the following SBP values: M1 Low=95.6 High=98.4, GI Low=90.6 High=99.0 End Low=100.7 High=102.0. It appears that those children possessing a high anger score had greater SBP means and appeared to increase to the stimulus of the television content, although condition was not a significant main effect.

Diastolic Blood Pressure:

The interpretation of Figures 11 and 12 represent the changes in DBP in both groups, and again reveal autonomic reactivity occurring in the children. An ANOVA performed found a significant interaction of time and score ($F(1,18)=2.50$ $p=.10$). However, Tukey's analysis (HSD=8.4) failed to reveal the source of the interaction.

In conclusion, the children did reveal trends between high AAI score and their autonomic reactivity observed while watching television. The discussion section elaborates further in these relationships in response to the television programming.

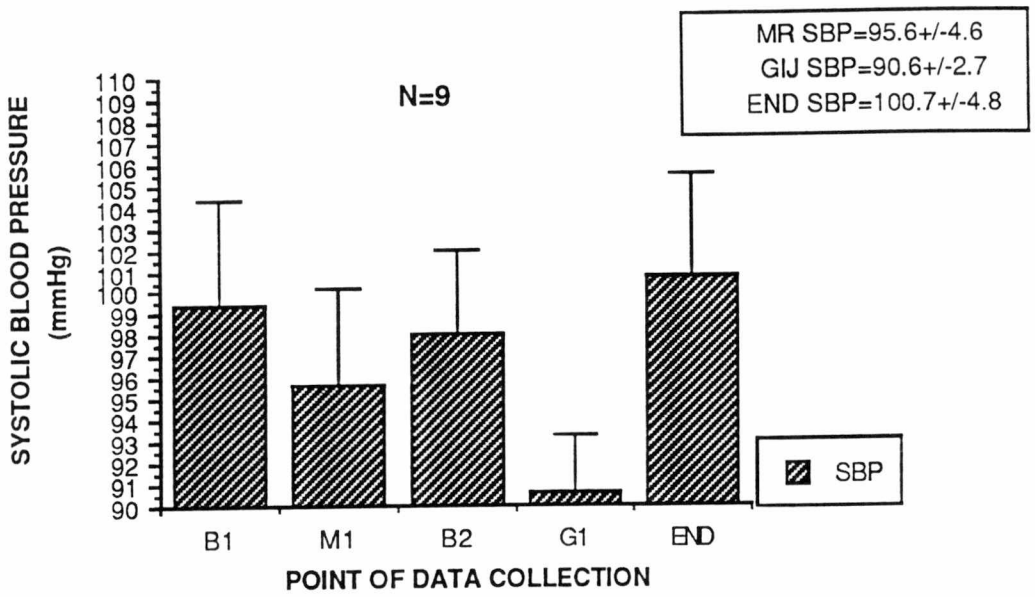

Figure 9. Low AAI Scorers and Mean SBP in Response to Television Viewing.

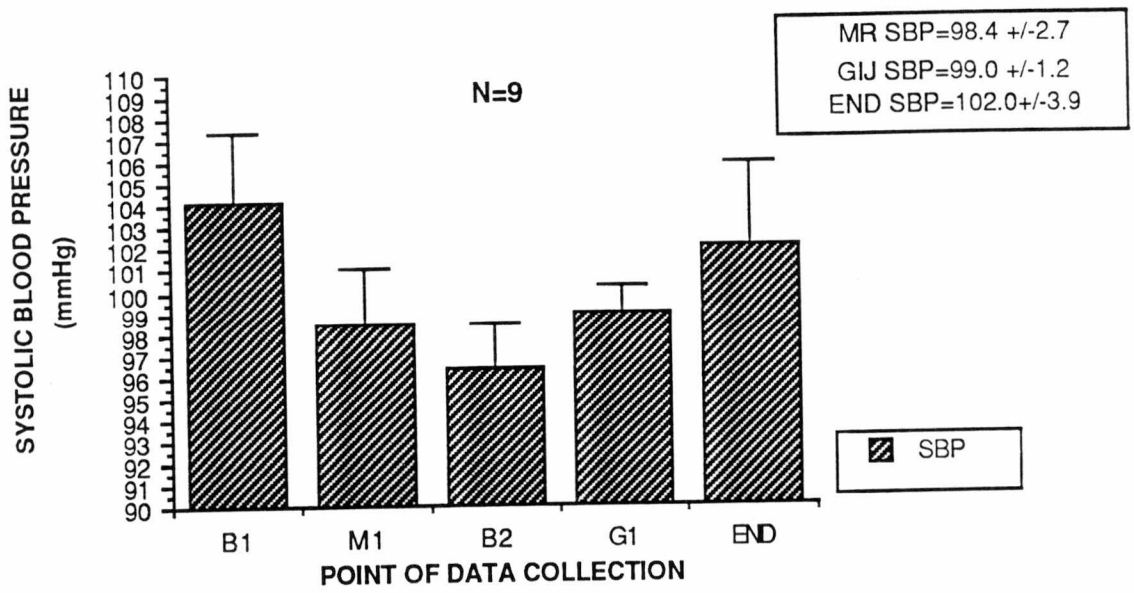

Figure 10. High AAI Scorers and Mean SBP in Response to Television Viewing.

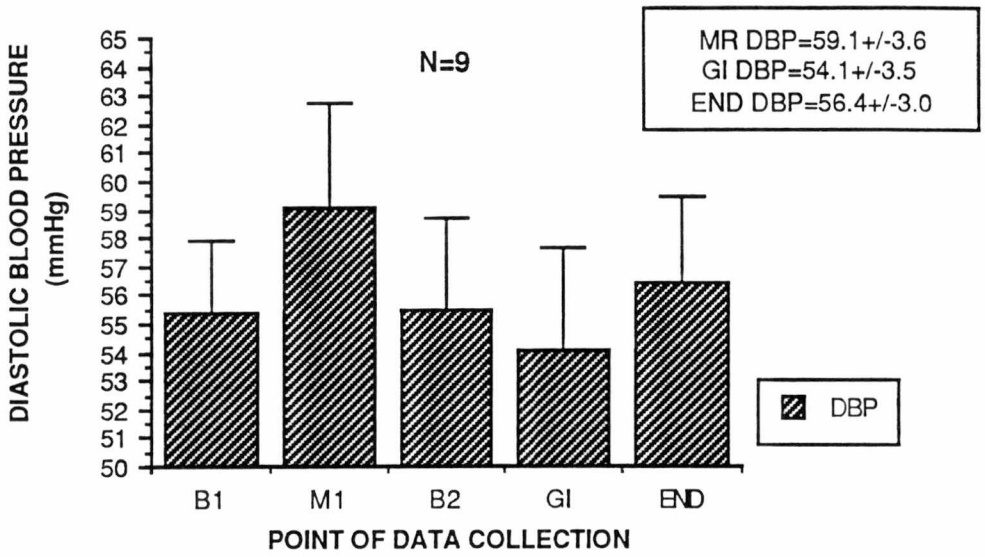

Figure 11. Low AAI Scorers and Mean DBP in Response to Television Viewing.

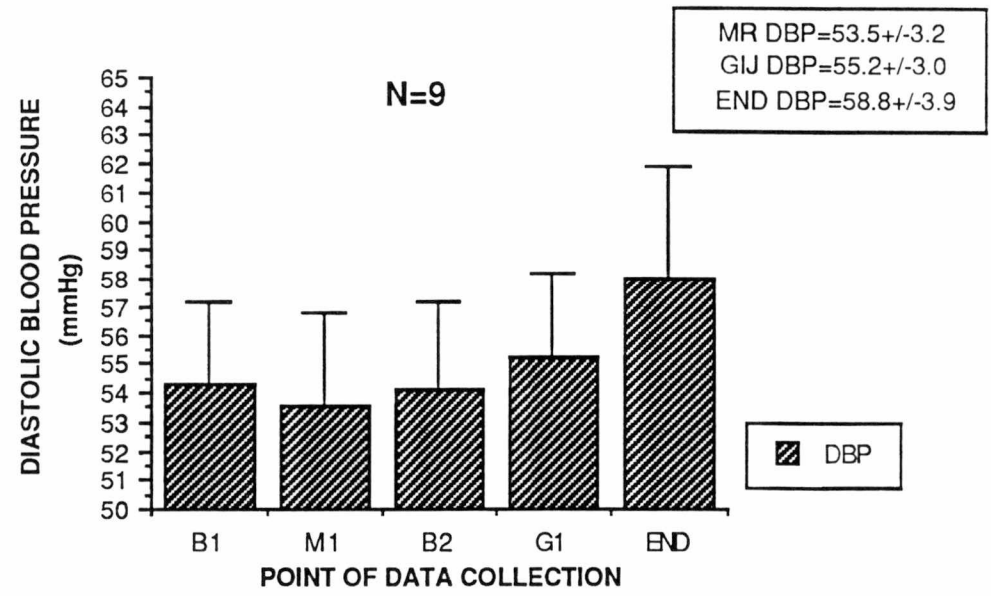

Figure 12. High AAI Scorers and Mean DBP in Response to Television Viewing.

CHAPTER V

DISCUSSION

This study was designed to measure changes in autonomic nervous system mediated physiological response to selected television content and to assess the relationship between anger and these responses. This chapter discusses the findings of this study and attempts to explain the phenomena observed as well as to describe limitations in the study and to suggest areas for future study.

Testing of hypothesis I found several main effects present. Condition, a measure of the difference between the two television contents was found to be significant in both HR and ST. In both HR and ST, the physiological reactivity assessed appeared to be consistent with arousal of the SNS as indicated by HR rises and ST decreases in the subjects. This suggests that the content of the programming did elicit significant changes in HR and ST.

Several experiments are reported in the literature demonstrating the effects of violence and aggression on physiological measures. Most of these studies utilize skin conductance and HR measurements in their findings. However, all the studies suggest that increased emotionality in response to the television viewing was evident in the subjects via the parameters measured in the study. Osborn and Endsley (1971) provided substantive evidence that the children in their study responded significantly to the portrayal of violence with increases in

galvanic skin resistance which indicates increased SNS activity and subsequent catecholamine release. With this hormonal cascade, one would expect to see changes in other physiological parameters due to the properties of the catecholamines.

The overall increase in HR observed during the GIJ content is consistent with other studies measuring physiological reactivity in response to environmental stimuli (Ax, 1953; Diamond et al., 1983; Lawler & Allen, 1981; Lawler et al., 1981; Schachter, 1957). The highest HR measured occurred near the end of the testing session during the cave scene with the gypsy queen and the frightening surroundings. Although small, it might be plausible to suggest that this frightening content, together with violence, may have been responsible for this HR elevation.

The main effect of condition did appear to elicit ST changes in the children. When the SNS is stimulated, a subsequent decrease in the peripheral ST is noted. As evidenced in Figure 2, smaller changes in ST were observed, indicating a decrease in ST. Time was also found to be a significant main effect in ST. Visual inspection of Figure 2 reveals a trend that appears to produce less arousal over time in response to the television stimulus. This may be habituation by the children to the television stimulus itself, regardless of the content viewed. Thomas et al. (1977) and Cline et al. (1973) have studied the effects of violence when prolonged or repeated viewing is permitted. An habituation to violence may have occurred in the children studied, and may be the reason time was a significant main effect for ST. The

ST measurement, a function of the peripheral blood flow to the skin, can be affected by several environmental influences such as ambient room temperature and the activity of the child prior to testing. All of these influences may have had some effect in these results. Nevertheless, it has been documented that stimulation of the SNS through some type of stimuli, in this study the television content, does produce decreases in ST through the aforementioned mechanisms (Ax, 1953). Several other studies have assessed the galvanic skin response, a measure of the skin's ability to conduct an electrodermal current in response to environmental stimuli as a measurement of SNS activity. Some studies have shown significant increases in galvanic skin responses to television viewing and staged situations involving fear and anger (Ax 1953; Cline et al., 1973; Osborn & Endsley, 1971).

Systolic blood pressure also has the three measurements of content (M1, G1, and End) as a significant main effect. This may also be due to a habituation effect in these children, although an increase was noted at the end of the experimental content. However, Tukey's analysis measuring the difference between the three measurement points did not reveal a significant difference. Therefore, this research offers only speculation as to the precipitation of this increase in SBP. Perhaps it was the element of fear (gypsy queen) coupled with the violent content that initiated the BP increases. Although no significant main effects were revealed, DBP and HR also increased at

the end of the GIJ cartoon, while ST showed little change. However, all these changes were expected if stimulation of the SNS occurred and elicited physiological responses to the television programming.

Although not every child reacted with equivalent vigor to the television programming in the study, the study was designed to observed the effects of television on children. Environmental conditions producing SNS arousal are characterized as requiring coping responses beyond those possessed by the individual. This problem of being unable to adapt effectively to stimuli and the subsequent excessive autonomic arousal has caused concern in recent years (Holroyd & Gorkin, 1982). These fluctuations in response to the stimuli presented, may possibly initiate hemodynamic conditions predisposing to HTN or CVD in susceptible individuals (Obrist, 1981; Steptoe, 1981). Cardiovascular hyperactivity or uncontrolled fluctuations in HR, ST, and BP may be evident prior to true acknowledgment of cardiovascular problems. Since the etiological basis for hypertension is not yet completely known, there is suggestive evidence to support the theory of cardiovascular hyperactivity in children leading to future problems in adulthood (Holroyd & Gorkin, 1982; Lawler & Allen, 1981; Lawler et al., 1981; Lundberg, 1982; Siegel, 1984; Steptoe, 1981; Obrist, 1981). This study supports that children are reactive to what they see on television but not all children are equally reactive.

Testing of hypothesis II found several significant main effects present. Condition and score were found to have significant main effects on HR. Condition was a main effect in the study for both groups. The mean HR assessed during the GIJ television content was greater than the mean HR assessed during the MR television content in both cases. This suggests that the violent content did elicit greater physiological reactivity in both groups of children.

The effect of time was also found to be a significant main effect. The low anger group appeared to have a higher mean HR than that measured in the high anger group. This may be attributed to their apprehension of the testing procedure or to the researchers.

Condition, time and score were also found to have significant interactions on HR. However, the additional ANOVA revealed no significance of time and condition in the high AAI scorers. This suggests that the results obtained in the high AAI scorers were not an interaction between time and condition and was probably a result of some other type of interaction.

The effects of the high and low anger groups were found to be significant in the SBP measurements. It appears that those possessing a high anger score had overall higher SBP rates than those possessing a lower anger score. This observation could be significant in individuals in which their fluctuations of physiological reactivity are consistent with those in the literature and may precipitate potentially pathopysiological changes in the cardiovascular system.

Diastolic blood pressure was noted to have a significant interaction of time and score. It appeared that the high anger group responded more characteristically in the manner expected with SNS arousal than those in the low anger group. The high AAI scorers revealed increases in DBP over time and were measured at their highest point at the end of the experimental content. However, the low AAI scorers were seen to have initially higher DBP during MR and followed with a decrease in DBP during GIJ. At the end of the experimental content the DBP was shown to have increased from the previous reading, though it was still not at the point measured at M1. This researcher offers no explanation of this phenomenon observed.

With the results presented in Chapter IV, it becomes evident that score alone and its interaction with time and condition were significant main effects in the study and suggest that reactivity is occurring in these children who may possess a higher anger score. These children may have been reactive to the television they viewed and the results of the study show a definitive trend. This data is consistent with the data available regarding the relationship between anger and autonomic reactivity. Most studies involving behavioral measures and physiological responses to an environmental situation revealed the more angry or hostile child to have significant changes in the parameters measured (Brown & Tanner, 1988; Lawler et al., 1983; Lundberg, 1983).

Conclusions

The results of this study indicate that autonomic reactivity may occur in preschoolers in response to television viewing and that those children possessing a high anger score may be more reactive than their low anger counterparts. The results of this study offer support for the two hypotheses presented and create the need for further research to be conducted in this area of study. It was interesting to note the results of the study given the nearly homogenous sample of black children. Perhaps the issue of race would also be significant in this research as many studies support the relationship between anger in black individuals and essential hypertension (Gentry, et al., 1982; Harburg et al., 1973).

The question of autonomic reactivity is perplexing to many researchers. However, with significance being found in some of these studies, it becomes necessary to investigate this area of study more completely to offer more definitive explanations of the phenomena. In recent years there has been little consistency in research studies and few replications have been published in this area. Without definitive answers, the questions posed remain a mystery.

Considerations in this investigation were the following: children's reactivity to television, propensity for anger and its relationship to autonomic reactivity to neutral and aggressive stimuli, and the effects of this cardiovascular reactivity on their health in future years. If the propensity for CVD and HTN can be

identified early in life, perhaps preventative measures can be taken by those at risk to lower their chances of these cardiovascular problems. Wellness teaching is essential in these reactive individuals and includes such nursing implications as relaxation techniques, diet and exercise recommendations, and stress reduction education. However, in this young age group, it is impossible to assure understanding with these wellness interventions. Therefore, it is necessary to educate the parents of these children about all the above interventions as well as the effects television viewing may have on preschoolers, regardless of the content. It is important to teach children and their parents critical viewing skills to limit the effect television has on their behavior and autonomic reactivity. Preventative health care measures taken early in life may alleviate numerous problems in adulthood, and research on this subject may offer a more definitive etiological basis for the development of CVD and HTN.

With the popularity of television and its increased use with young children in many day care/school classroom situations as well as in the home environment as a method of entertainment, this study becomes even more important. Due to the small sample size it is difficult to generalize these findings to the population. However, these results do provide a foundation on which to build future research studies. The trends established in this study, reactivity in

children in response to television programming and more reactivity to this content among the high AAI scorers, is the beginning of research in this area.

Limitations

The limitations of this study are listed as follows: 1) Difficulty in generalizing the findings of the study to the population due to small sample size; 2) For truly accurate data collection, a portable physiograph machine would have been ideal; 3) Lack of reliability and validity measurements on the instrument employed hindered the generalizability of the results; 4) The television content was not measured to determine if the children actually found MR neutral and GIJ violent.

Based on the data generated from this study, the following recommendations for future study include:

1. Study replication to see if similar results are obtained.
2. Expand the size of the sample.
3. Obtain a portable physiograph machine.
4. Obtain data on the amount and content of television watched per week.
5. Obtain a brief family history of each child including HTN, CVD, and kidney problems.
6. Include questions on the AAI that could measure not only displays of anger out, but also inhibited or repressed anger.

If children with labile autonomic nervous systems react excessively to environmental stimuli and predate them for future health consequences, it becomes necessary to do extensive research in the significance of this phenomena. Behavioral modification techniques may be appropriate for children who are hyperactive to environmental stimuli and respond to these situations with increased stimulation of their SNS. If television, an integral part of every child's life is one of the stimuli to which they are unable to adapt, nursing and parental intervention are needed as well. This includes television monitoring as well as the effects of environmental stimuli. As shown in the study, everyday television programming such as G.I. Joe cartoons can precipitate this SNS-like arousal. However, these changes would require not only the child, but also the parents and health care personnel to decrease the stimuli received and to integrate effective coping skills into their everyday routine.

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APPENDICES

APPENDIX A

ANGER ASSESSMENT INVENTORY

Anger Assessment Inventory

Name of Child_____ Age_____

Rater_____

This rating scale is designed to assess various aspects of a child's behavior. Please answer the following statements characteristic of the child on the scale given below:

1---never displays this type of behavior

2---infrequently, but occasionally displays this type of behavior

3---sometimes displays this type of behavior

4---displays this type of behavior frequently

5---displays this type of behavior in nearly every situation

1 2 3 4 5 1. This child has difficulty controlling anger when someone hurts him/her.

1 2 3 4 5 2. This child becomes so angry that he/she throws things.

1 2 3 4 5 3. This child raises his/her voice when he/she gets angry.

1 2 3 4 5 4. This child displays anger, but gets over it quickly.

1 2 3 4 5 5. This child gets angry with anyone who tries to restrict his/her freedom.

1 2 3 4 5 6. This child becomes so angry that he/she hits other people.

1 2 3 4 5 7. This child gets angry when he/she can't find something he/she is looking for.

1 2 3 4 5 8. This child is tolerant of others playing with his toys.

1 2 3 4 5 9. This child gets angry if his/her belongings are disturbed by someone.

1 2 3 4 5 10. This child gets angry if he/she cannot have something they have been told is off limits.

1 2 3 4 5 11. This child responds to frustration with anger.

1 2 3 4 5 12. This child has frequent episodes of anger.

1 2 3 4 5 13. This child gets angry when disciplined for doing something wrong.

1 2 3 4 5 14. This child gets angry when he/she must share with others.

1 2 3 4 5 15. This child likes to argue or debate with others.

APPENDIX B

LETTER OF PERMISSION (PROSPECTIVE SUBJECTS' PARENTS)

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

College of Nursing

March 8, 1988

Dear Parents:

You are invited to participate, along with your 4 - 5 year old child, in a research study by faculty from the College of Nursing at the University of Tennessee, Knoxville, Tennessee. The purpose of this research is to measure and compare signs of nervous system activity in children who are viewing television. You will be asked to fill out a family health history form, and a behavior form on your child. The experiment will consist of measurements of pulse, blood pressure, and skin temperature before, during, and after television viewing. These measurements would be done by the use of noninvasive portable equipment applied to the skin surface. There would be no pain or discomfort associated with any measurement. While the children are being measured, they will be viewing the video. The videotape on the television screen will consist of excerpts from television cartoon shows, and sports events and would normally be seen on television during the hours of 7:00 a.m. to 5:00 p.m. There may be some exciting, violent, and amusing scenes. Children will be asked to tell us their impressions of each scene. There are no risks at all in this research. We would stop the experiment if the child should not wish, at any point, to participate. The children will be given full explanations of all the procedures, and will given a small gift in appreciation. The research will be done in a quiet room at your child's nursery school/day care center.

All of the data obtained will be treated as confidential. Each child and his/her parents will be given a code number and only the researcher will have access to these codes. All data will be kept in a locked filing cabinet in Dr. Groer's office. Individuals will not be identifiable in any research presentation or reports that might arise from the research. Participation in this project is voluntary and your consent for participation may be withdrawn at any time prior to the completion of the data analysis by oral or written notice to the researcher listed below. If you withdraw or choose not to participate, you will not incur any penalty. If you have any questions about the study, please feel free to contact the researcher listed below.

I have read and understand the above statement. I freely consent to participate and allow my child _____ to participate in this project under the above conditions.

Parents or Legal Guardians:

_____

Date: _____

Dr. Maureen Groer
UTK College of Nursing
1200 Volunteer Blvd.
Knoxville, TN
37996-4110

APPENDIX C

ANOVA TABLES

ANOVA TABLES

SOURCE	DF	MEAN SQUARE	F VALUE	PR>F
Heart Rate				
Score	1	4118.45	3.76	0.0704
	16	1095.80		
Condition	1	601.33	6.36	0.0226
Condition/Score	1	110.45	1.17	0.2957
Time	4	74.875	1.24	0.3029
Time/Score	4	15.35	0.25	0.9060
Condition/Time	4	19.60	0.37	0.8288
Condition/Time/ Score	4	108.26	2.05	0.0984
High AAI scorers				
Time/ Condition	4		1.67	0.2904
Skin Temperature				
Score	1	2.74	0.13	0.7254
	16	21.42		
Condition	1	66.24	3.64	0.0745
Condition/ Score	1	4.67	0.26	0.6193
Time	4	4.70	2.52	0.0498
Time/Score	4	1.26	0.68	0.6112
Condition/ Time	4	0.37	0.23	0.9187
Condition/ Time/Score	4	1.21	0.76	0.5544

ANOVA TABLES (CONT)

SOURCE	DF	MEAN SQUARE	F VALUE	PR>F
Systolic Blood Pressure				
Score	1	359.15	3.15	0.1034
	11	113.89		
Time	2	141.25	3.13	0.0636
Time/Score	2	26.89	0.60	0.5595
Diastolic Blood Pressure				
Score	1	0.97	0.00	0.9471
	11	212.26		
Time	2	25.19	1.27	0.3020
Time/Score	2	49.85	2.50	0.1040

VITA

Michelle Deanne Howell was born in Boone, Iowa, on September 10, 1964. Her childhood years were spent living in the Midwest. In 1986, she graduated from Miami University with a Bachelor of Arts in Zoology.

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