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CORONARY-PRONE BEHAVIOR, CONTROL, AND REACTIVITY IN FEMALE CLERICAL WORKERS

A Dissertation

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Degree

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Lori Ann Schmied

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DEDICATION

To my husband, Karl, whose optimistic outlook has brightened many a dark day for me while completing my degree.

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ABSTRACT

Coronary-prone (Type A) behavior has been shown to be a risk factor for coronary heart disease. One mechanism by which this behavior pattern may lead to pathogenesis is by exaggerated sympathetic activity. Since Type As typically hyperrespond behaviorally to any threat to environmental control, this study examined cardiovascular reactivity associated with that behavior and performance on two tasks designed to produce and test learned helplessness.

Accordingly, 120 female clerical workers were given the Jenkins Activity Survey (JAS) and the Framingham Type A Scale (FTAS) to assess coronary-prone behavior (CPB). Locus of control was also given as a personality measure of control. Subjects were divided into three groups, each of which received differing levels of learned helplessness training on a concept identification (CI) task. Condition 1 subjects received noncontingent feedback on their performance. Condition 2 subjects received noncontingent feedback for one-third of the problems and no feedback for the remainder. Condition 3 subjects received no feedback at all. All subjects then worked on a timed anagram task. Heart rate (HR), heart rate variability (HRV), systolic (SBP), and diastolic (DBP) blood pressure were measured during the tasks and intervening rest periods.

Learned helplessness was exhibited by Condition 1

subjects as expected. Physiologically, it was accompanied by increased SBP and decreased HRV among Type As only. The Condition 2 subjects during the CI task exhibited differential Type and locus of control SPB and HRV effects with external As and internal Bs as the most reactive. The same pattern was also seen with HR during the CI task across conditions. DBP responses were greater in externals than internals during the CI task as well. These results are discussed in terms of the conflict arising from incongruent personality and environmental control interactions. It is suggested that these incongruencies can lead to greater reactivity in both Type As and Bs.

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CHAPTER I

INTRODUCTION

While the concept of psychological variables affecting physiological outcomes is not new, it is only in relatively recent years that empirical research has been carried out to demonstrate this relationship. Likewise there has been an increasing trend for using multi-disciplinary approaches in the study of health and illness. This is in sharp contrast to the 'medical model' approach widely used by the medical profession. The medical model assumes an underlying pathophysiological cause that can be determined reductionistically (Good & Good, 1981). Psychosocial varriables are virtually ignored in both diagnostic and treatment phases of an illness. While this simplistic approach has been adequate for interpreting certain disorders (i.e., infectious diseases), it is limited in use for a great many other disorders. One case in point is coronary heart disease (CHD). To view CHD as having a single cause is now considered outdated and inaccurate. A number of risk factors have been established and yet, in the tradition of the medical model, psychosocial influences had been largely ignored. The accepted physiological risk factors of smoking, serum cholesterol level, obesity, and hypertension, together predict less than half of the new clinical cases of CHD (Jenkins, 1971; 1976). Therefore, attention has

been turned to various psychological and social factors that might improve a predictive relationship.

Among these psychosocial variables is Type A coronary-prone behavior (CBP), a behavior pattern associated with increased risk for CHD (Dembroski, Weiss, Shields, Haynes, & Feinleib, 1978). This behavior pattern has received much attention in recent years because is has provided a theoretical framework consisting of both physiological and psychosocial components. This integration will be discussed more thoroughly in Chapter II, Coronary-prone Behavior. Chapter III expands this discussion to incorporate the specific research findings and problems associated with CPB in women. Finally, Chapter IV contains a treatise on control, another variable that has implicatins for an integrative model of psychological and physiological factors. Furthermore, it, too, has implications for both CPB and cardiovascular responding.

CHAPTER II

CORONARY-PRONE BEHAVIOR

Definition and Association with Coronary Heart Disease

The CPB pattern, also known as the Type A behavior pattern, is a syndrome thought to be associated with increased risk for CHD, independent of the other traditional risk factors. It has been 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 things or other persons" (Friedman & Rosenman, 1974, p. 67). Persons not exhibiting this behavior pattern are referred to as Type B.

The conception of this behavior pattern arose from clinical observations made by Rosenman and Friedman in the 1950's on coronary patients. Noting the inconsistency of the traditional risk factors in accounting for CHD incidence, Friedman and Rosenman then looked to certain behavioral characteristics that seemed pervasive among their clinical patients. From these observations a core of overt behaviors was identified that seemed to differentiate CHD cases from controls.

The cornerstone research effort investigating this behavior pattern was the Western Collaborative Group

Study. This was a large scale prospective study utilizing 3154 middle-aged men. These men were all originally free of CHD and were followed for 8.5 years. Traditional risk factors, such as age, systolic blood pressure, smoking, and serum cholesterol, were all assessed as was behavior type. The latter was accomplished via a structured interview developed by the researchers (Rosenman, Friedman, Straus, Wurm, Kositchek, Hahn, & Werthessen, 1964). At the end of 8.5 years, 257 subjects had experienced a clinical CHD event. Without adjusting for the influence of the traditional risk factors, it was found that Type A individuals had 2.37 times the risk of Type Bs for experiencing a CHD event. When the data were then adjusted for the impact of the other risk factors, Type A risk dropped to 1.97 times the risk of Type Bs (Brand, 1978). Thus Type A behavior, as defined by the structured interview, significantly accounted for unique variance beyond what could be explained by the traditional risk factors (Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975).

Further analysis of coronary risk and CPB has been done using a paper-and-pencil questionnaire to assess CPB. Jenkins, Rosenman, and Zyzanski (1974) found that Jenkins Activity Survey (JAS) Type As have an overall risk almost double that of Type Bs. This doubling of the risk holds even when variance accounted for by traditional risk factors is removed (Brand, Rosenman, Sholtz, & Friedman,

1976). Nevertheless, the best estimation of risk is gained when CPB is considered interactively with other risk factors, even though CPB is in and of itself an independent risk factor for CHD.

The relationship of CPB to CHD prevalence has since been confirmed as well in the Framingham Study (Haynes, Feinleib & Kannel, 1980), the Japanese-American Study (Marmot & Syme, 1976), and the Chicago Heart Association Detection Project (Waldron, Zyzanski, Shekelle, Jenkins, & Tannenbaum, 1977). Additionally, CPB has not only been related to incidence of CHD in general, but also specifically to incidence of myocardial infarction (Rosenman et al., 1975), risk for recurrent myocardial infarction (Jenkins, Zyzanski & Rosenman, 1976), angina pectoris (Jenkins, Rosenman & Friedman, 1966), atherosclerosis (Blumenthal, Williams, Kong, Schanberg, & Thompson, 1978; Frank, Heller, Kornfeld, Sporn, & Weiss, 1978; Friedman, Rosenman, Straus, Wurm, & Kositchek, 1968; Zyzanski, Jenkins, Ryan, Flessas, & Everist, 1976), and rate of atherosclerotic progression (Krantz, Sanmarco, Selvester, & Mathews, 1975). Mention should be made, however, of some studies that have in fact failed to demonstrate such associations. For instance, Dimsdale and colleagues have not found a significant association for CPB and atherosclerosis (Dimsdale, Hackett, Hutter, Block, & Catanzano, 1978; Dimsdale, Hackett, Hutter, & Block, 1980). Also significant CPB-CHD associations

have not been found in two major prospective studies: The MRFIT study (Shekelle, Hulley, Neaton, Billings, Borhani, Gerace, Jacobs, Lasser, Mittlemark, & Stamler, 1985) and the Aspirin Myocardial Infarction Study (Shekelle, Gale & Norusis, 1985). Explanations have varied but generally center on differences in sample population studied or the CPB assessment instrument used.

Description and Assessment

As mentioned earlier, CPB is a set of behaviors characterized by excessive time consciousness, competitiveness, impatience, and hostility (Rosenman, 1978). It is a core of behaviors elicited in some individuals by environmental demands rather than being present as a trait (Matthews, 1982). Whether it is genetic predisposition or certain socialization patterns or both that make an individual vulnerable to CPB is not yet known. Typically the behavior pattern is evoked during challenging or provocative situations. Although there is a tendency, as indicated by the name, to view Type A behavior as a discrete, dichotomous typology (i.e., either one is Type A or Type B), the pattern is theoretically considered along a continuum from complete absence of CPB characteristics (Type B) to total presence of those characteristics (Type A).

Assessment of CPB is accomplished by a number of

methods, each perhaps measuring slightly different facets of the behavior pattern. The original method is the Structured Interview (SI) (Rosenman, 1978). This standardized procedure, in which interviewers must be trained, relies more on voice stylistics and mannerisms of the individual for assessment rather than content of responses. Here degree of CPB is established within four categories ranging from B to completely developed (A1) Type A behavior. The SI has been validated with CHD incidence (Rosenman, 1978).

A number of questionnaire methods have been derived, facilitating large-scale screening for CPB. Only two, however, will receive discussion here. The foremost of these is the JAS (Jenkins, Zyzanski & Rosenman, 1979). Assessment here must obviously rely on content of answers. Questions emphasize the time urgency and achievement aspects of CPB. It has been validated both in regard to SI assessment (Jenkins, Zyzanski & Rosenman, 1971) and clinical CHD incidence (Jenkins, Rosenman & Zyzanski, 1974). Additionally it has demonstrated adequate (.60-.70) test-retest reliability (Jenkins, Rosenman & Friedman, 1968; Jenkins, 1978). Three independent subscales within the JAS have emerged in addition to the Type A scale: Job-involvement, Speed and Impatience, and Hard-driving and Competitive. Separate versions are available for different sample populations (employed versus unemployed), as well as a student form (Krantz, Glass & Snyder, 1974).

The Framingham Type A scale is another questionnaire method of CPB assessment (Haynes, Levine, Scotch, Feinleib, & Kannel, 1978). This scale, developed for use in the Framingham Study, also purports to tap various psychological components of CPB, has been related to CHD incidence, and has been validated as well against the SI (Haynes, Feinleib & Kannel, 1980). The other instruments that exist for CPB assessment have not been validated in a prospective study. Therefore, these three measures represent at this time the best psychometric vehicles, with the SI being perhaps somewhat superior in predicting CHD risk (Krantz & Glass, 1984).

Psychological Characteristics

Numerous studies have been carried out to determine empirically the behavioral and psychological attributes that constitute CPB. It is from these studies that the characteristic profile of the Type A individual as time-conscious, achievement-oriented, hostile, and impatient has been confirmed. For instance, support for the hypothesis that Type As indeed show greater time urgency has been shown in a study in which Type As judged that a minute interval had passed more quickly than did Type Bs (Burnam, Pennebaker & Glass, 1975). The same study also demonstrated that in the absence of a specified deadline, As will outperform Bs, although no performance differences exist

with a deadline. This could also be interpreted as an indication of greater achievement drive by As. When an experimental task requires delayed responding, however, Bs outperform As; this is presumably because As become impatient and consequently perform less accurately (Glass, Snyder & Hollis, 1974).

The high achievement drive exhibited by Type As was also apparent in a study by Carver, Coleman, and Glass (1976). In this study As reported feeling less fatigue than Bs on a treadmill test even when they had worked closer to their own physical limits. When faced with continual failure (of moderate rather than high salience) on an experimental task, As again outperform Bs (Krantz, Glass & Snyder, 1974). Self-report measures also point to the high achievement orientation of Type As. As not only rate themselves higher on achievement scales (Chesney, Black, Chadwick, & Rosenman, 1981; Matthews & Saal, 1978), but also achieve higher occupational status (Mettlin, 1976; Waldron, 1978), receive more rewards at work (Mettlin, 1976), and achieve more scholastic or athletic honors while in school (Glass, 1977a).

Type As report themselves as more dominant and aggressive than do Bs (Chesney et al., 1981). Carver and Glass (1978) found that As would increase intensity of an electric shock delivered to a confederate after working on a frustrating task. Holmes and Will (1985) have recently

shown that in a similar experimental paradigm, non-angered As gave a confederate more intense shocks than Bs but that there was no difference in the levels of shocks given by both angered As and Bs. Type As will also dominate a group discussion if possible (Yarnold, Mueser & Grimm, 1985) and engage in more aggressive interpersonal behavior during competitive situations (Van Egeren, 1979).

While early descriptive research tended to focus on behavioral characteristics, more recently attention has turned to the attributional and belief system possessed by Type As (Price, 1983). This belief system presumably then gives rise to the behavior pattern evidenced during particular situations. Price (1983) has hypothesized that these cognitions are accompanied by a variety of fears that then fosters the maladaptive coronary-prone behaviors. An example from her hypothesized belief set is the notion that positive self-worth is based on material attainments; thus the need for achievement is established. Although this current line of thinking remains largely theoretical, at least one study (Burke, 1984) offers self-report evidence in support.

Another current trend in research on the psychological aspects of CPB involves examining subgroups of Type A individuals. This trend is based on the fact that only a certain percentage of Type A persons will actually develop CHD. In fact some researchers have even gone so far as to

distinguish Type A behavior from coronary-prone behavior in contrast to the usual synonymous terminology (Matthews, Krantz, Dembroski, & MacDougall, 1982). This issue is further complicated by the discrepancies in assessment when comparing SI and JAS classifications. This raises the strong possibility that the two measures are not assessing the same aspects of CPB (Matthews, 1982; Matthews et al., 1982; Musante, MacDougall, Dembroski, & Van Horn, 1983). Hostility has been targeted as a likely discriminator among Type A individuals (Williams, 1984). Hostile individuals were found to have the greatest incidence of CHD in the Western Collaborative Group Study (Matthews, Glass, Rosenman, & Bortner, 1977) and the Western Electric Study (Shekelle, Gayle, Ostfeld, & Paul, 1983). Hostility has also been shown to interact with directing anger inward in Type A individuals' severity of coronary artery disease (Dembroski, MacDougall, Williams, Haney, & Blumenthal, 1984), as well as cardiovascular arousal (Dembroski, MacDougall, Herd, & Shields, 1979). Recently a subset of Type A individuals, called charismatic Type As, has also been identified and is associated with good health (Friedman, Hall & Harris, 1984; 1985).

Physiological Characteristics

Appropriate to its role as a risk factor for CHD, CPB has also been found to be associated with a variety of

physiological events deemed relevant. This has been important in establishing the possible mechanism by which CPB affects CHD. Without a physiological mechanism to translate the behavior pattern into pathophysiological events culminating in CHD, the whole concept of a coronary-prone behavior pattern is a mere heuristic device at best. In general the course of this research has followed two lines of endeavor: To identify pathophysiological responses that operate through other CHD risk factors and to demonstrate cardiovascular hyperresponsivity during situations that elicit the CPB pattern.

Thus far healthy Type As have been shown to have higher serum cholesterol (Friedman, Byers, Rosenman, & Elevitch, 1970; McCranie, Simpson, & Stevens, 1981), faster blood clotting times (Friedman & Rosenman, 1959), higher levels of fasting and postprandial serum triglycerides (Friedman & Rosenman, 1964), and postprandial sludging of erythrocytes (Friedman, Byers & Rosenman, 1965; Friedman & Rosenman, 1964). All of these occurrences have been implicated in the pathogenesis of CHD (Kuo & Joyner, 1955; Friedman, 1978). Furthermore, Type As excrete more norepinephrine during working hours (Friedman & Rosenman, 1959) and during stressful challenge (Friedman, Byers, Diamant, & Rosenman, 1975; Glass, Krakoff, Contrada, Hilton, Kehoe, Mannucci, Collins, Snow, & Elting, 1980). Other biochemical differences between As and Bs considered relevant to

CHD include decreased levels of growth hormone following arginine challenge (Friedman, Byers, Rosenman, & Neuman, 1971) and hyperinsulinemic response to glucose challenge even though glucose tolerance tests are negative (Friedman, Byers, Rosenman, & Elevitch, 1970). These are important in fat metabolism and cholesterol regulation (Friedman, 1977). To a lesser extent, excessive pituitary-adrenal-cortical system activity may be involved as well (Henry, 1983). Elevated levels of adrenocorticotropic hormone (ACTH) have been found in Type As (Friedman, 1977).

While this is an impressive conglomeration of possible pathophysiological correlates, the majority of these studies are now at least fifteen years old and actually represent data from a small number of subjects. Little recent work has been done to corroborate these findings with the exception of levels of catecholamines. In fact some catecholamine studies have failed to note A-B differences under challenge (Lundberg & Forsman, 1978; Frankenhaeuser, Lundberg & Forsman, 1980). A second point about these physiological correlates is that these findings are all the result of 'stressful' situations. Either situation is laboratory-contrived (Friedman, Byers, Rosenman, & Diamant, 1975; Glass et al., 1980) or represent naturally stressful times, such as during working hours in a job with continual deadlines (Friedman & Rosenman, 1959). In general, healthy Types A and B persons are not different in

resting levels of blood pressure, serum cholesterol, smoking, or obesity (Shekelle, Schoenberger & Stamler, 1976; Waldron, 1980; Haynes et al., 1978).

Cardiovascular Reactivity Research

Even though a synergistic relationship may exist between CPB and other CHD risk factors, the preponderance of evidence is for a psychophysiological relationship in which Type As are more reactive in a maladaptive fashion under stress. This notion of a 'dynamic' model (Haynes, 1984) proposes that Type As consistently respond to environmental stressors with excessive sympathetic nervous system (SNS) activation. Many researchers feel that cardiovascular hyperresponsivity, mediated by the SNS, can lead to pathophysiological consequences (Obrist, 1981; Drummond, 1983; McCubbin, Richardson, Langer, Kizer, & Obrist, 1983). These consequences can take a variety of forms. Among them is direct tissue damage to arteries caused by elevated levels of circulating catecholamines. This sets the stage for the atherosclerotic process by providing an appropriate environment for platelet aggregation, lipid deposition, and smooth muscle cell proliferation (McKinney, Hofschire, Buell, & Eliot, 1984; Ross & Glomset, 1976). Elevated circulating catecholamines also contribute to the production of arrhythmias (Lockett, 1965), as well as electrolyte imbalances caused by stress-

induced sodium retention (Lockett, 1965; McKinney, Hofschire, Buell, & Eliot, 1984). Clearly the mechanism of hyperreactivity may also act synergistically with other CHD risk factors, such as hyperlipidemia, to aid in the progression of coronary artery disease, for example. It should be noted that only one prospective study thus far has been done on cardiovascular reactivity and CHD. In this study (Keys, Taylor, Blackburn, Brozek, Anderson, & Somonson, 1971) diastolic blood pressure responses to a cold pressor task were predictive of future CHD.

Reactivity studies in CPB have mainly focussed on cardiovascular indices, such as heart rate and pressor responses, of SNS activation. The basic paradigm for such experiments is to compare resting measures of the physiological variables with measures obtained during a laboratory stressor. Reactivity then is defined as acute stereotypical physiological changes, stable over time and usually independent of basal or resting observations (Krantz & Manuck, 1984). While to review all studies (approximately 50; see Holmes, 1983; Krantz & Manuck, 1984; Myrtek & Greenlee, 1984; Wright, Contrada & Glass, 1985) in detail is beyond the scope of this thesis, the following study can be offered as a typical example. (Reactivity studies using female subjects will be examined in depth in a following section).

Dembroski, MacDougall, Shields, Petitto, and Lushene

(1978) tested 50 male students during three behavioral tasks: Choice reaction time, electronic 'ping-pong' game, and a series of difficult anagrams. Heart rate, heart rate variability, diastolic, and systolic blood pressure were measured at rest and during each of the three tasks. Averaged across the tasks, Type As (as defined by both SI and JAS) exhibited greater systolic blood pressure and heart rate responses. So even though reactivity was not shown by all variables, the aggregate evidence supported the notion of SNS hyperreactivity. Other reactivity and CPB studies have involved a variety of sample populations, such as healthy adult men (Friedman, 1977), healthy adult women (Lawler, Rixse & Allen, 1983), healthy male and female college students (MacDougall, Dembroski & Krantz, 1981; Manuck & Garland, 1979; Dembroski et al., 1978), children (Lawler, Allen, Critcher, & Standard, 1981), and adolescents (Siegel, Matthews, & Leitch, 1983).

Because of rather inconsistent results in reactivity studies (see Houston, 1983), a number of theoretical issues in the design and interpretation of these studies have arisen. One of these issues involves the nature of the tasks used. The task requirements in an experiment are seemingly critical in whether or not A-B psychophysiological differences will be observed. There is a differential engagement effect in which some tasks are better than others in producing A-B physiological differences. For

example, tasks involving moderate incentive (Manuck, Craft & Gold, 1978; Manuck & Garland, 1979) or characterized by a moderate degree of difficulty (Lovallo & Pishkin, 1980; Gastorf, 1981) will evoke A-B physiological differences. Since it has already been established that certain types of challenging situations are necessary to evoke CPB, it follows then that these are perhaps the situations that elicit the psychophysiological correlates.

The importance of challenge was therefore specifically tested by Dembroski, MacDougall, Herd, and Shields (1979). In this study 84 college-age men were subjected to cold pressor and reaction time tasks while cardiovascular responses were monitored. Both the SI and JAS were given to assess CPB. Half of the subjects received 'challenging' task instructions, i.e., task difficulty and good performance was emphasized. Results showed As to be more responsive physiologically than Bs during the cold pressor task when the challenging instructions were given. So tasks deemed unchallenging will not only fail to produce the Type A pattern, but will also not produce the SNS hyperresponsivity (e.g., Price & Clark, 1978; Goldband, 1980). If the task is very easy, there is no reason for As to try harder and consequently become more aroused. While this is certainly a viable explanation, it is also a 'catch-all' explanation. Any negative results can be attributed to insufficient experimental tasks. Seldom are tasks arranged

a priori to be adequately challenging; the conclusion that a task was insufficient is usually after the occurrence of negative results. Many of these experimental situations are subject to alternative interpretations of what characteristics are responsible for the elicitation of CPB. For instance, as Krantz, Manuck, and Wing (1986) point out, the Dembroski et al. (1979) experiment cited above actually had several task characteristics which were simultaneously manipulated. These included challenge, degree of engagement, positive incentive, and task difficulty. Thus the overlap of various task dimensions makes it difficult for the researcher to tease out CPB-relevant characteristics. As will be seen in the following chapter, this becomes of particular importance when disparate results with female subject populations are encountered.

Experiments in which control of the situation by a Type A person is threatened has produced A-B behavioral differences (Glass, 1977b). This alternative explanation will receive an extensive treatment in a separate section. Goldband (1980) has summarized the task characteristics needed for differential engagement by As and Bs as competitive, time-dependent, and potentially uncontrollable.

A related issue involving reactivity studies is that of interpersonal stressors. This is similar to the preceding notion of appropriate task characteristics in that several studies have found reliable A-B reactivity differences when

the laboratory stressor includes interpersonal or social interaction. For example, in Study I of Glass et al. (1980), subjects were involved in a competitive electronic game with a confederate who either did or did not harass the subject according to the experimental condition. Independent of the nature of the task or their performance, Type As showed greater heart rate and systolic blood pressure increases than Bs, as well as higher levels of plasma epinephrine during the harassment condition. Another example is the Friedman et al.(1975) experiment in which pairs of subjects competed for a bottle of wine. Type As had greater plasma norepinephrine increases than Type Bs during the task. However, results can also be attributed to other task characteristics, such as the presence of background noise, the task instructions themselves, and repeated venipuncture for the catecholamine assays.

Studies in which reactivity has been examined during the SI itself have also been put forward as supporting evidence for the need for interpersonal stressors in evoking A-B physiological differences. Dembroski, MacDougall, and Lushene (1979), Krantz, Schaeffer, Davia, Dembroski, MacDougall, and Shaffer (1981), and MacDougall, Dembroski, and Krantz (1981) all found A-B differences in systolic blood pressure responses during the SI. Additionally, heart rate response differences were found in Krantz et al. (1981) and diastolic blood pressure differences were

noted in Dembroski, MacDougall, and Lushene (1979). However, this phenomenon has not been replicated in as many other studies (Scherwitz, Berton & Leventhal, 1978; Smyth, Call, Hansell, Sparacino, & Strodtbeck, 1978; Lawler & Schmied, 1986). Certain methodological considerations, such as sample population and variations in when the physiological measures are obtained during the interview, may explain at least some of these inconsistencies. Furthermore, the possible confounding effects of using the Type A assessment instrument as the experimental task should be taken into account (Lawler, 1985).

Two studies which suggest that the CPB pattern may be mediated at least in part by constitutional factors, as opposed to situational variables, are deserving of mention. In the first study (Kahn, Kornfeld, Frank, Heller, & Hoar, 1980), intraoperative blood pressure was monitored during coronary artery bypass surgery while the patients were under general anesthesia. Type As exhibited greater increases in intraoperative blood pressure, compared to blood pressure taken at hospital admission, than Type Bs. These results were replicated by Krantz, Arabian, Davia, and Parker (1982) with additional findings that the increases were not due to increased preoperative blood pressure and that these changes were related to SI assessments rather than JAS. These results imply the possibility of a constitutional component of CPB that is unrelated to

evocative tasks. This has led Krantz and Durel (1984) to suggest that it is the SNS reactivity that gives rise to the behavioral aspects of CPB. In other words, the hyper-responsivity may be the underlying substrate for the CPB pattern. This hypothesis has received additional support from pharmacological studies in which SNS activity was manipulated (Krantz, Durel, Davia, Shaffer, Arabian, Dembroski, & MacDougall, 1982; Schmieder, Friedrich, Neus, Rudel, & Von Eiff, 1983). In both studies beta-blocker medication (which suppresses SNS activity) was administered to an experimental group. Krantz et al. (1982) found that individuals on beta-blockers were less intense in Type A behaviors, particularly speech stylistics, during the SI, while no differences were observed in content of answers. Schmieder et al. (1983) found that individuals undergoing beta-blocker therapy became successively less Type A, as defined by the SI, over a 6-week period. So an interaction between situational factors (environmental), cognitive factors (perceptual), and constitutional reactivity (physiological) may be responsible for the overt manifestations of CPB.

The type of assessment of CPB used is another factor in reactivity studies. In general the SI is held to be the better predictor of A-B differences in reactivity (Houston, 1983; Krantz & Manuck, 1984; Matthews & Haynes, 1986). If the SI and JAS are measuring different facets of the CPB

pattern, then perhaps the SI-defined CPB is more relevant to psychophysiological responding. Again, however, results are not consistent with either measure and therefore conclusions as such may be premature.

Other individual differences in addition to CPB may influence whether or not enhanced cardiovascular reactivity occurs. For instance, family history of cardiovascular disorders, such as hypertension, interacts with CPB in affecting reactivity (Williams, Lane, Kuhn, Melosh, White, & Schanberg, 1982). Another source of interaction with CPB is hostility. Dembroski, MacDougall, Herd, and Shields (1979) found that even with minimally challenging laboratory tasks, highly hostile As exhibited significant SNS arousal. Gender differences may also play a major role in CPB and reactivity. This has in fact been posited as a likely explanation for some inconsistent findings (e.g., MacDougall, Dembroski & Krantz, 1981) and will be discussed in the following section.

Finally, Holmes (1983) points out that often the reactivity studies are described as producing all positive results (i.e., A-B differences), when in fact only certain of the physiological variables differ. A reliable difference on one measure will be found but not on another and moreover these respective differences (or lack thereof) will vary from study to study (c.f. Myrtek & Greenlee, 1984). In other words there is a tendency to ignore the

negative or even merely inconsistent findings when reviewing these psychophysiological studies. These singular findings may be task-induced rather than reflecting an overall tendency by As to hyperrespond. Inspection of reactivity experiments does in fact show that while diastolic blood pressure and heart rate responses are neither consistent nor reliable in differentiating As and Bs, systolic blood pressure responses are a more likely candidate. However, out of over 40 reactivity studies, about 70% show enhanced reactivity by As on at least one of the physiological variables (Krantz & Manuck, 1984).

CHAPTER III

WOMEN AND CORONARY-PRONE BEHAVIOR

Association with Coronary Heart Disease

To date there has been only one prospective study in which CPB has been examined for a relationship with CHD in women--the Framingham Study (Haynes, Feinleib & Kannel, 1980). In this study 1674 male and female subjects in the Framingham Cohort were given an extensive psychosocial questionnaire at their 8th or 9th biennial examination. This questionnaire included a 10-item Type A behavior scale. Eight years later subjects were examined for evidence of CHD. Relative risk for Type A women incurring CHD was established at 2.1 times Type Bs when other risk factors were controlled.

Three other studies have examined CPB-CHD incidence using cross-sectional data. Rosenman & Friedman (1961) in the earliest such study found that Type A women had four times the CHD prevalence than Type Bs. In this study it should be noted that none of the typical assessment procedures were used in determining behavior type. Persons familiar with the CPB concept selected participants that exhibited characteristic traits for either type. Bengtsson, Hallstrom and Tibblin (1973) studied women who had suffered CHD incidents (myocardial infarctions, angina, or EEG changes) and age-matched healthy controls.

The myocardial infarction survivors scored higher on aggression scales than did the healthy women. The authors linked the aggression factor to CPB, although the latter was not directly measured. Another study looked at healthy and CHD-hospitalized women also and found higher JAS Type A scores among the CHD women (Keningsberg, Zyzanski, Jenkins, Wardwell, & Licciardello, 1974). Finally, angiography studies using the SI classification (Blumenthal et al., 1978; Frank et al., 1978; Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980) all indicated that Type A females, as well as males, showed greater degrees of coronary artery occlusion.

Unlike with men, the association between CPB and CHD does not seem to be independent of other coronary risk factors. No significant associations with cholesterol level, blood pressure, and smoking were found in the Framingham Study (Haynes et al., 1978a). While Shekelle, Schoenberger, and Stamler (1976) did find positive associations between elevated blood pressure and higher JAS scores in older (45-64 year old) women and a small correlation between smoking and higher JAS scores in younger (25-44 year old) women, they did not find a significant relationship with cholesterol levels. These studies are in contrast to Blumenthal et al. (1978), who found that SI Type As had higher levels of serum cholesterol. These women, however, already manifested coronary artery disease

and therefore may have produced confounding results for CPB and cholesterol levels. Rosenman and Friedman (1961) also found significant associations between CPB and serum cholesterol and diastolic hypertension in women. Waldron (1978) reported higher systolic blood pressure levels in employed Type A women.

Smyth, Call, Hansell, Sparacino, and Strodtbeck (1978) examined blood pressure responses monitored during the SI in inner-city black women. No A-B differences were found in the blood pressure levels, although intrasubject pressor variability was greater for Bs. This study was not measuring reactivity but averaged pressor responses during the interview only. The authors suggest that CPB may be more adaptive, cardiovascularly, for stressed inner-city black women. Since this sample population is so unique, extrapolation to the general female population is unwarranted.

In short, although analyses in general indicate unique and independent contributions of the different risk factors to CHD incidence in men, the intercorrelations between the various risk factors are inconsistent in women. Coronary-prone behavior assessment, age, and employment all seem to affect the various relationships either singly or synergistically.

Degree of Coronary-prone Behavior in Women

Prevalence of the Type A behavior pattern itself among

women has been less than clear. While some studies suggest that CPB is more prevalent in men than women, other studies produce evidence to the contrary. Employment seems to be the key determining factor. Silver, Jenkins, Ryan, and Melidossian (1980) found that men with coronary artery disease scored more Type A (JAS) than women. Haynes et al. (1978b) also found that women were in general less Type A than men. However, employed women possessed CPB at comparable rates to men. Waldron et al. (1977) administered the JAS to employed men and women. The younger women (18-25 year old) were found to be less Type A than the same aged men, while no differences in Type A prevalence existed in the older subjects. Shekelle, Schoenberger, and Stamler (1976) also reported similar rates of CPB among employed men and women when socio-economic status was controlled. Additionally, three other studies have reported no gender differences in degree of CPB (MacDougall, Dembroski & Musante, 1979; McCranie, Simpson & Stevens, 1981; Hicks & Schrettlin, 1981). Three studies have in fact shown a higher prevalence of Type A behavior in females compared to males (Lundberg, 1980; Waldron et al., 1980; Koskenvuo, Kaprio, Langinvaino, Romo, & Sarna, 1981). In Koskenvuo et al. (1981) the women held high level administrative jobs, while in Waldron et al. (1980) and Lundberg (1980) female subjects (college students) all had high career aspirations. So apparently gender differences in Type A

prevalence exist unless aspects like age, socio-economic status, and employment are taken into account. Socio-economic status is largely a function of employment and may therefore be redundant.

Behavioral Characteristics

No studies have examined only behavioral aspects of CPB and women. In general, what data exist have been collected in studies in which both males and females have been used as subjects. These studies, covering diverse areas such as time urgency (Burnam, Pennebaker & Glass, 1975; Yarnold & Grimm, 1982), attentional focus (Weidner & Matthews, 1978; Matthews & Brunson, 1979; Carmody, Hollis, Matarazzo, Fey, & Connor, 1984), and competitive behaviors (Van Egeren, 1979b), have found no gender differences in behavioral characteristics. However, in all these cases Type A women were behaviorally different from Type B women. As with males, Type A females had a greater sense of time urgency, were more competitive, and had a narrower attentional focus than do Type Bs. Measures of anger or hostility have mixed associations with CPB in regard to gender differences. Williams et al. (1980) in their angiography study reported that high hostile (MMPI) Type A women and men had greater incidence of coronary artery occlusion. As mentioned previously, there are possible confounding effects in this study since CHD was already in evidence.

In contrast, Waldron et al. (1980) and Haynes, Feinleib, and Kannel (1980) found significant correlations between various measures of anger and CPB in women but not in men. Waldron et al. (1980) used the JAS measure of CPB, while Haynes, Feinleib, and Kannel (1980) used the Framingham Type A scale. In both studies the anger measure was derived from questionnaires constructed by the respective authors.

Reactivity Studies

The reactivity studies employing female subjects are few indeed compared with similar studies with men. Although results are by no means conclusive, there do seem to be certain patterns in the presence or lack of responsivity in Type A women. The reactivity studies can be divided into two classes: Those in which both males and females are used and those in which female subjects only have been studied.

Of the six studies using both male and female subjects, four have found no female A-B differences in physiological measures of reactivity. Manuck, Craft, and Gold (1978) studied systolic blood pressure in students (half female) during conceptual problem solving. The task was administered with monetary incentives for correct responses and penalties for incorrect responses. Only Type A males exhibited greater increases in systolic blood pressure than

Bs. Not only was there a CPB gender difference in responding, but also a gender main effect in systolic levels such that males had higher systolic blood pressure throughout the rest and task conditions. It should be mentioned that the CPB assessment instrument used here was the Sales Inventory, an unvalidated Type A scale.

Lott and Gatchel (1978) used the student-JAS on a mostly female student sample. The tasks used were a cold pressor test and a heart rate biofeedback task. They found no A-B differences in systolic blood pressure, diastolic blood pressure, or heart rate measures.

Van Egeren (1979b) also looked at heart rate and finger pulse volume responses in male and female students during competitive tasks. In a two-person interaction task, no heart rate differences were noted by gender or by type (student-JAS-defined). However, Type As did exhibit diminished pulse volume amplitudes, reflecting SNS vasoconstriction. In a second study (Van Egeren, 1979a) the task was changed so that instead of just competing, subjects had to decide to either compete, cooperate, reward, punish, or just withdraw from interaction with a confederate. Here Type A scores were positively correlated for both males and females with heart rate responses. Furthermore, gender differences were observed in that losing females had greater heart rate responses than winning females in

contrast to winning males having greater heart rate responses than losing males.

Gastorf (1981) found no gender differences in pressor responses when subjects performed anagrams of varying difficulties. Therefore, physiological data for male and female students were pooled. Behavior type was again assessed by the student-JAS. A-B reactivity differences were reported for systolic blood pressure with As having greater increases, averaged across task conditions. Closer inspection showed that As were more reactive only during the difficult condition or, interestingly, when they were led to believe that the task would be difficult. Bs, on the other hand, were only reactive during the difficult task. Thus, male and female Type As seemingly react to external cues about a situation.

Steptoe and Ross (1981) also used the student-JAS to evaluate male and female college students. In this study no A-B differences in heart rate or pressor responses were found during a variety of experimental tasks. Likewise, no gender differences were reported either.

Weidner and Matthews (1978) examined systolic and diastolic blood pressure and hand temperature responses during task conditions of predictable and unpredictable noise. Specifically, Type A and B women (student-JAS-defined) attempted to solve math problems for varying lengths of time while listening to predictable or unpredictable bursts

of aversive noise. Only systolic blood pressure responses differentiated As and Bs during the tasks. During the predictable noise condition, As exhibited greater systolic blood pressure increases. Physiological variables again were measured only once before and then after the task, rather than being monitored continuously.

MacDougall, Dembroski, and Krantz (1981) attempted to replicate previous findings of increased SNS reactivity in Type A males during challenging tasks (Dembroski et al., 1978; 1979). Therefore 60 female students were assessed for CPB by the SI, student-JAS, and the Framingham Type A scale. Cold pressor and reaction time tasks were administered while heart rate and pressor responses were monitored. No A-B reactivity differences were found. The lack of a Type A response to the cold pressor task was actually consistent with results from Dembroski et al. (1978; 1979), as well as Goldband (1980) and Lott and Gatchel (1978). A cold pressor task is apparently not an appropriate task to elicit A-B physiological differences in either males or females. A second study was then carried out using different tasks (e.g., a challenging oral history quiz) and adding a monetary incentive to the reaction time task. Again no A-B differences were found during the latter task. However, SI Type A women showed greater systolic blood pressure responses during both the SI itself and the quiz. There were still no heart rate response differences.

This was interpreted as evidence that an interpersonal stressor is required to evoke A-B differences in women.

Lawler, Rixse, and Allen (1983) examined professional women and housewives for SNS reactivity. Forty-one women were given the JAS and heart rate, pressor, and skin conductance responses were monitored during mental puzzle solving and arithmetic tasks. Interestingly, the employed women were all Type A, whereas the unemployed women were more evenly divided between As and Bs. Furthermore, the majority of the As scored as very strong Type As, scoring above the 65th percentile on the JAS. This study reported physiological reactivity by Type As, similar to that found in studies with male samples. Type As had greater increases in systolic blood pressure during the tasks. The most reactive group, in fact, was the unemployed Type As. Employed As, in contrast, exhibited the greatest heart rate responses. However, Type Bs had higher heart rate levels overall than Type As during the resting periods. There were no A-B differences in diastolic blood pressure or skin conductance.

This study was then followed by a similar experiment with female college students (Lawler, Schmied, Mitchell, & Rixse, 1984). An identical experimental paradigm to the above study was used, except for the substitution of the student-JAS and SI for the JAS for behavior type determination. Although all the females in this sample were

professed career-bound women, the group was divided into traditional female career majors (e.g., education and nursing) and traditional male career majors (e.g., engineering and math). Females pursuing the traditional male careers were more predominantly Type A. This is in line with increased prevalence of CPB among professional women found in Lawler, Rixse, and Allen (1983), as well as Morell and Katkin (1982) and Pirie, Luepker, Folsom, Jacobs, Gillum, Blackburn, and Johnson (1983). However, in contrast to Lawler, Rixse, and Allen (1983), there were no significant differences in physiological reactivity by As and Bs. This held not only with SI classifications, but also with student-JAS extreme A-B groups and median-split As and Bs. So the reactivity observed in professional Type A women was not replicated in college-age females.

Lane, White, and Williams (1984) also found no A-B reactivity differences in college-age females during a mental arithmetic task. Here CPB was assessed by the student-JAS. Forearm blood flow was measured in addition to heart rate and pressor responses since it showed differential responsivity for male As and Bs in Williams et al. (1982). There was, however, an interaction effect between CPB and family history of hypertension. In the positive family history group, the Type As were hyperresponsive cardiovascularly.

Since the lack of positive CPB reactivity results in

both Lawler et al. (1984) and Lane, White, and Williams (1984) were possibly due to the nature of the tasks used, Lawler and Schmied (1985) added an interpersonal stressor. This time both the JAS and student-JAS were administered. According to MacDougall, Dembroski, and Krantz (1981), the addition of an interpersonal stressor should enable differential task engagement by As and Bs to occur. Using an oral history quiz as the interpersonal task, in addition to an individual conceptual problem (Stroop Color-Word test), again no clear reactivity differences in heart rate and blood pressure by As and Bs were seen. There was only a modest tendency for JAS As to be more reactive in heart rate during the Stroop task. This is in contrast to results by MacDougall, Dembroski, and Krantz (1981) for two reasons: 1) the increase in heart rate by the As occurred during the individual task, rather than during the interpersonal stressor; and 2) the reactivity was expressed with heart rate, rather than systolic blood pressure. However, the assessment instruments used were not the same in the two studies, so complete comparisons are impossible. Questionnaire methods were used here, whereas MacDougall, Dembroski, and Krantz (1981) found only the SI to be successful in delineating reactive Type As.

Finally, Lawler and Schmied (in press) returned to adult working women for examination of physiological reactivity and CPB, as well as other psychological variables.

Fifty-two secretaries were tested for heart rate, pressor, and frontalis EMG responses. There were a variety of tasks used, including mental arithmetic, vigilance (completing 3 different tasks simultaneously), a work interview in which questions pertaining to job stress were asked, and the SI. Results showed that SI Type As had higher levels than Bs of both systolic and diastolic blood pressure during all tasks. SI As, however, were not more reactive than Bs. JAS Type As were no different from Bs, with the exception of having larger EMG increases during the vigilance task. So once again the strong effects of cardiovascular reactivity found in the professional women sample (Lawler, Rixse, & Allen, 1983) were not replicated, even in another sample of working women.

As in the reactivity studies with males discussed previously, there are a number of issues that are pertinent in reconciling these seemingly inconsistent and haphazard results. Although Baker, Dearborn, Hastings, and Hamberger (1984) in their review of women and CPB conclude in favor of Type A women in general being more reactive, further inspection of the various studies warrants a more cautious tendering.

Assessment of CPB is once again an important consideration in these studies. The six studies in which both males and females were used all employed the student-JAS. Of the six, only two (Van Egeren, 1979a; Gastorf, 1981)

produced positive results (i.e., greater reactivity relative to Bs on a cardiovascular index by Type As). However, methodological considerations now intrude. The reactivity results of Van Egeren (1979a) take the form of correlational analysis instead of the traditional analysis of variance or covariance techniques. Whether or not correlations are proper indicators of reactivity is highly debatable. Likewise, the Gastorf (1981) results are somewhat questionable because blood pressure (the significant variable) was measured only once during the task itself. Reactivity is best assessed by continuous monitoring or at least several samples during both rest periods and tasks (Krantz & Manuck, 1984). So the positive results in this study must be viewed as suspect. The remaining seven reactivity studies with all-female samples show a similar lack of results when the student-JAS is the assessment instrument. While Weidner and Matthews (1978) also report greater systolic blood pressure increases, again there are problems in the timing of the measures taken. Blood pressure was measured once before and once again during the task. So although the student-JAS has been used in almost 70% of the CPB-women studies, results have been either positive with methodological flaws or lacking altogether. Since the student-JAS has not been validated in a prospective CHD study, its further usage, especially with females, may be ill-advised.

The Manuck, Craft, and Gold (1978) study is not easily compared with the other studies because it employed a different CPB assessment instrument altogether, the Sales Inventory. This questionnaire has also not been validated for use as a CPB determinant. Of the remaining studies then, there are two with strong positive results (MacDougall, Dembroski, & Krantz, 1981; Lawler, Rixse, & Allen, 1983). The former used the SI with students, while the latter used the JAS with employed professional women. Although the SI is often stated as the preferred CPB assessment technique (Dembroski, 1978; Mayes, Sime & Ganster, 1984), it should be remembered that the SI was developed and then validated exclusively with male subjects.

Mayes, Sime, and Ganster (1984) examined 63 employed women for CPB assessed by several different methods (i.e., SI, JAS, Thurstone Activity Scale, and the Bortner Type A scale). Reliability and validity coefficients for each instrument and various measures of physiological and psychological strain were obtained. Change scores from a resting baseline to an arithmetic task for heart rate, blood pressure, and skin conductance were computed. This is a typical reactivity procedure. However, correlational analyses were then used in lieu of repeated measures analysis of variance or covariance. Finally, the purpose of the study was not to verify CPB reactivity in women but rather

to indicate which, if any, assessment instrument had the strongest correlational relationship with strain variables in order to establish validity. Therefore, this study should not actually be included as a bona fide reactivity study. The correlational analyses did show that for this sample the SI was more strongly associated with the physiological variables, whereas the JAS was more valid for the psychological variables.

There is contradictory evidence, however, that the SI is not the best instrument for women. For instance, Haynes, Feinleib, and Kannel (1980) reported a concordance rate between the SI and the Framingham Type A scale classifications of 55%. The concordance rate between the SI and JAS is even lower at 47% (Anderson & Waldron, 1983). Both of these rates are lower than those reported for men (Haynes, Feinleib, & Kannel, 1980; Matthews et al., 1982). Haynes (1984) suggests that the SI ratings in women may emphasize speech stylistics over content to a greater extent than in men. This may be particularly important when one considers the gender socialization differences. For example, Type A women might be less willing to admit to hostile and competitive behaviors in contrast to men in whom such behaviors are more socially acceptable. Furthermore, specific speech stylistics may be weighted differently for men and women when determining behavior type (Anderson & Waldron, 1983). The SI has not been used in a

prospective study with women either. Although MacDougall, Dembroski, and Krantz (1981) achieved positive reactivity results for SI Type A students, Lawler et al. (1984) did not. In view of the less than satisfactory evidence for the SI as the best CPB assessment technique in women, the former study must be therefore regarded with caution.

The Lawler, Rixse, and Allen (1983) study is unique in producing positive results in JAS Type A working women. This was in contrast to the three other studies using the JAS (MacDougall, Dembroski & Krantz, 1981; Lawler & Schmied, 1985; in press). However, all three studies differed from the 1983 study in an important respect--employment status. Both MacDougall, Dembroski, and Krantz (1981) and Lawler and Schmied (1985) used student females. Although Lawler and Schmied (in press) used working women also, their employment status was quite different from that in Lawler, Rixse, and Allen (1983). Recall that the latter study used professional women and housewives with educations such that they could be employed in a professional field. In contrast, Lawler and Schmied (in press) employed clerical workers. It should be mentioned that this study did indicate interactive effects in reactivity between CPB and the other variables examined. Given these employment differences, it is difficult to compare directly the reactivity studies with regard to their use of the JAS. Note, too, that the Rosenmen and Friedman (1961) study that

originally established CHD risk factor differences between female As and Bs used a sample in which the As were predominantly professional women and the Bs were predominantly housewives. Suffice it to say at this point that there is no reason to suggest that the JAS should not be used with women.

One can speculate that the JAS is perhaps a more sensitive CPB reactivity discriminator in women when employment is a factor. Appropriately, Meininger (1985) found that for women the items on both the JAS and the Framingham Type A scale that had the best concurrent validity with the SI were all employment-related. On the other hand, she argues quite strongly against use of the JAS or Framingham scales with employed women because of their poor agreement with SI classifications (57% correct for JAS; 49% correct for the Framingham Type A scale). However, the use of the SI as the appropriate validating criterion is not discussed.

The type of laboratory stressor used in these reactivity studies is also relevant in this discussion. Again the nature of the task used is crucial for eliciting differential engagement by As and Bs as manifested by differences in physiological reactivity. Failing to find an appropriate task has been cited to explain negative results in several of the studies with female samples (e.g., MacDougall, Dembroski, & Krantz, Study I, 1981; Lott & Gatchel, 1978). The cold pressor task has already been

mentioned as an example of an inappropriate task for the study of reactivity in both men and women. However, for women the range of appropriate tasks is even narrower than for men. Interpersonal stressors are often acclaimed as the best reactivity task for women, in spite of contradictory evidence (e.g., Lawler & Schmied, 1984; in press). Moreover, as mentioned earlier, the interpersonal stressor is often confounded by the SI, either because the latter is used as the task itself or because of possible carry-over effects from the SI to the task. In MacDougall, Dembroski, and Krantz (1981), for instance, the increased reactivity during the oral quiz could be interpreted simply as carry-over from the increased responding during the preceding SI.

With the paucity of reactivity studies with women, it is difficult to analyze adequately the issue of the appropriate task. One must wonder, nevertheless, at the efficacy of a search for such a task. If the appropriate task(s) is(are) so nebulous as to defy usual laboratory paradigms, contrary to studies with men, then researchers must turn to an aspect of CPB that is more relevant to reactivity in women. This may be accomplished perhaps by delineating tasks more pertinent to daily life. Another possibility is to examine CPB in conjunction with other variables that contribute to individual differences in responding (Krantz & Manuck, 1984). Family history of cardiovascular disease is one example of that type of variable

(Lane, White, & Williams, 1984; Lawler & Schmied, 1985). Of course it may simply be that differential reactivity in young Type A and B females is a relatively rare occurrence. Since the young female samples have been universally composed of students, broader samples must be used to test this hypothesis.

Employment

Employment is important enough in the topic of CPB and women to warrant further discussion. It is conceivable that young Type A women are not reactive until they enter the workforce (Lawler, 1985). Perhaps it is necessary to experience the environmental and/or interpersonal challenges of the workplace in order for the Type A hyperresponsiveness to occur. Males are exposed to competitive and achievement-oriented environments more as a matter of course during their socialization process. Females, on the other hand, may not have similar experiences until they enter the workforce (Waldron, 1978; Price, 1983).

Demographic data on employment and CPB in women lend support to this notion. For instance, both the Framingham Study (Haynes et al., 1978b) and the Chicago Project (Shekelle, Schoenberger & Stamler, 1976) found that more employed women were classified as Type A than housewives. Furthermore, Waldron (1978) reported that employed women had higher Type A JAS scores than part-time employed women,

who in turn had higher scores than housewives. In this study Type A scores were also significantly correlated with higher occupational status. It should be noted that the Type A scores themselves were relatively low with the highest scores falling at the 50th percentile. Corroboration of these employment results are found in other studies with women (Davidson, Cooper & Chamberlain, 1980; Koskenvuo et al., 1980), as well as men (Mettlin, 1976). Employed Type A women also had comparable Type A scores to men in the Framingham Study (Haynes et al., 1978b) and the Minnesota Heart Survey (Pirie et al., 1983). Interestingly, Pirie et al. (1983) and Davidson and Cooper (1984) also found that women employed in professional and executive jobs were more frequently Type A (JAS-defined) than men in equivalent jobs. Meininger (1985) found the incidence of CPB among employed women in her sample comparable to that found in men in the Western Collaborative Group Study (45% vs. 47%, respectively) (Rosenman, Brand, Sholz, & Friedman, 1967).

Age and education are also important in the issue of employment among female Type As. For instance, Waldron et al. (1977) found that men were more Type A than women in the 18-25 year old group. However, in the older (26-44 year old) group, men and women had comparable JAS scores. Note that the majority of female CPB reactivity studies have used students whose ages fell in the range of the younger group. This may partially account for the paucity

of results compared with similar studies of male Type A students. Reactivity may occur only when CPB is manifested to a particular degree, one not found as readily in 18-25 year old females. Waldron (1978), in examining older (40-59 year old) women, found that employment was associated with CPB only in college-educated women. Possibly the older, better educated sample tends to be employed more by choice rather than necessity, a characteristic consistent with CPB. This would be especially evident in professional white-collar jobs and indeed they manifest the highest proportions of Type As (e.g., Lawler, Rixse & Allen, 1983; Pirie et al., 1983). Since the highest Type A scores in women occur between ages 30-35 (Waldron et al., 1977), it is possible that there is a greater tendency for Bs to stay at home during these years for child-rearing purposes. Alternatively, increased exposure to the working environment may exacerbate CPB. A reciprocal relationship may in fact exist between the two possibilities, as suggested by Price (1983).

Employment also interacts with CPB to affect incidence of CHD in women. Although Type A working women in the Framingham Study had comparable rates of CHD to Type A housewives (10.4% vs. 10.9%, respectively), Type A housewives had a greater risk, relative to Bs, of developing CHD (Relative Risk=2.9) than did Type A working women, relative to their B counterparts (Relative Risk=1.6) (Haynes,

Feinleib & Kannel, 1980). Note that the CHD rates for Type A women were similar to those of Type B men. Haynes (1984) has ascertained that the lower risk of CHD incidence found in Type A working women was due to the higher rates among Type B working women. That is, working outside the home increases CHD risk for Type B women but not for Type As. Working women overall had no more incidence of CHD after the eight year follow-up than housewives (Haynes & Feinleib, 1980). One possibility for this finding is the "healthy worker effect," the tendency for those with poor health to leave the workforce.

The Framingham Study also indicated that Type A men employed in white-collar jobs had the greatest risk for CHD (Haynes, Feinleib & Kannel, 1980). However, there was no relationship with CPB and blue-collar workers. Other retrospective studies have contradicted the latter finding (Glass, 1977a; Zyzanski, 1978). In contrast, female white-collar workers had the lowest CHD incidence rates whereas clerical workers had by double the highest incidence (Haynes & Feinleib, 1980). The female white-collar jobs were represented by traditional female career lines, such as teaching and nursing. It is therefore difficult to compare them to the male white-collar jobs. Even so, it is evident that within the Framingham sample there is a particular subset of working women, namely, clerical workers, that are at greatest risk for CHD. This holds even though

the overall rates for employed and unemployed women do not differ. In Lawler and Schmied (in press) more than 30% of the clerical workers had symptoms of cardiovascular disorders.

This seems puzzling in view of the reactivity studies in which Type A professional women exhibited pronounced SNS hyperresponsivity (Lawler, Rixse & Allen, 1983) and Type A clerical workers did not (Lawler & Schmied, in press). The Type A clerical workers were reactive, however, when other variables (life stress and feelings of powerlessness) were considered concurrently. Evidently CPB alone is not sufficient to elicit differential reactivity in clerical workers. Other aspects of their personality or environment must interact before the reactivity is observed. Coronary-prone behavior in professional women, however, will evoke reactivity similar to that seen in male samples. Again if CPB and employment are intertwined, it is not surprising to find similar reactivity results among males and females with comparable occupations, just as their Type A scores are equivalent. The key to solving the apparently disparate results with clerical workers and other female Type A studies may lie in determining the environmental characteristics pervasive in that particular occupation which interact with CPB. The next step would be to determine whether or not the identified characteristic(s) can be

a possible contributor for the excessive incidence of CHD seen in clerical workers.

One such characteristic has emerged from the literature--Control. Clerical jobs are exemplified by lack of control. This lack of control is seen both as a lack of personal autonomy and also lack of environmental control in conjunction with high job demands. As will be seen in the following chapter, the issue of control has links not only to occupational stress, but also to CPB and CHD.

One might question the utility of studying CPB in women since men succumb to CHD with far greater frequency (Waldron, 1976; Johnson, 1977; Gordon, 1978; Ibrahim, 1980). Explanations for this differential vary widely. The protective effects of estrogen are often cited (e.g., Higano, Robinson & Cohen, 1963; Bonnar, 1978), in spite of contradictory evidence (e.g., Williams & Novak, 1963). Differences in manifestation of CHD risk factors, such as smoking, may also contribute (Johnson, 1977; Wald, 1978). Waldron (1978) suggests that gender differences in socialization may contribute to the greater prevalence of CPB in men, which consequently may affect their higher rates of CHD. Although recent trends show a decline in the ratio of male to female CHD deaths, this decline is in part due to the increase of CHD incidence in women (Waldron, 1976). It is not known whether nonfatal CHD rates have declined as well. Coronary-prone behavior, established as a CHD risk

factor, is predominant among working women; women are increasingly entering the workforce (Ibrahim, 1980). Therefore, it is conceivable that in the future CHD rates among working women or at least certain subsets, such as clerical workers, will rise (Haynes, 1984). Since CHD takes several years to develop and manifest, identifying CPB with its physiological concommitants as a risk factor in women, as well as men, could be important ultimately for prevention of CHD.

CHAPTER IV

CONTROL

The importance of control in the study of behavior can be seen by its appearance in numerous major psychological theories, spanning both several decades and several disciplines within the field. The concept of control has had a role in personality theories (e.g., Adler, 1956), learning theories (e.g., Seligman, 1975), social psychology (e.g., Heider, 1958; Wortman & Brehm, 1975; Bandura, 1977), and psychophysiology (e.g., Obrist, 1981), to name just a few. Unfortunately, because of this widespread use, the concept often emerges under different guises. For instance, reinforcement contingency (Rotter, 1966; Abramson, Seligman & Teasdale, 1978), causality (Weiner, Heckhausen, Meyer, & Cook, 1972; Wortman, 1975), choice (Corah & Boffa, 1970; Glass & Singer, 1972), coping (Lazarus, 1966; Obrist, 1981), self-efficacy (Bandura, 1977), intrinsic motivation (Deci & Ryan, 1985), predictability (Averill, 1973), and success (Zuckerman, 1979) all illustrate different facets in the control literature. Even though the concept of control may underlie each of these areas and others unmentioned, important albeit subtle differences among them exist. These differences may be reflected not only by the experimental paradigms used to test them, but also in the individual conceptual assumptions. For example, is

perception of control a state or trait? Is it a behavioral or cognitive phenomenon or a combination of both?

The focus of this thesis will be on two of the most extensively studied aspects: locus of control and learned helplessness. As will be seen, prior research has established their pertinence to both CPB and reactivity. Both reflect dimensions of behavioral control in particular and therefore lend themselves well to empirical studies.

In a classic review, Averill (1973) outlined three types of control and examined both the stress-inducing and stress-reducing properties of each type. The first type of control discussed is behavioral control, which is defined as the "availability of a response which may directly influence or modify the objective characteristics of a threatening event" (p. 287). Note the assumption of an aversive event that underlies a control (or lack of) context. Averill (1973) further divides behavioral control experiments into those involving manipulated administration of the aversive event (regulated administration) and those manipulating some aspect of the aversive event itself (stimulus modification). An important point from this review and others (Thompson, 1981; Folkman, 1984) is that having control over an aversive event does not guarantee an absence of stress (as defined by some physiological index) nor does lack of control guarantee a stress response. The situation context, as well as characteristics of the

response, both help determine the stressfulness of the outcome.

The well known 'executive' monkey study by Brady, Porter, Conrad, and Mason (1958) and the follow-up study with rats by Weiss (1971) illustrate this point. In the first study monkeys were yoked in pairs such that one monkey was responsible for responding in order to avoid an electric shock. The other yoked monkey was the passive recipient of any shocks that the first monkey failed to prevent. It was found that the monkeys in control of the shocks developed ulcers and subsequently died. The Weiss (1971) study, however, indicated that it was the lack of feedback concerning the avoidance response's success that was the critical factor rather than the avoidance response itself. Furthermore, the number of coping responses required influenced the stressfulness of the paradigm. Thus there is a complex interrelationship between the behavioral and even cognitive aspects of the situation (see also Abramson, Seligman & Teasdale, 1978).

Locus of Control

Locus of control refers to an individual's expectancies about events being contingent or noncontingent upon their actions. It is now commonplace to label the former an internal locus of control and the latter an external locus of control. In one sense it can be viewed as a form of

cognitive control (Averill, 1973) because there is an implicit assumption of self-appraisal regarding those expectancies. This appraisal will consider the situational context, as well as the stability of the locus of control, i.e., fixed or variable (Weiner et al., 1974). For example, ability and effort both constitute facets of internal locus of control but differ on a stability dimension. Ultimately, however, this appraisal is based on past learning experiences of contingency of reinforcements with responses. So control of reinforcement is the crucial variable in the construct, at least as theorized by Rotter (1966). This in turn leads to certain expectancies or perceptions about control in the future (Hiroto, 1974). Rotter (1966) in fact originally defined the construct in terms of both self-contingency and self-causality. This has led to some confusion because certain situations could be interpreted in conflicting ways. For example, according to Rothbaum, Weisz, and Snyder (1982), a person who perceives himself as having limited ability to perform a task could be viewed as having an external locus of control, due to the independence of the person's response with the task outcome, or an internal locus of control, because the person's inability is the 'cause' of the task outcome. Since the major emphasis in the literature is on the contingency of response to outcome, for this thesis

internality will be equated with contingency and externality equated with noncontingency.

The importance of the locus of control construct lies in its generalizability from the original situation that influenced the direction (internal/external) of control to other situations. Given the development of a particular set of control expectancies, individuals will approach tasks of skill and chance quite differently. The bulk of empirical research on locus of control has in fact attempted to differentiate internals and externals by task manipulations involving skill and chance. However, skill and chance are not to be equated with internality and externality (Rotter, 1975). It should be emphasized that locus of control is not necessarily conceptualized as a typology but more as a description of process regarding past contingencies and future expectancies (Lefcourt, 1980) that can be rather specific to certain situations. Classifying individuals as internals or externals is merely a convenience of research. These categorizations are influenced in turn by experiences with success and failure and value of the reinforcement held by the individual (Rotter, 1975). Although locus of control refers to generalized expectancies, its efficacy is limited by the assessment instrument used. For this reason many researchers are developing locus of control scales specific to certain life dimensions, as, for example, the health locus of control scale

(Furnham, 1985). As Lefcourt (1976, p.14) says, it is better to ask the question "locus of control of what." According to Rotter (1966;1975), locus of control is most useful in less structured, ambiguous situations.

Because lack of control has been linked to physiological stress responses in experiments involving both animal and human subjects, it was inevitable that locus of control be examined as well for mediation of stress responses. Some studies have even linked locus of control with illness (McFarlane, Norman, Streiner, Ray, & Scott, 1980; Matheny & Cupp, 1983; Seeman & Seeman, 1983; Krause, 1985). Early studies of control and stress responses primarily looked at manipulation of control over aversive events without considering locus of control. In general the consensus was that perceived control over an aversive stimulus leads to less SNS arousal, as indexed by a variety of physiological measures. The most common measures include electrodermal, heart rate, and pressor responses. Both Corah and Boffa (1970) and Geer, Davison and Gatchel (1970) showed that skin conductance responses were smaller and fewer in subjects who felt they could avoid an aversive noise stimulus and electric shock, respectively. The former study further indicated that giving some subjects a choice of escaping or not escaping the noise was equivalent to giving control. The latter study indicated that the mere perception of control, contrary to reality, was sufficient to affect

physiological responding. Hokanson, DeGood, Forrest, and Brittain (1971), using a yoked-control design, found that subjects who were able to choose rest periods during a shock-avoidance procedure exhibited lower systolic blood pressure levels than did their yoked partners. The authors attribute this decreased responding to perceptions of control. However, as Averill (1973) points out, there are other alternative explanations available, including subjects choosing their rest periods at physiologically propitious moments.

Later experiments represent a shift in theoretical analysis of control situations. This was spearheaded by the work of Obrist and colleagues (e.g., Obrist, 1976; Light & Obrist, 1980; Steptoe, 1983). This line of research showed that physiological arousal was experienced by subjects when faced with some difficulty in coping with a task. So even though the subjects had control over the task situation, i.e., a coping response was available, the degree of task difficulty and consequently degree of coping responses required influence autonomic functioning. Manuck, Harvey, Lechleiter, and Neal (1978) corroborated these findings by specifically varying the difficulty of the tasks.

Solomon, Holmes, and McCaul (1980) produced mixed results when they varied task difficulty. There were no heart rate differences between the easy and difficult conditions but there was greater finger vasoconstriction

during the difficult task. The importance of task difficulty was also elaborated in studies by Obrist, Gaebelein, Teller, Langer, Grignolo, Light, and McCubbin (1978) and Light and Obrist (1983). Both of these experiments indicated that increased cardiovascular responses occurred during the difficult task as opposed to the easy or impossible tasks. The former study used a shock avoidance task, while the latter study used a reaction time task combined with monetary incentives. This latter format possibly accounted for one of the discrepant findings of the Light and Obrist (1983) study; namely, the subjects in the easy condition had cardiovascular responses actually similar to those in the impossible task. So monetary reward could have provided enough incentive to continue at an easy task with maximum effort.

The impact of a warning signal for an impending aversive stimulus in an active versus passive coping design was the focus of Lovallo, Wilson, Pincomb, Edwards, Tompkins, and Brackett (1985). Here it appeared that effort and uncertainty exerted direct but independent effects on cardiovascular responses.

A major difference between these experiments and those previously discussed in which control led to reduced physiological arousal is that the responses in the earlier studies did not require much effort. For instance, in Hokanson et al. (1971), subjects merely requested the removal of the

aversive stimulus, a relatively effortless way of responding. Spacapan and Cohen (1983, Exp. 2) failed to find any blood pressure differences between subjects with perceived control over a cold pressor task and subjects without such control. Here perceived control consisted of the knowledge that one could terminate the task at will. Again, no effortful responding was necessary, only passive endurance. Furthermore, results of the experiments in which task difficulty has been manipulated may be indicative of increased responding due to a perceived threat to control. Since effortful coping was required to maintain control in these studies, the potential for losing that control could have been seen as correspondingly high.

Based on this background of physiological studies of control, attention can now be turned to locus of control studies. There are few studies that examine physiological reactivity in conjunction with locus of control. Houston (1972) looked at these variables in order to test both situation-specific and general (locus of control) expectations of experimental control with concomitant reactivity Subjects were assigned to either an avoidable or unavoidable shock condition. Increased heart rate was experienced by the subjects who believed they could avoid the electric shock by making no mistakes on a cognitive task. This is consistent with the active coping studies discussed previously. Again the effort of responding was deemed the

critical factor. Furthermore, the internal locus of control (Rotter, 1966) subjects exhibited greater heart rate responses during the threat-of-shock conditions than did the external subjects. This was contrary to expectations: It had been predicted that since external locus of control subjects were assumed to have general feelings of helplessness, this would manifest itself in physiological arousal. The contrary results were explained as externals giving up and therefore not exerting themselves whereas internals, believing themselves able to control, do exert themselves. Task performance of internals and externals followed the predicted pattern. Subjects in congruent situations (i.e., internals in the avoidable condition and externals in the unavoidable condition) performed better than their incongruent counterparts.

A similar experiment was done by DeGood (1975), in which blood pressure was monitored in internal and external locus of control subjects during an avoidable or unavoidable shock task. The avoidance response was the same as in the Hokanson et al. (1971) experiment, where the response was merely a request for time-out from the shock task. As in Hokanson et al. (1971), systolic blood pressure responses were elevated in the no-control condition. There was also a significant interaction between locus of control and experimental condition. Increased diastolic blood pressure was seen in subjects in the incongruent situations

compared to subjects in congruent situations. This was in contrast to the heart rate results of Houston (1972): there were no significant differences between the congruent and incongruent subjects in that study. However, since pressor responses were not monitored in Houston (1972) and heart rate responses likewise were not monitored in the DeGood (1975) study, direct comparisons of arousal of course can not be made. DeGood (1975) notes that the actual decision to take a time-out may act as a safety signal, thereby decreasing the stressful nature of the situation. There are other reactivity studies with locus of control but since they also involve learned helplessness or CPB, discussion of these studies will be reserved for the appropriate sections.

Learned Helplessness

The learned helplessness theory achieved conceptualization from a series of studies carried out primarily by Seligman and colleagues (e.g., Seligman & Maier, 1967; Hiroto & Seligman, 1975; Maier & Seligman, 1976), although studies by other researchers had been done as well (e.g., Thornton & Jacobs, 1971). Learned helplessness refers to the disruption of behavior subsequent to being exposed to uncontrollable events. The definitive studies employed an experimental paradigm in which dogs were put into either avoidable or unavoidable shock conditions. Dogs in the

avoidable shock condition efficiently learned to escape the shock by jumping a barrier to the other side of a shuttle-box. Dogs who had been exposed repeatedly to unavoidable shocks, however, later showed marked deficits in acquiring the shuttle-box avoidance behavior when given the opportunity to escape shock. Having learned through prior experience that there was no contingency between responding and reinforcement (i.e., shock termination) in the inescapable shock condition, motivation for initiating responding in a later situation is undermined. So learned helplessness refers not only to the exhibited behavior showing the interference of the acquisition of escape-avoidance learning, but also to the more general process underlying the behavior--learning that responses and reinforcements are independent. Further experimentation indicated that learned helplessness could be alleviated by impressing upon the animal the contingency between responses and reinforcements (Seligman, Maier & Geer, 1968). For instance, during the shock avoidance training after learned helplessness had already been induced, the helpless dogs were literally dragged over the shuttle-box barrier in order to show them how to avoid shocks. After repeated trials the dogs were 'cured' of their learned helplessness.

The experimental paradigm has been extended to other organisms, including humans (Hiroto & Seligman, 1975). While the uncontrollable event usually takes the guise of

an obvious aversive stimulus, such as shock or noise, cognitive tasks in which difficulty is manipulated have also been used (Hiroto & Seligman, 1975; Hanusa & Schulz, 1977). In fact Seligman & Maier (1967) were able to show that it was not the aversive stimulation per se that induced learned helplessness but rather the uncontrollability of the stimulus.

Producing learned helplessness in humans was attractive to researchers both for studying learning processes and also for providing a model for reactive depression (Seligman, 1975). However, the evidence regarding learned helplessness in humans is not as clear-cut as in lower animals. Although the phenomenon has been established in several of the studies, there are some inconsistent results (e.g., Hanusa & Schulz, 1977; Frankel & Snyder, 1978). Methodological differences among the experiments may account for at least some of the inconsistencies. Even studies that provide support for the model in humans have methodological problems. For instance, the Thornton & Jacobs (1971) study, widely cited for demonstrating learned helplessness in humans, actually only showed that subjects who were able to avoid shock on a training task performed significantly better on a subsequent test task than the other groups. The other groups included one exposed to unavoidable shock with the training task, one exposed to unavoidable shock but no task, and one group merely

working on the task with no shocks at all. These three groups did not differ in subsequent testing. The learned helplessness model would have predicted that the unavoidable shock group would perform worse than the others during later testing. Another potential problem common to many of these studies is the arousal of subjects' suspicions that the experiment is rigged because of the noncontingent feedback (Wortman & Brehm, 1975).

Hiroto (1974) used an experimental paradigm that was meant to be a human analog to the animal experiments. Subjects were exposed to escapable or inescapable aversive noise for a pretreatment task. Another group did not undergo pretreatment training. All the subjects were then tested for escape-avoidance performance with a human shuttle-box apparatus. Here sliding a knob from one side of the apparatus to the other constituted the appropriate avoidance response to halt the aversive noise. Results indicated that the subjects who were in the uncontrollable noise group during the pretreatment performed significantly worse (indexed by longer response latencies and more failures to escape) during the avoidance task. Criticism of this study has focussed on the following point: The subjects in the escapable and inescapable groups were not yoked with respect to noise actually received; the escapable group received only an average of 1.4 seconds per trial of aversive noise, compared to 5.0 seconds per trial

for the inescapable group. Therefore, the helplessness might have been a reflection of failure to perform the task rather than the noncontingency of responses and reinforcements.

Hiroto and Seligman (1975) further examined learned helplessness in humans using both the instrumental tasks of Hiroto (1974) and cognitive tasks for pretreatment and testing. The purpose of this study was not only to replicate findings of learned helplessness in humans, but also to determine if the helplessness generalized to other situations. So two groups performed either an instrumental task or a cognitive task for pretreatment and each of those was subdivided into groups performing an instrumental or cognitive test task. The four groups were then also divided according to helplessness pretreatment, i.e., escapable noise or a solvable cognitive task, inescapable noise or an insoluble cognitive task, and controls (no pretreatment). Hiroto and Seligman (1975) maintain that an insoluble cognitive task is analogous to an inescapable aversive stimulus because in both instances there is an independence of responding and reinforcement. Subjects in the inescapable or insoluble pretreatment conditions all performed significantly worse on the test task than their respective controls. In the cognitive pretreatment-cognitive test condition, however, additional trials of insoluble problems were required to induce helplessness. So regardless

of the type of helplessness training, the effects seem to generalize to different subsequent tasks.

There then follow a number of studies that appear to offer varying degrees of support for the learned helplessness model in humans (e.g., Miller & Seligman, 1975; Roth & Kubal, 1975; Klein, Fencil-Morse & Seligman, 1976; Tennen & Eller, 1977). The results are often equivocal because of the kinds of methodological problems cited earlier and also because of conflicts regarding the attributional processes presumed to accompany the acquisition of learned helplessness (Hanusa & Schulz, 1977; Frankel & Snyder, 1978). These problems led Seligman and colleagues to offer a reformulation of learned helplessness theory (Abramson, Seligman & Teasdale, 1978). This modification expanded on the cognitive processes involved and attempted to reconcile disparate results. Specifically, the authors outlined three orthogonal pairs of causal attributions: Stable or unstable, global or specific, and internal or external. These attributions then helped determine the effects of learned helplessness experiences, such as their generalization to other situations or effects of self-esteem.

The main interest in examining physiological correlates of learned helplessness alone has been due to the linkage between learned helplessness and depression. Two experiments illustrate this area of research. Other physiological studies involving learned helplessness and other

variables will be discussed later. Gatchel and Proctor (1976) studied skin conductance and heart rate responses during the helplessness training. Subjects were exposed to escapable or inescapable noise for the pretreatment and then were tested on a cognitive task. The behavioral results were as predicted by the learned helplessness model with subjects in the inescapable groups exhibiting detriments in cognitive testing. Although the groups had no significant heart rate differences, there were significant findings for skin conductance. Specifically, the group with learned helplessness showed lower tonic skin conductance levels, smaller phasic responses, and more spontaneous responses than the escapable noise group. The findings were of interest to the authors because of their similarity to previous skin conductance findings in clinical depressives, as well as being indicative of reduced SNS arousal due to a decreased effort in responding.

A follow-up experiment was then conducted using the same design except that half of the subjects were measured as depressed (Gatchel, McKinney, & Koebernick, 1977). Results showed that nondepressed subjects in whom learned helplessness had been induced exhibited detrimental cognitive performing comparable to the control depressed group. In other words, there was a similarity of impairment in cognitive testing in both depressed subjects and learned helplessness subjects. However, the skin conductance

responses differed in the two groups. The learned helplessness group exhibited smaller phasic responses in general, while the depressed group had greater phasic responses. These differences were most pronounced at the end of the pretreatment and beginning of the cognitive testing. The authors suggested that there may be different underlying mechanisms for the behavioral similarities of depression and learned helplessness.

Learned Helplessness and Locus of Control

There is a conceptual similarity of locus of control and learned helplessness because both deal with expectations of contingency between responses and reinforcements. Although control is central to both, one is experimentally induced while the other is the result of perceptions of life experiences in one's past. A number of studies have been done therefore to investigate any interaction. The Hiroto (1974) experiment, previously described, also included internal and external locus of control (Rotter, 1966) variables in its design. It was predicted that subjects with an external locus of control would exhibit more helplessness than internals following exposure to uncontrollable aversive noise. Results not only followed that prediction, but also showed that externals, regardless of the pretreatment, had poorer escape-avoidance performance than internals. This latter result influenced Hiroto

(1974) to conclude that the externality variable functions similarly to an uncontrollable pretreatment in inducing learned helplessness and therefore may share a common underlying process. Interestingly, internals made significantly more responses during the uncontrollable pretreatment task.

Cohen, Rothbart, and Phillips (1976) tested internals and externals (Rotter, 1966) in a learned helplessness format. Specifically, the study examined the generality of learned helplessness with respect to the types of tasks used both for the pretreatment (a nonaversive cognitive task) and posttreatment testing (a problem-solving and non-problem-solving task). Yoked controls for amount of reinforcement actually received were used. Also, median scores for locus of control were used instead of extreme scores as in Hiroto (1974). Results again showed replication of the learned helplessness effect in both internals and externals exposed to the noncontingent pretreatment. The detriments in performance occurred with the problem-solving task both for soluble and insoluble puzzles. During the non-problem-solving task (Stroop color-word test), however, only externals showed deficits. It was suggested that since externals have a more generalized expectancy of the noncontingency of responses and reinforcements, helplessness for these people generalizes to more situations. The presence of the interaction between pretreatment contingency and

locus of control is in contrast to the results of Hiroto (1974). Possibly the chronic helplessness effect found in externals in the latter experiment occurs only in individuals with extreme scores. Another explanation for the discrepant results may be the use of an aversive pretreatment in Hiroto (1974). Perhaps in the face of aversive stimuli, externals simply give up responding more readily, regardless of contingencies.

When contingency is made more salient by the use of feedback, internals (Mirels, 1970) perform worse than externals on a shuttle-box task following exposure to inescapable aversive noise (Gregory, Chartier & Wright, 1979). The same experimental design used by Hiroto (1974) was employed with the addition of response feedback lights during the pretreatment. Following escapable noise, the performance of internals equalled the externals. However, externals in the escapable condition also performed better than control-externals, leading the authors to conclude that learned effectiveness had taken place. So while the impaired performance following inescapable noise is learned helplessness in internals, facilitated performance following escapable noise with response feedback is learned effectiveness in externals.

Finally, Pittman and Pittman (1979) also examined learned helplessness and locus of control with varying degrees of helplessness. This study was a test of Wortman

and Brehm's (1975) model of integration of learned helplessness and reactance theory. Reactance is the motivational arousal, often accompanied by hostility and aggression, that occurs when control is threatened or taken away from individuals that initially expect to have control. By varying the degree of helplessness training, different patterns of responding may be expected according to the influence of reactance. For instance, moderate amounts of helplessness training might actually facilitate performance in reactant subjects attempting to reassert control. In conditions of high helplessness, however, the more extensive exposure to uncontrollability results in the learned helplessness effect. Reactance has obvious connections with locus of control since both are concerned with general expectations of controllability. Since reactance occurs most readily in individuals who initially expect control, the researchers predicted that internals would exhibit greater reactance than externals in conditions of mild uncontrollability. The pretreatment task was a cognitive discrimination task; degree of helplessness was manipulated by varying the amount of correct (contingent) feedback for internal and external locus of control (Rotter, 1966) subjects. So persons in the high helplessness condition received predetermined noncontingent feedback for each problem. The low helplessness group received no feedback at all for two-thirds of the problems and then

noncontingent feedback for the remainder. Finally, a control group received no feedback for any of the problems. Following completion of the pretreatment task, subjects were then tested for helplessness effects on another cognitive task (solvable anagrams).

Results were generally as predicted for internals and externals. Namely, low helplessness-internals performed better than control internals whereas low helplessness-externals performed worse than their controls. As expected, both internals and externals performed worse than their respective controls and externals outperformed internals in the high helplessness condition. There were no main effects for locus of control. Low helplessness subjects also reported more feelings of hostility than those in the other conditions, while high helplessness subjects experienced more depression. So internals displayed reactance during the low helplessness condition and externals, having no pre-extent expectation of control, did not display reactance but instead quickly exhibited learned helplessness. This would be consistent with the results of Cohen, Rothbart, and Phillips (1976) where externals generalized the learned helplessness more easily. The Pittman and Pittman (1979) results can also be explained in terms of the salience of the contingency of responses and reinforcements, as in Gregory, Chartier, and Wright (1979). The noncontingent verbal feedback in Pittman and Pittman

(1979) may have served a similar function as the response lights signalling uncontrollability in Gregory, Chartier, and Wright (1979), causing internals to display more learned helplessness.

Coronary-prone Behavior and Control

The early behavioral studies by Glass and colleagues (e.g., Glass, Snyder & Hollis, 1974; Burnham, Pennebaker & Glass, 1975; Carver, Coleman & Glass, 1976; Carver & Glass, 1978) on different aspects of CPB, such as achievement behavior, time urgency, and hostility, seemed to reveal a common element or apparent consistency. This observation led Glass to formulate a theoretical framework in which these seemingly diverse facets of CPB could be unified. This unifying factor was control, defined as the perceived contingency between responses and outcomes (Glass, 1977b). Within this framework, then, Glass (1977a; 1977b) postulated that CPB is a characteristic pattern of responding by certain individuals when threatened with loss of control. So As are engaged in a struggle for control whereas Bs are not so concerned. The potential for uncontrollability is apparently more stressful to Type As. Therefore, when faced with uncontrollability, Type As typically respond at least initially in such a way as to reassert control.

Behaviorally, there are several studies that establish the need for control as a central aspect of CPB. Foremost

among these studies is the work by Glass (Krantz, Glass & Snyder, 1974; Glass, 1977a; Glass, 1977b; Glass & Carver, 1980). Glass undertook a series of studies that systematically examined CPB responses to uncontrollable laboratory stressors. The basic experimental design throughout these studies was the learned helplessness paradigm, in which subjects are initially exposed to a controllable or uncontrollable stressor and then subsequently tested in another potentially controllable situation for helplessness effects. The stressor used in most of these studies was aversive noise.

The first experiment by Krantz and Glass (Glass, 1977a) involved Type A and B subjects exposed to 12 bursts of controllable or uncontrollable noise. Following pretreatment, subjects were then tested on a choice reaction time task. Type As had faster reaction times than Bs after exposure to uncontrollable noise. Glass suggested that the As were hyperresponsive because of increased motivation from being subjected to uncontrollability.

This basic experiment was then replicated using a cognitive pretreatment task and a DRL (Differential Reinforcement of Low rates of response) task used in a previous study of time urgency and CPB (Glass, Snyder & Hollis, 1974). A DRL task is one in which a subject must wait a fixed interval before responding; if a response is premature, the interval is begun again. Type As typically

perform worse than Bs on such a task, presumably because they are more impatient and therefore have more premature responses. However, it was predicted that given some exposure to uncontrollability, the performance of As would improve. Results did in fact support the prediction with As performing better than Bs after uncontrollable noise.

A third study (Krantz, Glass & Snyder, 1974) then examined the effects of prolonged exposure to an uncontrollable stressor (35 bursts of noise), again using the learned helplessness paradigm. Here pretreatment was divided into conditions of high stress (107 db--slightly more than that used in the previous studies) and moderate stress (78 db), both with escape and no escape possible. The following test was the human shuttle-box avoidance task, as described in Hiroto (1974). As expected, the learned helplessness effect was seen in both high and moderate stress groups following uncontrollable noise. In the high stress group, No escape-As performed worse than Escape-As; Escape- and No escape-Bs had no differences in performance. Under moderate stress conditions, however, No escape-As performed the same as Escape-As, while Escape-Bs outperformed No escape-Bs. In the face of mild uncontrollability, Type As seem to be indeed hyperresponsive. When exposed to conditions of high uncontrollability, they become hyporesponsive and thus more helpless.

These contrasting performances were also explained in

terms of differential salience of uncontrollability (Glass, 1977a; 1977b). In conditions of mild uncontrollability, the uncontrollability cues are of low salience. It is therefore easier for As to deny the possibility of uncontrollability and learned helplessness does not take place, as indeed was found. Under conditions of high stress (which must have high salience), the threat of uncontrollability is more difficult to ignore and hence initially As are hyperresponsive. This increased effort would result in a firmer conviction of noncontingency, which would then lead to the characteristic hyporesponsiveness of learned helplessness. This all assumes that the variations in stressfulness (e.g., noise intensity) correlate with variations in salience.

In order to test the salience hypothesis, another experiment was conducted by Glass and Hollis (Glass, 1977a). The pretreatment consisted of a solvable or insoluble cognitive discrimination task used earlier (also c.f. Hiroto & Seligman, 1975). Salience was manipulated by varying degrees of emphasis of performance feedback (low salience-verbal feedback by experimenter; high salience-verbal feedback by experimenter plus a written tally sheet). Subjects were then tested for helplessness effects in anagram solving. Results were similar to those of Krantz, Glass, and Snyder (1974). Type As were more

helpless following the insoluble condition if the control cues were highly salient. When the cues were low in salience, the learned helplessness effect was not demonstrated. In contrast, learned helplessness for Bs occurred only in the low salience condition. Further experimentation indicated that the salience factor does in fact mediate the sequence of hyperresponsiveness followed by hyporesponsiveness after extended exposure to uncontrollable stressors. Glass (1977a) concludes that Type As may simply have an elevated threshold for responding to cues of uncontrollability. Therefore, As exhibit greater effects to reestablish control at first and then lapse into learned helplessness as the noncontingency between responding and reinforcements becomes apparent. The aggregate results of all these studies have led to the theory that CPB is in fact a "response style for coping with perceived lack of control over environmental stress" (p. 124).

It should not be thought that the results of the experimental work by Glass on his uncontrollability theory are unequivocal. Although in general the evidence is favorable, there are some flaws in methodology that have been acknowledged (c.f. Lovallo, 1979). For instance, the same problems discussed earlier that plague the human learned helplessness studies can be applied. To reiterate, these problems include confounding effects of aversive stimuli also acting as a feedback signal and suspicions of

nonveridical feedback during pretreatment (i.e., noncontingent conditions being rigged). In the study on extended uncontrollability (Krantz, Glass & Snyder, 1974), the pretreatment and testing task were very similar and thus it is not entirely certain that learned helplessness rather than learned failure occurred. The addition of the salience variable creates some heuristic difficulty because of the tendency to define it post hoc. Careful a priori consideration must be given to that factor for any meaningful analysis. Finally, the theory has been questioned because of the inconsistent and seemingly nonsensical performances of Type Bs in these studies (Lovallo, 1979). However, it can be argued that their performance is irrelevant since they are not at risk for CHD--it is only necessary that the performance of As fit the theory.

Other laboratories have since provided additional supporting evidence of the need for CPB individuals to maintain control. Dembroski and MacDougall (1978) found that when under conditions of high stress (threat of electric shock), Type As prefer to work alone more so than Bs. The As are thus able to maintain personal control over a stressful situation. Matthews (1979) replicated Glass' work with salience and uncontrollability with children and adults. Salience was manipulated by the conspicuousness of a control panel on the response apparatus. Stress level was varied by having two schedules of reinforcement for

responding, a VR7 or FR7 schedule. The variable schedule was presumed to be more stressful. The design was to test specifically initial reactions to uncontrollability: A VR7 schedule is only initially perceived as a noncontingent exercise. As in the Glass (1977a) study, Type As outperformed Bs in the VR7 schedule when salience was high. There were no differences in the FR7 or low salience conditions.

Weidner (1980) examined the effects of contingent or noncontingent feedback on a cognitive task in CPB individuals. In this instance contingency also meant successful solution of the task whereas with noncontingent or random feedback it was nearly impossible to solve the problem. Subjects always received negative feedback at the end of the problem. Salience was enhanced in all subjects by requiring them to keep a written tally of their correct and incorrect responses. After the cognitive task all subjects had a choice of taking a performance-enhancing or -inhibiting drug for the next task. Different dosages of each drug were also available for choosing. The experimental set-up was such to ensure complete freedom of choice by each subject. No drug or further testing was actually administered. Results showed that Type A subjects who had been in the noncontingent pretreatment chose the performance-inhibiting drug significantly more than any other group. This was viewed as self-handicapping behavior, a

type of learned helplessness, by CPB individuals in response to experienced failure.

Lovallo and Pishkin (1980a) also attempted to replicate Glass' findings, examining performances of As and Bs after initial moderate uncontrollability and extended high uncontrollability. Furthermore, the authors modified the experimental designs used in Glass' work in order to remedy potential confounding factors, such as having an aversive stimulus perceived as contingent upon task performance. This means that the stimulus has information beyond its mere aversiveness. The moderate controllability condition had A and B (SI-defined) subjects exposed to aversive, noncontingent noise while working on two easy cognitive tasks or exposed to quiet ambient noise while working on two difficult tasks. The severe uncontrollability condition involved presenting aversive noise during the two difficult tasks. Results were opposite those predicted by Glass' uncontrollability theory (1977a). In the high uncontrollability condition, Type Bs outperformed As initially (during pretreatment) and later exhibited more learned helplessness. The authors argued that in view of their improved experimental design, the uncontrollability theory of Glass (1977a) is suspect. They also cite more general problems, such as the attributional processes, with the learned helplessness model and thus question its efficacy for examining CPB. However, they do not seem to take into

account the reformulated model of learned helplessness in which these problems are addressed (Abramson, Seligman & Teasdale, 1978). Although their design is an improvement in some respects, there is some question that the conditions are actually variations of controllability. Certainly the easy-difficult manipulation does not fit with the basic premise of uncontrollability being equated with noncontingency of responses and outcomes. In fact Lovallo and Pishkin (1980b) refer to the same conditions usually as 'success' or 'failure' conditions. Although the noise is uncontrollable, subjects were always aware of that fact. It therefore acts perhaps more as a distractor from the tasks. Hence, this experiment can not be taken as a failure to replicate Glass' work.

Results by Brunson and Matthews (1981), in contrast, do support CPB as a coping style during threat of uncontrollability. They examined the problem-solving strategies and attributions by Type As and Bs during prolonged exposure to insoluble cognitive tasks. Salience was also manipulated by the method used by Glass and Hollis (Glass, 1977a), discussed previously. Results indicated that during the high salience-uncontrollable conditions, the As attributed their failure to internal factors (e.g., lack of ability or effort). Throughout the task the As became increasingly upset and employed maladaptive problem-solving strategies as their performance deteriorated. Type Bs in the moderate

salience condition also performed less efficiently but did not employ ineffectual strategies as consistently. They also attributed their difficulties to external factors, such as chance and task difficulty. The authors speculate that learned helplessness would have resulted in Type As if further testing had been done. However, Bs would have been more likely to exhibit 'pseudohelplessness'--performance deficits not caused by a change of contingency expectations.

These attributional results are somewhat in contrast to a study by Burke and Deszca (1982). This study examined career experiences associated with feelings of failure in 75 Type A and B managers. Interestingly, CPB was significantly associated with experiences reflecting disappointment and failure. One of these significant experiences was termed an external locus of control, i.e., work success was due to luck rather than ability. So perhaps if learned helplessness had been induced in the subjects of Brunson and Matthews (1981), such external attributions might also have been made at that point.

The motivational variables associated with perception of control in CPB individuals were investigated by Smith and Brehm (1981). The authors hypothesized that deprivation of control would lead to increased motivation by As to make use of information for attributions about an opponent in a future competitive situation. Results were as expected

only when the Hard-driving and Competitive subscale of the JAS was used to classify subjects. High scoring subjects on that scale did experience more self-reported motivation to succeed in the competitive task, given prior information concerning their opponents. They in fact exaggerated beforehand the amount of dispositional information available about their opponent and believed (unjustifiably) from such that they could predict the opponent's behavior. This was regarded by the authors as evidence that the high hard-driving and competitive scorers were reestablishing perceived control over a potentially threatening situation. While the results are indicative of CPB, they were not significant with the Type A scale of the JAS.

Interpersonal responses by CPB individuals in a control relevant situation were studied by Sanders and Malkis (1982). Subjects worked in problem-solving groups, a situation in which threat to control is inherent. Therefore, it was predicted that As and Bs would react differently in a group situation, with As more likely to become leaders. Furthermore, since there were more Type As than leadership positions available, some As were going to be frustrated with the lack of control. This might then result in a learned helplessness phenomenon. As predicted, Type As were more likely to be leaders in the group discussion. However, the learned helplessness effect was not observed in frustrated Type As. It was suggested, however, that the

duration of the experiment may not have been sufficient to induce the effect.

Control was manipulated in Type A and B students in another study examining the effects of situations involving multiple demands (Fazio, Cooper, Dayson, & Johnson, 1981). The authors argued that having to attend to multiple tasks simultaneously should constitute a greater threat to control than working on a single task. Furthermore, it was predicted that Type As would exert more effort than Bs in performing the multiple tasks. Half of the subjects worked on a single proofreading task, while half worked on the same task and also performed a simultaneous word-count task and an anagram task. To perform the anagram task, the subjects were interrupted from the other tasks and taken to another room. So actually there were only two simultaneous tasks. Results supported the prediction of superior performance by As on the primary (proof-reading) task during the multiple-demand condition. During the single task condition, however, As performed worse than Bs. So when in a situation posing no threat to control, the As exerted relatively less effort on the task. There were no A-B differences in performance of the secondary tasks.

Rhodewalt and Comer (1982) specifically looked at CPB and reactance (Wortman & Brehm, 1975). The study investigated the hypothesis that when faced with loss of control, Type As experience hyperresponsiveness or reactance in an

attempt to reestablish that control--essentially Glass' (1977a) theory. A choice-elimination paradigm was employed in which subjects rated the attractiveness of potential gift items. After being told that one item was now unavailable as a choice for a gift, half of the subjects were asked to reevaluate attractiveness. Reactance theory predicted that Type As would rate the unavailable item higher in attractiveness than Bs on the second evaluation. Control was therefore manipulated by altering the subjects' freedom of choice. Results indicated that in the Choice-elimination condition only Type As rated the item as more attractive; they were the only group to experience reactance. That this demonstrates hyperresponsiveness, however, is somewhat questionable.

Finally, Strube and Weiner (1985) conducted a study in which Types A and B students had a choice of relinquishing task control to a partner on a reaction time task. Type As in fact relinquished fewer trials than Bs to their partners, especially when the partner had exhibited a superior performance during a pre-test trial. So in spite of evidence of the partner's superior ability, Type As were less willing to be convinced of that fact.

It is obvious in these behavioral studies of CPB and control that the conceptualization of the control variable varies greatly. This makes it difficult to integrate the research. However, with the exception of Lovallo and

Pishkin (1980a), the studies all provide converging evidence for the notion of CPB as a response style to lack of control. Only Lovallo and Pishkin (1980a) and Weidner (1980) used the two-phase experimental design to look for the predicted CPB hyperresponsiveness, followed by hyporesponsiveness. Yet, for reasons already mentioned, Lovallo and Pishkin (1980a) must be discounted as a replication of the uncontrollability studies by Glass and colleagues (1977a). All the other studies have focussed on the initial responses of Type As to uncontrollable stressors or situations and have found the expected hyperresponsiveness.

It should be mentioned that a number of researchers have suggested that the hyporesponsiveness of learned helplessness may actually be a form of maintaining control in itself (Wortman & Brehm, 1975; Frankel & Snyder, 1978; Wortman & Dintzer, 1978; Weidner, 1980; Rothbaum, Weisz & Snyder, 1982). This alternative interpretation of 'secondary control' (Rothbaum, Weisz & Snyder, 1982) views some individuals (e.g., CPB individuals) as actively engaging in behavior <u>not</u> to respond (c.f. Weidner, 1980). This in effect prevents negative outcomes and can be a way of protecting self-esteem from failure. Without attributional information by Type As concerning learned helplessness paradigms, however, it remains only speculation.

Glass (1977a;1977b) has also extended his uncontrollability theory in CPB individuals to life events research.

Since some researchers (e.g., Paykel, 1974; McFarlane et al., 1980) have proposed that it is the uncontrollable life events that cause the most stress and consequently illness, this might be a relevant factor that interacts with CPB in the etiology of CHD. Therefore a retrospective study was done in which hospitalized coronary and non-coronary Types A and B patients were surveyed for significant life changes, especially uncontrollable ones, during the preceding 12 months. A non-hospitalized control group was also surveyed. Results indicated that hospitalized patients reported more uncontrollable life events than non-hospitalized controls. Furthermore, overall findings pointed to a tendency for coronary patients to be Type As (JAS-defined) who had experienced uncontrollable life events during the preceding year, while non-coronary patients were Type Bs who had also experienced uncontrollable life events. This result, although weak, is suggestive of the influence of uncontrollable life events on CPB and CHD.

The relationship between CPB and uncontrollable life events was also examined by Suls, Gastorf, and Witenburg (1979). In this retrospective study, A and B students indicated the number of stressful life events experienced in the preceding 6 months. Controllability, expectedness, and desirability were also indicated for each event. Type As (student-JAS) did report more life events than Bs. In

addition, events perceived as undesirable, ambiguously controllable, and unexpected were significantly associated with greater distress in Type As. Type Bs, on the other hand, exhibited less distress as more events which were uncontrollable occurred. So events which are not clearly controllable pose more threat to the CPB individual.

Cardiovascular and psychological health was assessed in Types A and B (JAS) adults in whom life events and job stress during the past 12 months had been reported in another study (Rhodewalt, Hays, Chemers, & Wysocki, 1984). Events were classified as either highly, moderately, or uncontrollable. Type As who reported high job stress or many undesirable and moderately uncontrollable events had the most psychological and cardiovascular impairment. This is similar to the results of the above study. Events totally controllable or uncontrollable had less effect on Type As. Rhodewalt and Agustsdottir (1984) in contrast found that greater mental distress was reported by Type As who had experienced events perceived as either moderately controllable or uncontrollable, regardless of desirability of the events.

While the results of these life event studies are consistent in regard to the impact of controllability, they are limited by their retrospective designs. Moderate or ambiguous control seems to be the most stress-inducing. Rhodewalt and Comer (1982) indicated that Type As perceive

threats to control more readily than do Bs. Thus when faced with a moderately uncontrollable situation, Type As may then respond in an exaggerated fashion.

Coronary-prone Behavior, Control and Reactivity

A number of studies have examined physiological responses in CPB individuals during experimental situations in which control has been a factor. If Type As are more threatened by loss of control, then this might manifest itself by differential autonomic reactivity. The behavioral hyperresponsivity initially observed in As in the face of uncontrollability might be accompanied by SNS hyperreactivity.

Krantz, Glass, and Snyder (1974) did monitor palmar skin conductance during their learned helplessness experiment, already discussed. There were no A-B differences in phasic responses during the pretreatment (moderate or high stress; escapable or inescapable noise). No explanations or comments are offered for these negative results. Electrodermal activity may nevertheless be a poor choice to examine physiological differences in CPB individuals (c.f. Myrtek & Greenlee, 1984). Relatively few CPB studies have used the measure and results have been mixed. For instance, Lawler, Rixse, and Allen (1983) analyzed spontaneous skin conductance responses and found no A-B

differences; however, A-B differences were clearly observed in other physiological measures.

Type As did exhibit greater skin conductance levels and more spontaneous responses than Type Bs in the study by Lovallo and Pishkin (1980b). This paper reported the physiological results of the same study discussed earlier (Lovallo & Pishkin, 1980a). In addition to skin conductance, blood pressure, heart rate, finger vasoconstriction, cholesterol, and triglycerides were measured. Heart rate, vasoconstriction, and skin conductance were monitored throughout the two pretreatment and test tasks, while the other variables were measured only before and after the tasks. Heart rate and pressor responses did not differ between the As and Bs during the tasks. In addition to the greater skin conductance responses, As had higher levels of serum cholesterol and triglycerides than Bs after the tasks. Type As also had higher skin conductance levels than Bs during the Easy task condition. Vasoconstriction was different between As and Bs during rest, with As being more vasoconstricted. Bs eventually became more vasoconstricted by the end of the tasks.

The aspect of controllability is really de-emphasized in this study. In fact the study is reported as just a psychophysiological investigation of CPB individuals during various tasks. No discussion at all is given on controllability in spite of the experimental design being such that

it was the critical factor in Lovallo and Pishkin (1980a). The statistical analyses compare individual task results to the one baseline period rather than compare the tasks themselves. There was only one baseline period used instead of interposing rest periods between the tasks. The only significant interaction of CPB and any aspect of controllability (task difficulty) was with skin conductance levels. Since As were more responsive during the easy condition, perhaps this is indicative of the greater arousal accompanying hyperresponsiveness in As during situations of moderate uncontrollability. However, it should be recalled that controllability in Lovallo and Pishkin (1980a) was a combination of both task difficulty and noise level. Presumably since the behavioral results of Lovallo and Pishkin (1980a) were not as expected according to Glass' (1977a) uncontrollability theory, the present results were therefore not analyzed in that framework.

Pittner and Houston (1980) examined stress responses in CPB individuals exposed to both threat of shock and threat to self-esteem. Although the same cognitive task was used in both conditions, either physical (shock) or psychological (failure feedback) threat was anticipated for mistakes made on the task. Control was not explicitly examined but is nevertheless implicit in the threat to self-esteem condition. The failure feedback in this condition was noncontingent upon performance, thus fitting the conception of

uncontrollability by Glass (1977a). The threat of shock was actually contingent upon performance. Physiological measures included finger pulse volume, pulse rate, and blood pressure. The first two variables were monitored continuously, while the latter was taken only once during the baseline period and after each task. For all task conditions, As exhibited significantly higher heart rates than Bs. This indicated greater arousal during the tasks, although it was not accompanied by a superior behavioral performance. During the threat to self-esteem condition, As tended to exhibit higher systolic and diastolic blood pressures than Bs.

Perceived control was again the implicit topic of consideration by Gastorf (1981) in his study of the effects of subjective and objective challenges on CPB. It was reasoned that both perceived and real task difficulty would constitute a potential uncontrollable stressor. It was predicted that As would be more sympathetically aroused during the subjectively or objectively difficult tasks whereas Bs would be aroused only during the latter. The task was anagram-solving and subjective difficulty was altered by task instructions indicating the level of difficulty to be expected. The objective challenge condition employed truly easy or difficult problems. Blood pressure was monitored throughout the experiment. There was only a tendency for Type As to perform better than Bs when they

were expecting a difficult task. Physiologically, however, Type As were more aroused (as indexed by elevated systolic blood pressure) both when they expected the task to be difficult and when the task was truly difficult. Bs, on the other hand, had elevated systolic blood pressures only during the anticipated difficult task. So apparently even perceived potential uncontrollability is enough to produce reactivity effects in Type As.

Physiological responses associated with control of aversive stimuli in Type A and B subjects were examined in another study (Contrada, Glass, Krakoff, Krantz, Kehoe, Isecke, Collins, & Elting, 1982). Either contingent or noncontingent aversive noise and electric shock were administered to subjects during a reaction time task. Success and failure were signalled to the subjects by altering the frequency of the aversive stimulation. This design is more on a par with the studies of effortful coping and control discussed earlier (e.g., Manuck et al., 1978; Light & Obrist, 1983). Consistent with findings of these earlier studies, it was expected that physiological arousal would be observed during the contingency condition in which effortful responding would be required. This arousal would be manifested by greater levels of plasma catecholamines, blood pressure, and heart rate. Results were as predicted for blood pressure and plasma epinephrine, as well as behavioral responses (faster reaction times during the

contingency condition). Similarly, greater physiological reactivity was predicted to occur in Type As during the contingency condition. Although this seems opposite to what would be expected given the hyperresponsivity of As in uncontrollable (noncontingent) situations, careful study of the methods reveals the rationale. In this study the contingency condition was one in which control was merely expected but not in fact real. In the noncontingency condition, subjects were never led to believe they could control the aversive stimulation. Thus during the contingency condition subjects initially expected control but presumably the actual lack of relationship between responding and outcomes begins to be apparent and Type As particularly will engage in an effort to retain mastery of the task. Type As did respond with faster reaction times than Bs during the contingency condition. Also plasma norepinephrine levels were greater in Type As during the contingency condition, especially when given feedback signalling failure (salience). Although interactive effects of systolic blood pressure and heart rate levels were seen with Type As relative to Bs during the tasks, the expected interaction with condition was not observed. This result, while consistent with many other reactivity studies using challenging tasks (e.g., Dembroski et al., 1978; Glass et al., 1980), adds nothing to the controllability theory of CPB. Nevertheless, the behavioral and norepinephrine results do

support the notion of hyperresponsivity by As when threatened with uncontrollability. The authors suggest that physical stressors such as electric shock may not have been the best stress to use for examining CPB and control (c.f. Pittner & Houston, 1980). However, the task was obviously sufficient to elicit differential reactivity between As and Bs, disregarding the control variable. Possibly the inclusion of a group that truly did have control over the aversive stimulation would have provided the comparison necessary to elucidate control differences in cardiovascular reactivity.

A similar study was carried out by Pittner, Houston, and Spiridigliozzi (1983). Conditions that varied both in controllability and consistency of controllability were employed to examine pulse rate, finger pulse volume, and blood pressure in Type As and Bs. The four experimental conditions were low stress (no threat of shock), lack of control over shock, intermittent control, and consistent control over shock. Control was a function of performance on a cognitive task. Even though threat of shock did not produce A-B reactivity differences in Pittner and Houston (1980), it was felt that the addition of stratified levels of control would lead to arousal in Type As. Results indicated that overall the consistent control condition was the most physiologically stressful, perhaps reflecting the increased effort to maintain that control. When CPB was

considered, physiological results were not so clear-cut. However, the consistent control condition again produced the most reactivity in Type As, as indicated by systolic, diastolic blood pressure, and heart rate responses. Diastolic blood pressure also differed for As and Bs in the intermittent control condition, while systolic blood pressure responses differed during the lack of control condition. So once again Type As respond in an exaggerated fashion to situations in which control is potentially threatened.

Heart rate was monitored in Type A and B subjects during a threat-of-shock task in another study (Evans & Fearn, 1985). The choice of an active or passive coping strategy was the major concern of the study. Here the potential of predictability of the aversive stimulus was considered equivalent to control. This could be achieved by choosing to receive a warning signal. In contrast, subjects could choose a distraction with no signalling value. There were no heart rate differences between As and Bs in either condition. However, it is questionable that merely monitoring a visual channel for a warning signal constitutes active coping, as the authors suggest. In fact there was no avoidance response required in either condition and therefore contingency or noncontingency of responses is clearly irrelevant. Thus the concept of control, formerly established (Glass, 1977a), is not maintained in this study. It

is not clear then whether heart rate differences should have been observed. Also, as the authors point out, during the baseline period, Type As had significantly higher levels than Bs. The law of initial values would have predicted less change by As during the task.

Different levels of behavioral control were also established by van Schijndel, de Mey, and Naring (1984) in a physiological study of CPB. Anagrams in varying degrees of ease of solution were given to subjects while blood pressure and heart rate were monitored. Experimental conditions were such that either 30%, 50%, or 100% of the anagrams were solvable. Control was equated here with task difficulty. Pressor responses were sensitive to the experimental conditions so that both diastolic and systolic blood pressure were greatest during the intermediate difficulty condition. Coronary-prone behavior interacted with the conditions as well. Type As had greater pressor responses relative to Bs also during the intermediate condition. There were no behavioral differences between As and Bs in any of the conditions. This was particularly indicative of inappropriate cardiovascular responses by As in the absence of increased behavioral effort.

Lawler and Schmied (in press) examined physiological responses in Types A and B secretaries. A control-related construct, powerlessness, was measured (Maddi, Kobasa & Hoover, 1979), along with stressful life events and CPB.

Powerlessness refers to feelings of despair of influence over personal or social affairs. So it is similar to external locus of control. Heart rate, pressor, and electromyogram (EMG) responses were monitored during cognitive tasks and an interview (including the SI). Results indicated that while powerlessness did not affect reactivity by itself, it did interact with either CPB or stress for the various physiological measures. The powerlessness by Type A behavior (SI-defined) interaction was significant for heart rate responses during the SI. Type As scoring high in powerlessness had higher heart rates than comparable Bs. There was no difference among low powerlessness subjects. Low powerlessness Bs had greater variability in resting heart rate which decreased during the vigilance cognitive task. Triple interactions were seen with both diastolic and systolic blood pressure responses. Within the high stress group, powerless Type As had higher systolic and diastolic levels than powerless B.

Finally, only one study has examined cardiovascular reactivity in conjunction with both CPB and locus of control (Manuck, Craft & Gold, 1978). Given the evidence that it is important for Type As to maintain control over their environment, one might expect that they would also have greater expectations of control. The hyperresponsiveness exhibited by the As when threatened with loss of control is indicative, according to reactance theory (Wortman & Brehm,

1975), of having those expectations. It is also reminiscent of the hyperresponsiveness by internal locus of control subjects in the Hiroto (1974) study. Therefore, there seems to be a link between possessing Type A behavior and an internal locus of control. Glass (1977a) does report a significant although quite small (r=-0.17) correlation between the student-JAS and Rotter's (1966) locus of control. The direction of the correlation points to an association between CPB and internality. However, Frost and Wilson (1983) found no difference in CPB scores between internals and externals. The CPB assessment instrument was not a commonly used one. Keenan and McBain (1979) and Burke and Weir (1980a) likewise found no association, again using unvalidated and rarely used CPB instruments.

The relationship of CPB and locus of control was also examined by Dembroski, MacDougall, and Musante (1984). In addition to Rotter's (1966) locus of control, desirability of control (Burger & Cooper, 1979) was evaluated. The two concepts are thought to be somewhat distinct with locus of control reflecting more ideological orientation and the other tapping actual preferences about control. The latter has been used more in conjunction with studies on depression (Burger & Arkin, 1980). In fact results indicated that the two were independent. Furthermore, the desire for control measure correlated significantly with both the SI and JAS, while locus of control correlated significantly

only with the JAS. The latter was of much stronger magnitude at r=-.44 than found by Glass (1977a).

Study II of Manuck, Craft, and Gold (1978) explored physiological responses of internal and external Types A and B students. Heart rate and pressor responses were monitored during a cognitive task. The task was not specifically designed to be control relevant, merely challenging. Systolic blood pressure was greatest during the task among Type As, although there was no CPB by locus of control interaction. Internals also exhibited marginally greater systolic blood pressure increases than external locus of controls. A significant triple interaction was seen with diastolic blood pressure, although this was due to an elevated baseline by Type A-internals, rather than reactivity. Heart rate response differences were not significant.

These results are not overwhelming in their support for a synergistic relationship between CPB and locus of control. The two seem to act more independently, as is seen in the systolic blood pressure responses. This study merely supports the notion of increased reactivity by Type As in challenging situations. However, since the task did not particularly threaten control, this design may not have been an appropriate vehicle in which to study the interplay between the two. The student-JAS was used to assess CPB in Study II and because of its very small correlation with

locus of control, may not have been the best instrument to use either.

Control and the Work Environment

Control (or lack of) has been identified as an important influence in occupational stress and ultimately, occupational health (see House, 1974; Cooper & Marshall, 1976; Cooper, 1983 for reviews). While by no means the only or even most pervasive source of occupational stress, lack of control at the workplace emerges again and again as a consistent factor. For example, Margolis, Kroes, and Quinn (1974) found that a stress measure called 'non-participation' correlated significantly with all ten measures of strain and job-related stress used in the study. Non-participation referred to a "lack of 'say' in decisions that affect one's job" (p. 660). The sample included an occupational cross-section of 1496 workers.

Kobasa and Hilker (1982) also found in male executives that powerlessness was the strongest influence on work perception and interacted with illness and stress in determining the quality of working life. Lack of control on the job was associated with more illness and job stress among 5145 working women in a survey conducted by the National Association of Working Women (1984).

Lack of control in the work environment has also been deemed especially important in regard to sources of job-

related CHD (Karasek, Russell & Theorell, 1982). Karasek, Baker, Marxer, Ahlbom, and Theorell (1981) carried out a 6-year prospective study to examine the association between certain job characteristics and subsequent development of CHD in 1928 Swedish men. After controlling for age, education, smoking, and obesity, multivariate analysis showed that men who reported low control were associated with greater risk of developing CHD. In fact one component of low control, termed low personal freedom, increased CHD mortality risk over six times that for high scoring individuals. Alfredsson and Theorell (1983) surveyed a nationwide sample of 3876 men in 118 different occupations. Their results also indicated that elevated CHD risk was associated with jobs characterized by high demand and little opportunity to control one's work environment (e.g., controlling one's work pace).

Brousseau and Mallinger (1981) investigated locus of control in conjunction with occupational stress and cardiovascular health. The latter was indexed by systolic and diastolic blood pressure readings and an EKG evaluation of a treadmill test. In addition a summary cardiovascular health index was computed from the three measures for this sample of 101 dentists. Results of the study were mixed: While locus of control (Rotter, 1966) did not correlate significantly with perceived stress, it did significantly correlate with systolic and diastolic blood pressure and,

not surprisingly, the health index. The direction of the correlations was such that having an external locus of control was associated with higher readings. Although significant, the magnitude of all correlations was quite small. These results are opposite to those reported previously for most of the physiological reactivity studies of locus of control except for Lawler and Schmied (in press). However, this was not a reactivity study but rather employed a single reading of static levels.

Control in the workplace has also been shown to be relevant to CPB, as might be expected. There are certain characteristics of Type As that are most amenable to expression in a job environment and not surprisingly, many of these deal with some aspect of control. Howard, Cunningham, and Rechnitzer (1977) surveyed a group of 236 male A and B managers. A number of job-related variables were examined for association with presence of CPB. Interestingly, although Type As reported heavier workloads, responsibilities, conflicting demands, and competition, they did not express job dissatisfaction. This implies a willingness by Type As to undertake such job burdens and perhaps therefore reflects the greater need for control (Chesney & Rosenman, 1980). The notion that Type As self-impose greater workloads is supported in other studies as well (e.g., Caplan & Jones, 1975; Dembroski & MacDougall, 1978; Matthews & Saal, 1978; Davidson, Cooper &

Chamberlain, 1980). A trade-off of having control is the concomitant possession of responsibility. Two other studies have also found a significant positive association between work overload and CPB (Keenan & McBain, 1979; Brief, Rude & Rabinowitz, 1983).

Cooper and Melhuish (1980) found that Type As who reported having too many demands by other people and the job itself had the poorest physical health. This sample included 196 male managers in whom a variety of job characteristics and measures of physical and psychological health were measured. Having too many outside demands can also be viewed as a potential threat to control.

Greater demands experienced by Type As were also reported in another study of occupational characteristics of CPB individuals (Burke & Weir, 1980b). Senior administrators were the subjects of this survey, which also included measures of life satisfaction, physical, and mental health. Specifically, the study examined the interaction of CPB with occupational and non-occupational stressors. Again the control construct was merely implicit in some of the occupational stressor measures. Type A behavior correlated significantly with greater responsibility, greater qualitative and quantitative overload, and greater number of hours worked per week. Type As were also more likely to report having greater influence at work, work satisfaction, and work self-esteem. The authors suggest as

well that the psychological benefits from the workplace outweigh the negative effect of the stressors experienced by Type As.

Control was more specifically targeted in a study by Chesney, Sevelius, Black, Ward, Swan, and Rosenman (1981). CHD risk factors and occupational stressors were examined in 384 male Type As and Bs. The control variable in this study took the form of an autonomy measure. Autonomy referred to a characteristic of the work setting in which workers are encouraged to make their own decisions, maintain responsibility, and take the initiative. Results indicated that Type As who perceived autonomy in their work environment had lower systolic and diastolic blood pressures than As without autonomy or all Bs. In contrast, Type Bs had higher blood pressures when the job environment was characterized as autonomous. So environments that were consistent with the Type A's need for control were less stressful in terms of decreased blood pressure. Chesney and Rosenman (1980) had similarly established that a measure of environmental control differentiated between As and Bs in another sample of male managers. Type As reported themselves to be in control of their work environment more often than did Bs. Additionally, Type As who were in environments in which they did not have control reported more anxiety than other As and Bs.

This stance is similar to the notion of the person-

environment fit that has become a popular theory in occupational stress (Van Harrison, 1980). This theory relates characteristics of the individual and the work environment along a number of dimensions, including goals and skills. This theory was tested in regard to CPB in order to see if the resultant interaction could help account for the stress association between CPB and CHD (Matteson & Ivancevich, 1982). Working environments were therefore classified as Type A or B according to their respective attributes associated with individual Type A and B behavior. Subjects (315 medical technologists) were then administered a number of psychological and physical health questionnaires, as well as measures of occupational stress. Here results were somewhat contrary to expectations. Being Type A in a Type A environment in this sample meant having the most reported symptoms of ill-health. In contrast Type Bs in a B environment meant having the least symptoms. One would have perhaps predicted that since an A-person/A-environment match is a positive person/environment fit, there would be actually less ill effects. However, the authors maintain that the detrimental effects of CPB per se are sufficient to override any benefits of a fit. Nevertheless, there are some important methodological differences between this study and Chesney et al. (1981). First, the CPB assessment instruments used were different: Chesney et al. (1981) used the SI, while this study employed an unvalidated scale

created solely for this research. Second, the samples had different occupational compositions--administrators versus medical technologists. Third, Matteson and Ivancevich (1982) used no physiological dependent variables. In any case the specific effects of control can not be evaluated since it is not mentioned alone as a particular variable of interest. One can speculate, however, that if both the person and the work environment are classified as Type A, there might be a resultant conflict. For instance, this might mean that both have been characterized as possessing a need for control and yet clearly control can only be possessed by one or the other.

Self-efficacy (Bandura, 1977), a control-relevant concept, was a variable of interest in a study of CPB and work productivity (Taylor, Locke, Lee, & Gist, 1984). It was thought that feelings of self-efficacy, developed because of previous occupational success, might interact with CPB to affect subsequent productivity. Therefore, 278 university faculty members were surveyed in regard to these factors. There was a significant correlation between possessing self-efficacy and CPB. This may be parallel to the associations found between CPB and an internal locus of control. Both CPB and self-efficacy were positively related to all measures of productivity. Finally, a correlational path analysis showed that Type A behavior was associated with productivity only if self-efficacy, high goals,

and polyphasic work habits were also included in the equation.

It has already been mentioned in a previous section that clerical work is one occupation characterized by low control (Haw, 1982; Haynes, 1984). Interestingly, it is currently considered the second most hazardous occupation in regard to general health (U.S. Dept. of Labor, 1985). The sample of secretaries in the Schmied and Lawler (in press) study were far above the norms for the number and seriousness of illnesses reported during a 12-month period. Furthermore, the powerlessness construct was the only personality variable significantly associated with increased illness. The associations between clerical work and CHD have already been mentioned (Haynes & Feinleib, 1980; Haynes, 1984; Lawler & Schmied, in press). LaCroix and Haynes (1984) stratified different occupations according to levels of control (degree of supervision by one's boss) and job demands for working men and women participating in the Framingham Heart Study. CHD incidence over a 10-year period was calculated. While no significant relationship between job characteristics and CHD incidence was observed in men, women employed in jobs characterized by high demand and low control had 2.9 times the relative risk for developing CHD than women in other jobs. Clerical workers in particular had an increased risk (Relative risk=5.2). These relationships were significant even when

other traditional risk factors were controlled. Using another method to classify occupations in demand and control categories, women in high demand/low control jobs were also found to have a greater relative risk for CHD; this association was significant only when cholesterol levels remained unelevated.

While several studies have noted control as being a relevant aspect of the work environment in occupational stress and/or satisfaction, few of the studies mentioned have explicitly measured that concept or manipulated it as an experimental variable. This is partly because many of these studies are field studies in which observations are made within the natural work environment. The 'control conflict' that erupts in conditions in which susceptible individuals (i.e., Type As) are exposed to uncontrollable or, perhaps more importantly, ambiguously controllable work environments is a phenomenon based mostly on subjective reporting by the individual. However, as noted previously, the mere perception of control rather than the reality affects behavior.

These occupational studies have mostly simplified the concept of control, using it only as a function of job-related characteristics (e.g., autonomy) instead of the individual. As reactivity studies have shown, individual differences in responding are important in identifying pathophysiological mechanisms that relate stressors to end-

point pathologies. Therefore, if control in the work environment is important in the pathological sequelae, it becomes necessary to vary it systematically in order to examine the accompanying responses. While this is impractical in the natural work environment, researchers can select subjects in career fields characterized by more or less control, such as clerical work.

The treatment of control in this chapter has focussed chiefly on two areas of research: Learned helplessness and locus of control. Both deal with perceived contingency of responses and outcomes. The former is a phenomenon specific to an experimental paradigm but which can be generalized to other similar situations. The latter is a general expectancy contained within a larger context of personal experiences. Both are relevant to CPB, as control has been found to be a central feature of the behavior pattern. Control is also pertinent to occupational stress. While there has been some integrating studies of learned helplessness and locus of control, differences in assessment instruments and experimental design have clouded interpretations. Lack of consistency in methodology has led to confusion as well. This is especially true in the reactivity studies where physiological variables and methods for data collection used differ from one study to the next.

CHAPTER V

PURPOSE AND RATIONALE

This study investigated cardiovascular reactivity in Type A and B female clerical workers who differed in locus of control. It further provided an integration of the research done on CBP reactivity and control by utilizing control relevant tasks in a learned helplessness paradigm. As CPB has been posited to be a coping style elicited by environmental circumstances in which a threat to control is perceived, it was necessary to provide a laboratory situation that achieved this. This is a feature missing from the past studies which have sought to investigate CPB and control as a personality variable. Thus control is evident in the study in three ways. First, the subjects came from a job environment considered to be low in control. Second, a personality characteristic, locus of control, was examined for either independent or interactive effects, both behavioral and physiological, with CPB. Third, the behavioral tasks were control relevant. That is, the tasks were administered in such a way as to test for learned helplessness.

Using clerical workers provided a female sample representing an occupation characterized as low in job control. It is maintained that these are individuals particularly at risk for CHD and are therefore important

candidates for a reactivity study. Having subjects all from one occupational field controlled somewhat for possible confounding by having similar job environments. Females were particularly desired for the study in order to compare and add to the reactivity results of other studies with women. So few studies of CPB, control, or reactivity have used female samples. It has been suggested that CPB in clerical workers must be investigated in conjunction with other variables in order for reactivity to emerge. Control was therefore the most likely variable to assist in such an endeavor.

Locus of control was measured as a personality characteristic that may or may not interact with CPB. As already indicated, results of studies combining the two have been mixed. Only one study, however, actually employed behavioral and physiological variables rather than simple correlations (Manuck, Craft & Gold, 1978). Females were not used in that study. Some pilot testing using post hoc analyses of the secretary study by Lawler and Schmied (in press) indicated that locus of control produced similar reactivity results as those associated with powerlessness. Therefore, its inclusion in this study of female clerical workers was not unwarranted.

A control-relevant experimental task was critical in this examination of CPB reactivity and locus of control. A laboratory situation must be created in which a threat to

control is first perceived and then the aftereffects of such exposure observed. This was in order to test the hyperresponsiveness-hyporesponsiveness sequence that is hypothesized to occur in CPB persons. A learned helplessness paradigm in which a pretreatment task threatens control was an obvious choice. Levine's (1971) concept identification task was used for the pretreatment task. It has been used as the cognitive pretreatment task in most of the learned helplessness studies discussed. It was also used in Manuck, Craft, and Gold (1978) where it was successful in eliciting A-B physiological differences. There were three pretreatment conditions that varied according to the degree of contingency between responses and reinforcements (c.f. Pittman & Pittman, 1979). Condition 1, for instance, was characterized by noncontingent feedback to the subjects' responses during the task. Additionally, salience was emphasized by requiring these subjects to keep a written tally of feedback. This condition was hypothesized to induce learned helplessness in all subjects but especially Type As and internals. Subjects in Condition 2 received no feedback for two-thirds of the identification problems and then noncontingent feedback for the final third. Subjects in Condition 3 received no feedback at all. This was done to prevent confounding from success/failure perceptions. Otherwise it could be argued that the predicted learned helplessness was a result of

negative feedback rather than noncontingency. Condition 2 was included because of numerous CPB reactivity studies that indicate intermediate challenges or threat to control as being the most psychologically stressful.

All subjects were then tested on a subsequent anagram task. This served two purposes. It tested for learned helplessness effects following the pretreatment task. It also acted as a control for reactivity effects that might be seen during pretreatment. Although both tasks were challenging and both involved to some extent an interpersonal stressor (i.e., the presence and interaction with the experimenter), only the pretreatment task was control-relevant. Thus any differential physiological A-B responses observed during the pretreatment could be attributed to the control factor. It was not expected that A-B reactivity differences would emerge from the anagram task, since this task was only challenging and not control-relevant.

Reactivity testing involved monitoring heart rate (HR), heart rate variability (HRV), systolic (SBP), and diastolic (DBP) blood pressure responses during rest periods and tasks. A 15-minute resting baseline was taken before the pretreatment task and a 5-minute rest period was given before and after the second task.

The design of this study enables replication of previous work done separately on learned helplessness, locus

of control, and CPB. Results can also be compared to studies in which two of the factors are simultaneously considered. This will complement the existing literature and hopefully resolve some of the conflicting results reported. This study is unique, however, in integrating all three factors. It is also unique in employing a female sample for the study of these factors together. Some of the specific research questions this study addresses are as follows:

1) Are there differences in cardiovascular reactivity during a control relevant task between Type A and B individuals? Between internal and external locus of control individuals?
2) If so, does CPB and locus of control exert independent or interactive effects on reactivity?
3) Will different levels of control interact with CPB and/or locus of control reactivity effects?
4) How will CPB and locus of control interact to affect behavioral performance following the learned helplessness training?
5) Will similar behavioral and reactivity results be found in CPB individuals classified by the JAS and the Framingham Type A Scale (FTAS)?
6) What are the cardiovascular correlates of learned helplessness?

CHAPTER VI

METHODS

Subjects

Female clerical workers were solicited from the community for voluntary participation in the study. Initial contact was by letter and where necessary, phone calls (see Appendix I). The letter explained briefly the purpose and procedure of the study. A reply card was enclosed for those wishing to participate. The only incentive to participate was the opportunity for a free blood pressure check. Subjects were asked to refrain from drinking caffeine beverages at least 3 hours before the experiment. Final sample size was 120 subjects, which allowed 10 subjects per design cell.

Apparatus

Rooms.

The experimental session was carried out in three of the rooms contained in the Human Psychophysiology Laboratory. These were the waiting room (4.0 x 3.1 m), subject room (4.6 x 2.1 m), and equipment room (4.6 x 3.7 m). The waiting room contained a chair and desk at which subjects filled out the questionnaires. The subject room contained a counter on which materials for the tasks and physiological recording were placed. There was a straight-back

chair for the experimenter and a reclinable lounge chair for the subject. There was a lap table with notepad and pen for the subject. A cable switch was also present to allow the experimenter to signal to the equipment room various stages of the experiment. The equipment room contained a Grass Model 7D polygraph and a Roche Model 1216 Arteriosonde automatic blood pressure monitor. A 7.6 cm diameter hole in the wall allowed for recording cables and the signal switch cable to pass from the subject room to the equipment room.

Task Materials.

The pretreatment task was Levine's (1971) concept identification (CI) task. This consisted of a series of five-dimensional stimulus patterns (see Appendix II). Each dimension had two values: (a) letter (A or T); (b) color (black or red); (c) letter size (upper- or lowercase); (d) border surrounding letter (circle or square); and (e) underline (dotted or solid). Two stimulus patterns were shown on a 4x6 inch card. One pattern consisted of a set of values from each dimension and the other pattern consisted of the complementary values.

The anagram task was composed of 20 solvable, 5-letter anagrams, each presented on a 4x6 inch card (see Appendix III). All anagrams had the same letter sequence (e.g., ECUNL - UNCLE). The anagrams were obtained from Tresselt

and Mayzner (1966). Only anagrams that had a normative median solution time of less than 60 seconds were used.

Physiological Recording

Heart rate was recorded by three regular size Beckman biopotential electrodes. These electrodes were filled with Beckman electrode paste. Two were placed on the chest bilaterally approximately 12 cm below the axilla, while the third ground electrode was placed on the midline 10 cm below the sternum. These chest leads allow freedom of arm movement. The raw EKG signal was sent for transduction to a Grass Model 7P4F preamplifier and two Grass Model 7DAF driver amplifiers on the polygraph. The preamplifier, a cardiotachometer, integrated the raw signal in order to convey second by second analysis of HRV.

Blood pressure was monitored by the automatic blood pressure monitor. An ultrasound detector covered with transmission gel (Burdick Corporation Lectrosonic Gel) was attached to an occluding cuff. After palpating the brachial artery on the nonpreferred arm of the subject, the cuff was placed over the upper arm so that the detector was over the artery. Inflation of the cuff was initiated by the monitor in the equipment room. There are two mercury columns on the monitor corresponding to SBP and DBP. Occassionally, blood pressure was taken manually by a

sphygmomanometer to verify the readings by the automatic monitor.

Procedure

Upon arrival in the laboratory, subjects were greeted and given a consent form (see Appendix IV) to read and sign before proceeding with the experiment. The consent form explained the procedures and any risks (of which there were none) involved. This form, as well as the entire procedure, was approved by The University of Tennessee's Committee on Research Participation. Subjects then filled out four questionnaires. A personal history form (see Appendix V) was used to obtain demographic data, such as age, education level, and smoking behavior. Coronary-prone behavior was assessed by two questionnaires: Form N of the Jenkins Activity Survey (JAS) (Appendix VI) and the Framingham Type A scale (FTAS) (Appendix VII). Rotter's (1966) Locus of Control (LC) scale (Appendix VIII) was also given at this time. Scoring was not done until after the experimental session. Subjects were randomly assigned to one of the three pretreatment conditions.

Next the subject was taken to the subject room where the EKG electrodes and blood pressure cuff were applied. Before application of the electrodes, the skin was cleansed and abraded with isopropyl alcohol. Once the equipment was in order, the subject was instructed to rest quietly for a

15-minute baseline period. The subject was left alone during that time.

After the baseline period, the experimenter returned to administer the first task. The lap table was placed over the subject to provide a working surface. Materials for the CI task were then brought out. Subjects were instructed that for each concept card, they were to choose which side (left or right) of the card contained the correct value. This value had been arbitrarily determined by the experimenter. In Condition 1 the experimenter gave feedback ("correct" or "incorrect") so that the subject could deduce the answer as quickly as possible. There were six problems consisting of 10 stimulus pattern cards (trials) each. Each card was presented for a maximum of 10 seconds. Subjects in Condition 2 were told that no feedback would be given for several problems so that a "baseline for guessing" could be made. Condition 3 subjects were told that no feedback for any problems would be given so that a "baseline for guessing" could be made. In addition, subjects were asked to keep a written tally of their responses and feedback (if given). After each problem all subjects were asked to state their hypothesized solution but were given no feedback on that solution. A sample problem was given to ensure the subjects' comprehension of the task. Subjects were then exhorted to perform their best and the experimenter presented the first card while

signalling with the cable switch the start of the task. A digital stopwatch was used to time the trials.

Feedback for Condition 1 was predetermined and noncontingent upon performance. Incorrect feedback was always given on the last trial. Condition 2 subjects did not receive feedback for the first four problems. They did receive noncontingent feedback for the last two problems.

At the end of the task, the experimenter again signalled to the equipment room and then left the subject for a rest period. After five minutes the experimenter returned with instructions for the next task, the anagrams. Subjects were told to solve each anagram as quickly as possible since they would be timed. Subjects were all told whether or not their solutions were correct. They were also told that there might or might not be a pattern to the solutions. A maximum of 60 seconds was allowed for each of the 20 anagrams. If a solution was not offered by that time, the next anagram was presented. The start and end of the task were signalled to the equipment room by a press of the cable switch by the experimenter. The experimenter timed each response by a digital stopwatch.

After the last anagram the subject was once again left for a 5-minute rest period. The experimenter then returned to remove the EKG electrodes and blood pressure cuff. Subjects were given a three item 7-point rating scale (see Appendix IX) to ascertain their perceptions of the

difficulty and solvability of the pretreatment task. Subjects were then debriefed and any questions were answered. In summary, subjects had an initial 15-minute rest period, the pretreatment (CI) task lasting a maximum of 10 minutes, a 5-minute rest, the anagram task lasting a maximum of 20 minutes, and a final 5-minute rest.

Variables

Heart Rate.

Heart rate was monitored continuously throughout the experimental session. This was quantified into 1-minute sums of the number of R-waves counted during that minute. These were averaged for each period to provide one mean for each rest period and one mean for each task. Only the last five minutes of the first 15-minute baseline were used. Task values were the mean of all whole minutes used.

Heart Rate Variability.

This was derived from the print-out of the cardiotachometer. Second by second heart rate changes were also measured continuously. During the first rest period, HRV was calculated in the first 30 seconds of Minutes 13 and 15. It was calculated in the first 30 seconds of Minute 3 for the other two rest periods. It was calculated by noting the single largest beat to beat interval for each 10 seconds comprising the 30-second block. Each of these values was averaged for one mean resting HRV. Similarly,

HRV values were read during the first 30 seconds of Minute 1 and then of every other whole minute thereafter for each task period. The task value was the mean of all the 10-second blocks.

Blood Pressure.

Blood pressure readings were taken during Minutes 11, 13, and 15 of the first rest and during Minutes 1,3, and 5 of the other two rest periods. These were averaged to provide one SBP and DBP mean for each period. For the tasks, blood pressure readings were taken during Minutes 1, 2, 3, and then every other whole minute thereafter. These readings were also averaged to yield one mean for each task.

Anagram Performance.

Three measures of performance on the anagram task were used. These were number of trials to criterion, number of failures to solve in 60 seconds, and mean response latency. Criterion was defined as the solution of three consecutive anagrams in 15 seconds or less.

Groups

Subjects were classified as Type A or B according to their JAS scores and FTAS scores. For the JAS, subjects scoring in the positive range were categorized as Type As. Those scoring in the negative range were termed Type Bs. This is based on the normative means data available for

the JAS (Jenkins, Zyzanski, & Rosenman, 1979). For the FTAS, scores can range from 0.00 to 3.00, so 1.50 was chosen as the division score. Subjects with scores above 1.50 were classified as Type As, while those with scores below 1.50 were Type Bs. Also subjects were categorized as internal or external locus of control individuals according to their scores on the Rotter (1966) LC scale. The normative mean score of 10.5 was used, such that those with scores above that point were classified as externals, while those scoring below 10.5 were internals.

Demographic Variables.

Information was collected for each subject on age, marital status, number of children, years of education, smoking behavior, and obesity.

Data Analysis

For all analyses the criterion for statistical significance was $p<.05$. Additionally, results are only reported if they also met the $p<.05$ criterion with the Huyn-Feldt correction factor. This is because of the bias in repeated measures analysis whereby observations occuring closer in time together tend to be more highly correlated than those farther in time. The Huyn-Feldt factor yields a more conservative test of significance. In all repeated measures analyses, the rest value used was the lowest mean rest for the entire experimental session.

CHAPTER VII

RESULTS

Group Data

Coronary-prone behavior was assessed by two separate scales: JAS and FTAS. The subjects were classified as Type A or B by both scales separately in the manner previously described. The JAS classification resulted in 20 As and 20 Bs for each experimental condition. The FTAS classification resulted in 18 As and 21 Bs for Condition 1, 17 As and 23 Bs for Condition 2, and 22 As and 18 Bs for Condition 3. Data for one subject were excluded from analyses involving the FTAS because of an incomplete questionnaire. Locus of control was assessed by Rotter's (1966) scale and the distribution of internal and external subjects was even, with 20 internals and 20 externals per condition. The means and standard deviations for each scale in the three conditions are presented in Table 1. Tables 2 and 3 contain means and standard deviations of scores for each subgroup. Scores are virtually identical across experimental conditions, verifying that the conditions were comparable with respect to CPB and LC score distribution. Likewise, internal and external subjects did not differ significantly in their CPB scores and Type As and Bs did not differ in their LC scores. Furthermore, the

TABLE 1

MEAN QUESTIONNAIRE SCORES
FOR EXPERIMENTAL CONDITIONS

	Mean Scores (S.D.)		
Condition[1]	JAS	FTAS	LC
1	1.2 (8.4)	1.5 (0.8)	9.2 (4.1)
2	-1.3 (8.4)	1.5 (0.8)	10.3 (4.0)
3	1.1 (9.6)	1.7 (0.8)	9.9 (3.7)
Overall	0.6 (8.9)	1.6 (0.8)	9.8 (3.9)

[1]N=40 for each condition

TABLE 2

MEAN LC SCORES BY CPB GROUPS

CPB Groups	N	LC Score (S.D.)
JAS A	60	9.9 (4.6)
JAS B	60	9.8 (3.3)
FTAS A	57	9.9 (4.0)
FTAS B	62	9.7 (3.9)

TABLE 3

MEAN CPB SCORES BY LC GROUPS

LC Groups	N	JAS Score (S.D.)	FTAS Score (S.D.)
Internal	60	0.9 (9.8)	1.6 (0.8)
External	60	-0.7 (7.9)	1.6 (0.8)

subgroup and individual condition scores are all similar to the overall means (N=120).

A correlational analysis was run on FTAS scores and the four JAS subscale (Type A, Speed and Impatience, Job-Involvement, Hard-driving and Competitive) scores to assess the concordance between the two measures of CPB. Locus of control was also included in the correlation matrix. The relationship between the JAS Type A scale and the FTAS was significant ($r=0.51$, $p<.0001$), showing a moderate agreement betweem the two scales. The FTAS also correlated significantly with the Speed and Impatience ($r=0.49$, $p<.0001$) and Hard-driving and Competitive ($r=0.40$, $p<.0001$) scales. With the exception of the Job-Involvement scale, the JAS subscales were also significantly correlated. So women classified as JAS Type As were also more likely to have higher Speed and Impatience ($r=0.71$, $p<.0001$) and Hard-driving and Competitive ($r=0.45$, $p<.0001$) scores. Higher scores on the Speed and Impatience scale were also associated with higher Hard-driving and Competitive scores ($r=0.24$, $p<.0001$). Locus of control correlated significantly only with the JAS Hard-driving and Competitive subscale ($r=-0.19$, $p<.05$). Therefore, external subjects tended to have lower Hard-driving and Competitive scores. Locus of control remained independent of both CPB measures. These correlations are summarized in Table 4.

TABLE 4

Correlation Coefficients for JAS[1], FTAS[2], and LC[2] Scores

		1	2	3	4	5	6
1.	JAS A	1.00	.71***	.13	.45***	.51***	-.07
2.	JAS SI		1.00	.06	.24**	.49***	.03
3.	JAS JI			1.00	.15	.11	-.09
4.	JAS HC				1.00	.40***	-.19*
5.	FTAS					1.00	-.01
6.	LC						1.00

[1]Pearson r correlation

[2]Spearman r correlation

*p<.05

**p<.001

***p<.0001

Demographic Variables

The sample (N=120) had a mean age of 37.2 years (S.D.=11.95), was predominantly married (67%), with the average number of children being 1.2 (S.D.=1.2). Only 5 of the subjects were black and there were no other non-Caucasian subjects. The mean level of education of the sample was 14 years (S.D.=2.2) or 2 years beyond high school. Smokers comprised 25% of the sample. Only 16% were determined to be obese, according to the 1983 Metropolitan Life Insurance tables. Eighteen subjects professed themselves to be hypertensive. Of these only 2 subjects were on beta-blockers at the time of the experiment. Since one was a Type A and the other a Type B, it was felt that their inclusion in the sample was still acceptable as any bias effects would presumably cancel out each other.

Correlations between age, marital status, number of children, race, years of education, smoking, and obesity variables and the JAS, FTAS, and LC scores were performed. There were no significant relationships between the questionnaire scores and any of the demographic variables. Therefore, there was no confounding of these factors with CPB or LC. Additionally, the lowest mean resting SBP value for each subject was also correlated with the questionnaire scores and demographic variables. The mean resting SBP was 111.6 mm Hg (S.D.=16.3). While it did not correlate significantly with either CPB measure or LC, resting SBP

did associate significantly with a number of the demographic variables. Specifically, there was a positive relationship with marital status ($r=0.18$, $p<.05$), such that married women tended to have higher resting SBP. Resting SBP also tended to increase as did the number of children a subject had ($r=0.19$, $p<.05$). As might be expected, SBP also rose with age ($r=0.29$, $p<.001$). Finally, higher levels of education were associated with greater resting SBP ($r=0.35$, $p<.0001$).

Anagram Performance

Separate analyses for trials to criterion, number of failures, and mean response latency were done. Analyses were all a 3 x 2 x 3 (Pretreatment Condition x Type x LC) factorial Analysis of Variance (ANOVA), Each of these analyses were also performed for JAS and FTAS classifications, resulting in six ANOVAS. The FTAS trials to criterion analysis resulted in a significant interaction of Condition by FTAS by LC ($F(2,107)=2.94$, $p<=.05$). Subsequent analysis indicated that the source of the interaction was two-fold: There was a strong learned helplessness effect by subjects in Condition 1 ($F(1,107)=22.78$, $p<=.0001$). These subjects, after being exposed to the noncontingent feedback in the CI task, took longer to reach the criterion of solving three consecutive anagrams in 15 seconds or less than did subjects in Conditions 2 or 3.

Condition 1 subjects took an average of 19.3 trials (S.D.=2.0) to reach criterion, while Conditions 2 and 3 subjects had means of 13.7 (S.D.=5.7) and 12.9 (S.D.=5.3) trials, respectively.

The second source of the triple interaction was found within Condition 3 subjects. These subjects had merely guessed answers during the CI task and received no feedback at all. Here a significant double interaction of FTAS by LC ($F(1,36)=6.49$, $p<.01$) occurred. Simple main effect analysis showed that this was due to external As showing greater performance deficits than external Bs. External As had a mean trials to criterion of 15.8 (S.D.=4.3), while external Bs had a mean of 8.6 (S.D.=4.2). Furthermore, among Type Bs, internals performed worse than externals with means of 14.0 (S.D.=4.4) and 8.6 (S.D.=4.2), respectively. Figure 1 summarizes this information.

The JAS analysis of trials to criterion also showed the learned helplessness effect of Condition 1 ($F(2,108)=22.9$, $p<.0001$). There was only a marginal JAS by LC interaction ($F(1,108)=3.71$, $p<.06$). However, the direction of this marginal effect was virtually identical to the FTAS analysis interaction. Neither the number of failures nor the mean response latency analyses using the FTAS or JAS yielded significant effects.

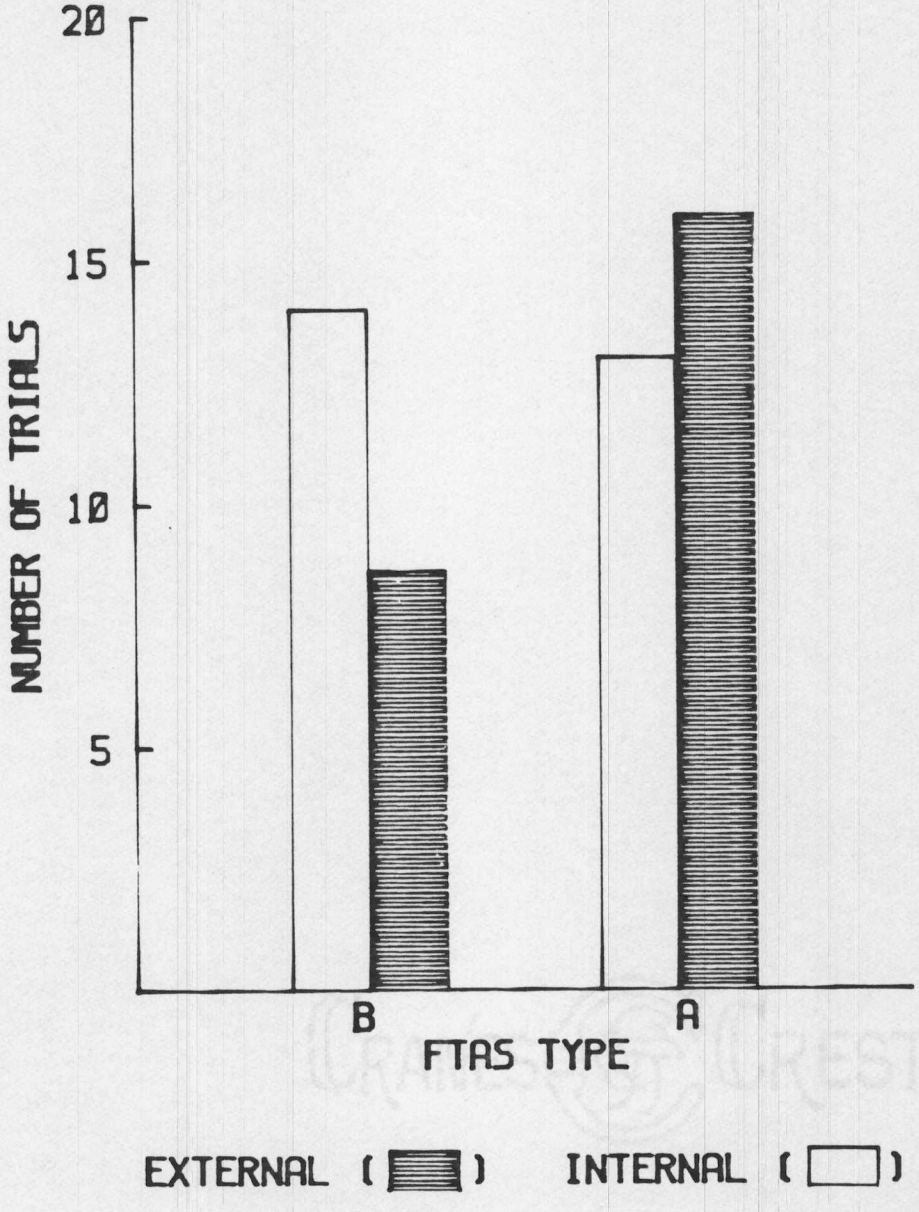


Figure 1. Trials to criterion: FTAS by LC interaction in Condition 3 subjects.

Rating Scale Data

A rating scale to ascertain subjects' perception of the CI task and their performance was given to each subject upon completion of the experimental session. This feedback questionnaire asked subjects to rate their success on the CI task and the solvability of the task before and after they had performed the task. All the ratings were on a 7-point scale ranging from "totally unsuccessful" or "totally unsolvable" to "totally successful" or "totally solvable." An ANOVA was performed with a factor of condition for each question.

There were no significant differences among conditions in subjects' perception of task solvability before they did the task. However, perception of task solvability after the task did differ significantly ($F(2,117)=7.68$, $p<.0001$). Closer inspection showed that subjects in Condition 3 rated the task as more solvable ($M=4.9$, $S.D.=1.8$) than those in Conditions 1 and 2. In fact, ratings from Conditions 1 and 2 did not differ from each other ($M=3.8$, $S.D.=1.6$, and $M=3.5$, $S.D.=1.4$, respectively). Note that both of these groups had received some degree of noncontingent feedback during the task, making it impossible to solve the task. Subjects in Conditions 1 and 2 also rated themselves as less successful at the task than those in Condition 3 ($F(2.117)=24.68$, $p<.0001$). Again mean ratings for Condition 1 and 2 subjects were similar ($M=2.8$, $S.D.=1.2$, and

M=3.0, S.D.=1.1). The mean rating for Condition 3 in contrast was 4.7 (S.D.=1.2).

Physiological Variables

The design used for the analyses of the physiological variables was a 3 x 2 x 2 x 2 (Condition by Type by LC by Repeated Measures) factorial. The Repeated Measures (R) factor was the change from rest to either CI or Anagram task. In all cases separate analyses were carried out for FTAS and JAS Type A classifications. Additionally, it should be noted that for all analyses, the R main effect was highly significant and therefore will not be reported individually. As expected, this indicated that both tasks produced physiological changes in the subjects. A summary of the physiological results is provided at the end of the chapter in Table 5.

CI Task.

HR: Using the FTAS classification, the ANOVA on HR revealed a significant R by FTAS by LC interaction ($F(1,107)=3.97$, $p<.05$). This interaction is graphed in Figure 2. A follow-up analysis with CI to rest change scores indicated that the double interaction of FTAS by LC was also significant ($F(1,114)=4.22$, $p<.05$). Tukey HSD post hoc tests were then performed, revealing that the source of the interaction was due to differences in HR reactivity among Type As and among externals (HSD=2.5).

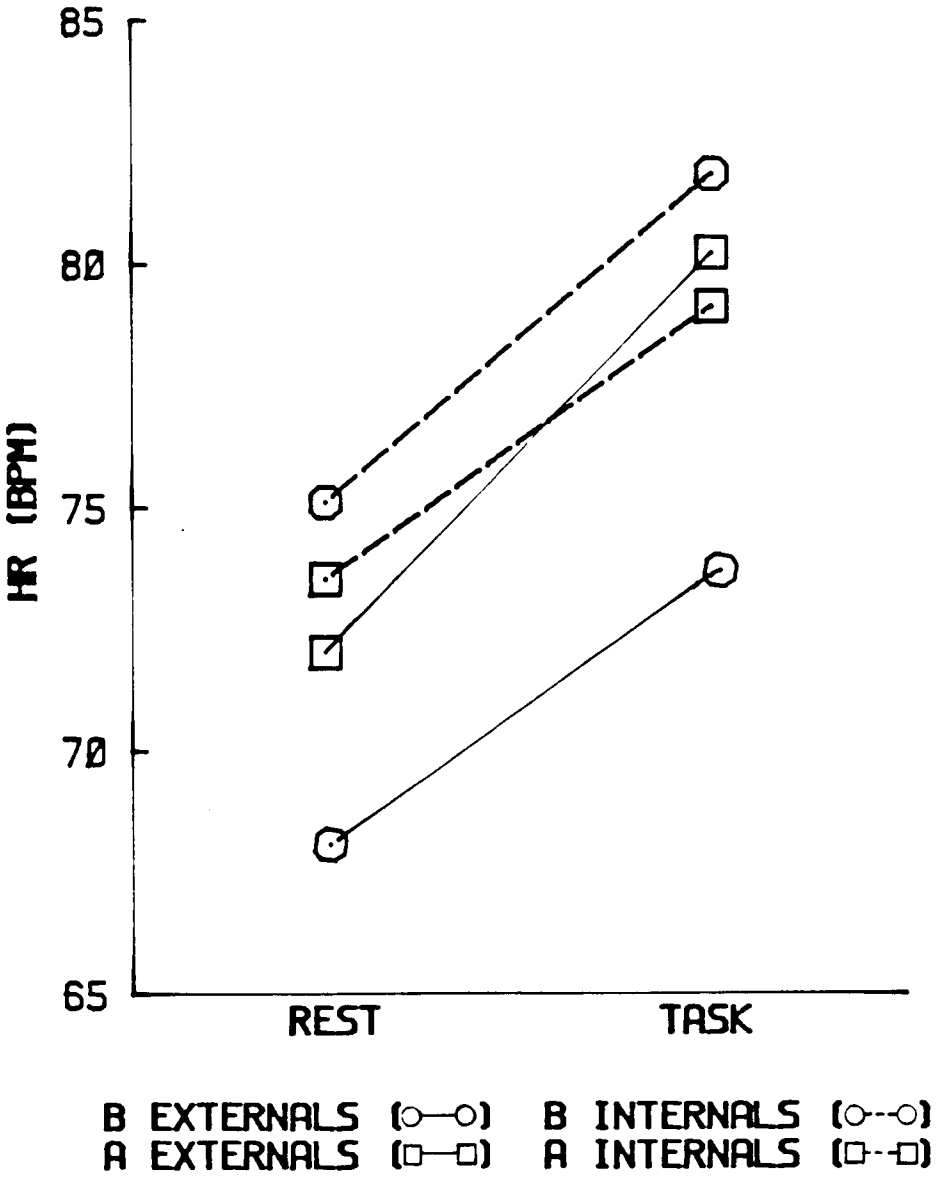


Figure 2. Heart rate during CI task: R by FTAS by LC interaction.

Specifically, among Type As, externals were more reactive than internals. Among the external subjects, Type As had greater HR increases than Type Bs. The change score analysis indicated that these effects were not due to any contributions by baseline levels.

Except for the R main effect, the JAS analysis revealed no significant effects for this task.

HRV: The FTAS analysis showed a significant main effect for LC ($F(1,107)=4.03$, $p<.05$), such that externals had greater variability levels than did internal subjects. Thus, externals had a mean variability of 6.8 beats (S.D.=1.7), while the mean for internals was 5.0 beats (S.D.=0.1).

An R by FTAS by LC interaction was also significant ($F(1,107)=6.01$, $p<.05$). Change score analysis showed that baseline differences did not contribute to the interaction. The follow-up analysis in fact indicated that the FTAS by LC interaction was quite significant ($F(1,114)=7.12$, $p<.0001$). As Figure 3 shows, the reactivity differences here were due to external As decreasing variability, while internal As increased variability. Additionally, among internal subjects, Type Bs decreased HRV, while As increased. These relationships were verified with Tukey tests (HSD=1.3).

The JAS repeated measures ANOVA revealed a similar R by JAS by LC interaction ($F(1,108)=9.39$, $p<.0001$). This

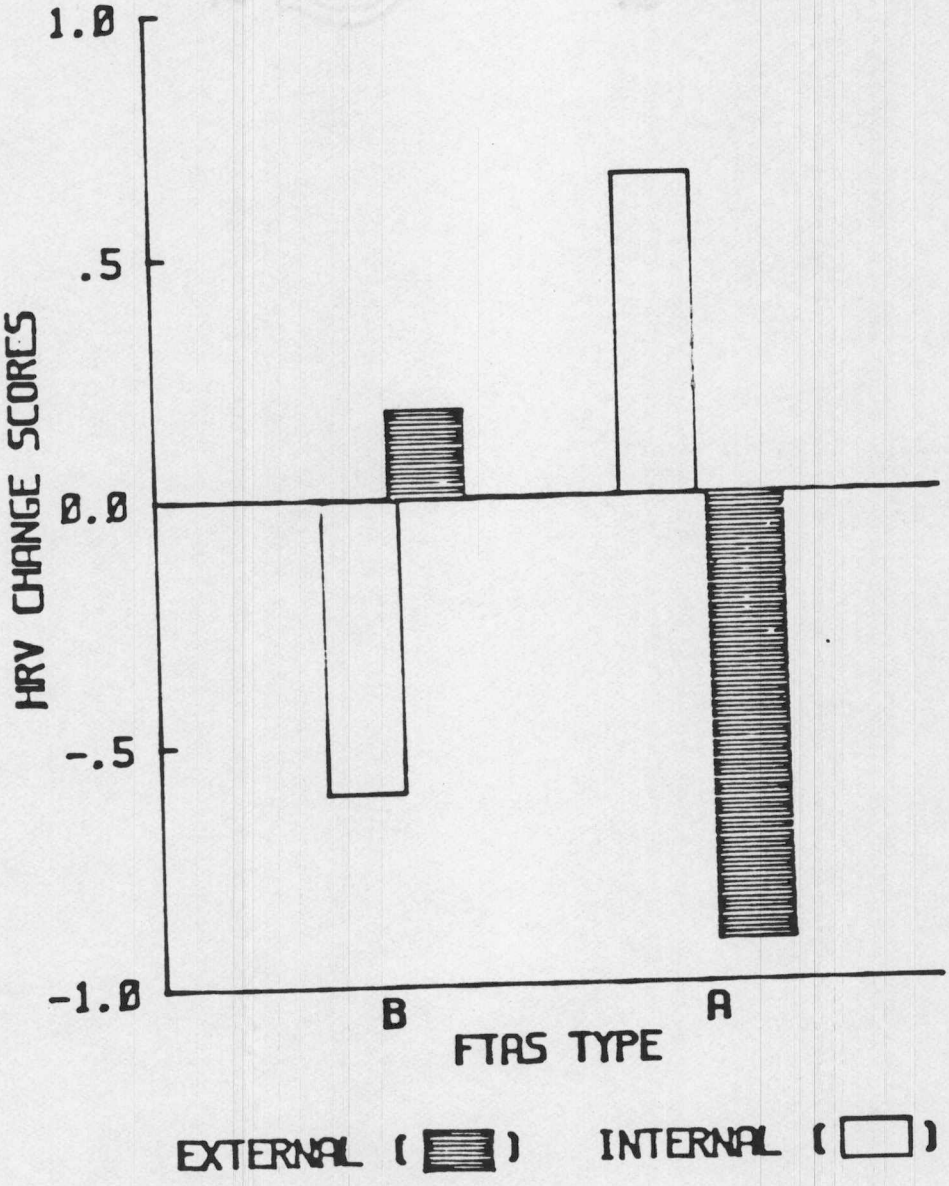


Figure 3. Heart rate variability during CI task: R by FTAS by LC interaction

reactivity effect also remained when baseline differences were taken into account ($F(1,115)=9.10$, $p<.0001$). Follow-up Tukeys (HSD=1.2) indicated that as with the FTAS classification, JAS Type A externals decreased their HRV, while A internals increased HRV. This is shown graphically in Figure 4.

SBP: The Framingham Type A scale levels analysis revealed a significant triple interaction of Condition by FTAS by LC ($F(2,107)=5.10$, $p<.0001$). Follow-up analysis indicated that this was due to a double interaction of FTAS by LC within Condition 2 ($F(1,36)=8.43$, $p<.0001$). This effect was further dissected to show the source of the interaction to be due to external As having higher SBP levels (M=134.0 mm Hg, S.D.=9.8) than external Bs (M=120.5 mm Hg, S.D.=11.7). Also, among the Type Bs, internals had higher SBP levels (M=132.2 mm Hg, S.D.=11.2) than externals (M=120.5 mm Hg, S.D.=11.7). These relationships were verified by Tukey post hoc tests (HSD=11.1). Figure 5 illustrates this interaction.

The JAS analysis revealed no significant effects other than the R main effect.

DPB: Only one effect other than the R main effect was significant for DBP during the CI task. This was the R by Condition by LC interaction ($F(2,108)=2.94$, $p<.05$), using the JAS classification. A follow-up analysis of covariance using rest to task change scores indicated that baseline

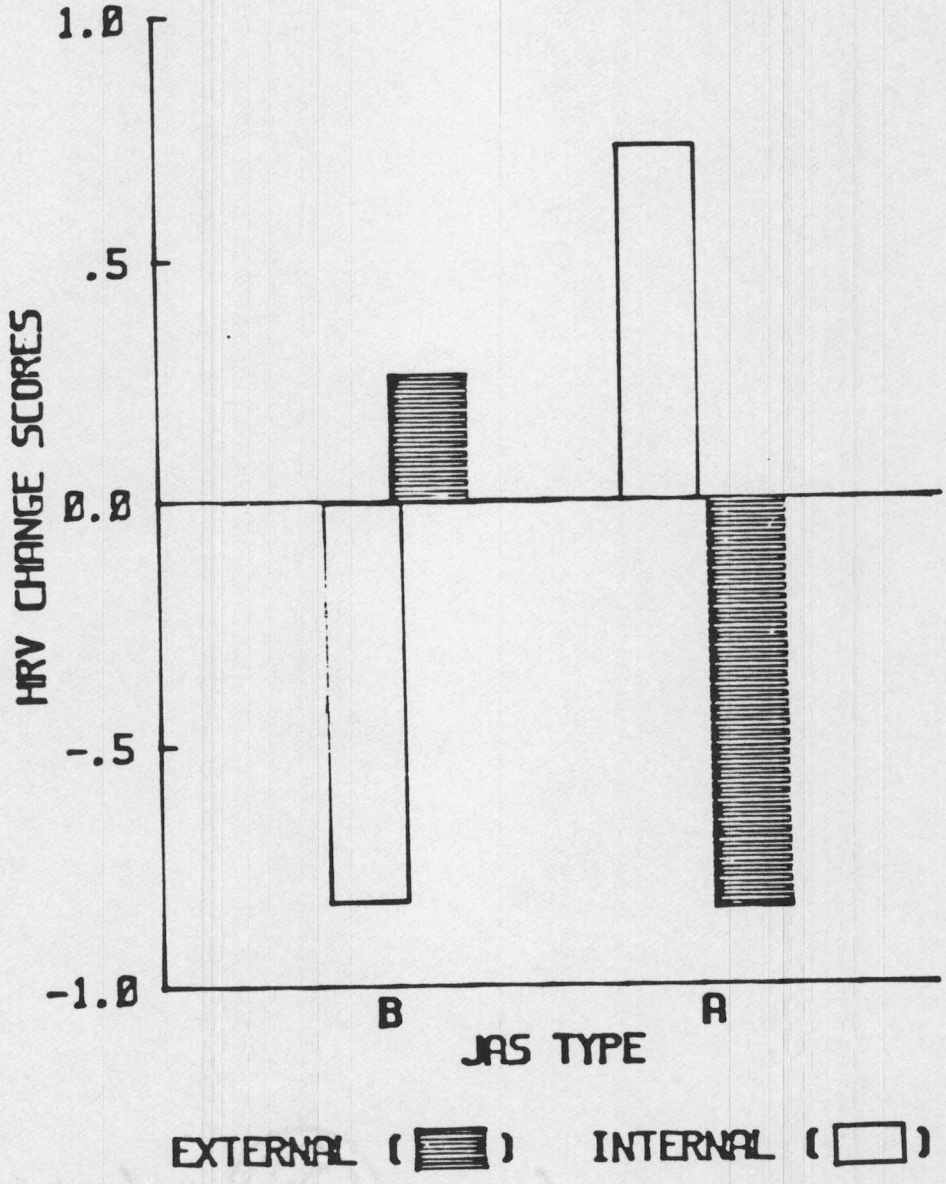


Figure 4. Heart rate variability during CI task: R by JAS by LC interaction.

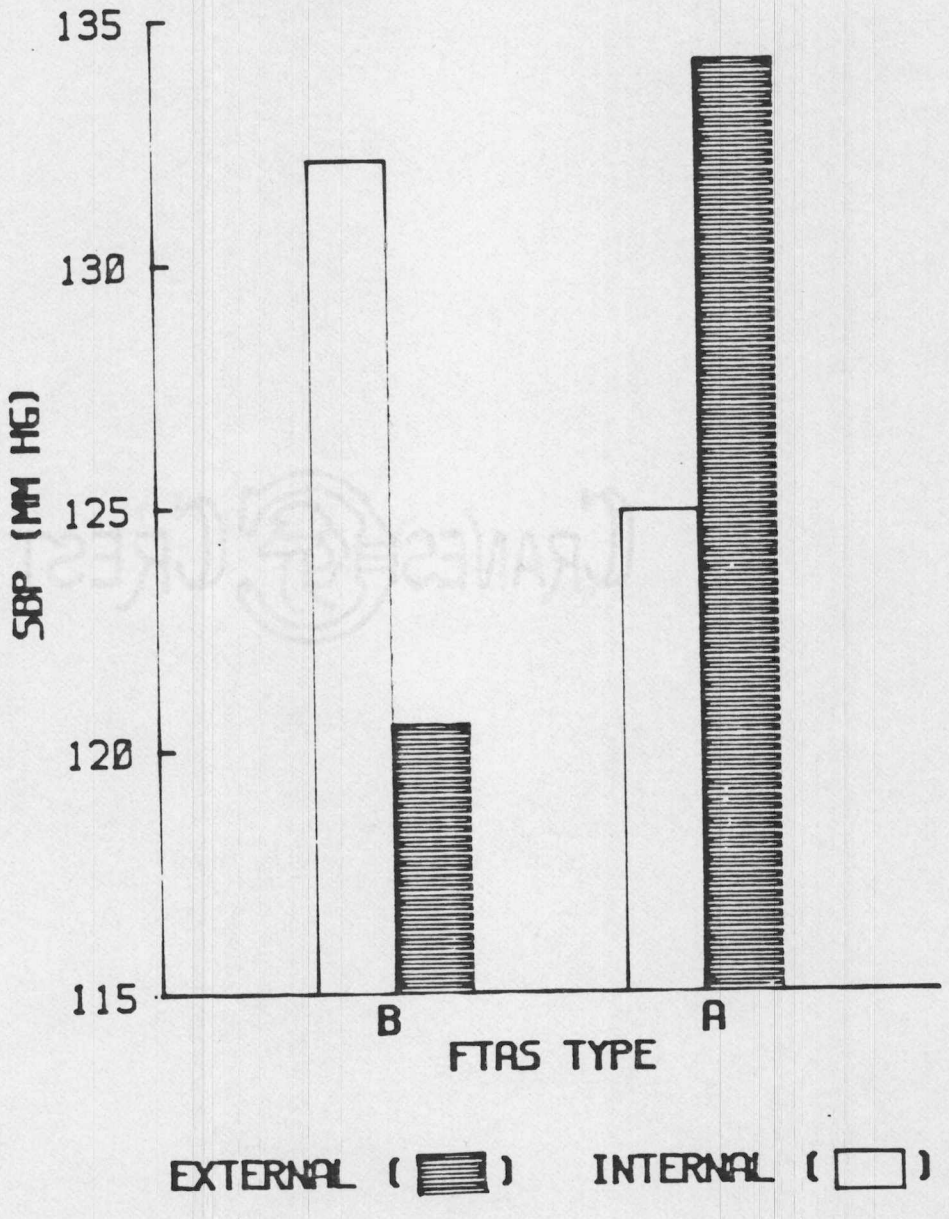


Figure 5. Systolic blood pressure during CI task: FTAS by LC interaction during Condition 2.

differences contributed to the reactivity seen in the still significant Condition by LC interaction ($F(2,113)=4.81$, $p<.0001$). Closer inspection indicated that in Condition 2, baseline differences alone accounted for the reactivity effect seen with LC. Externals had a DBP baseline of M=74.3 mm Hg (S.D.=9.9). Internals had a mean baseline of 70.6 mm Hg (S.D.=17.6). However, in Condition 3, there was no significant covariate of rest but a greater increase in DBP by externals than by internals ($F(1,37)=4.58$, $p<.05$). Externals increased DBP by 11.5 mm Hg, while internals in Condition 3 only increased by 6.7 mm Hg.

Anagram Task.

HR: The FTAS analyses revealed one significant effect in addition to the R main effect. This was the R by LC interaction ($F(1,107)=4.22$, $p<.05$). However, follow-up analysis of covariance with change scores indicated that this was due solely to the contribution of the resting covariate. Here externals had a lower resting HR (M=70.8 bpm, S.D.=11.0) than internals (M=74.1 bpm, S.D.=9.8). The reactivity effect did not therefore remain.

The R by JAS by LC interaction was significant when the JAS classification was used ($F(1,108)=5.10$, $p<.05$). Here change score analysis of covariance indicated that this was partly due to baseline differences between internals and externals. Internals had a mean resting HR of

74.1 bpm (S.D.=9.8), while externals had a resting mean of 70.8 bpm (S.D.=11.0). Nevertheless, the JAS by LC term with adjusted cell means still remained significant ($F(1,115)=4.14$, $p<.05$). Additional follow-ups of simple main effects were performed with Tukey tests (HSD=2.1). Among the As, externals had greater increases in HR than did internals. This can be seen in Figure 6.

HRV: The FTAS analyses produced two significant effects for HRV during the Anagram task. There was a significant main effect for LC levels ($F(1,107)=4.98$, $p<.05$). This was such that externals had greater variability levels (M=6.8 beats) than did internals (M=4.2 beats). There was also a reactivity effect of R by Condition by FTAS ($F(2,107)=3.12$, $p<.05$). The source of the interaction was shown to be due to subjects who had experienced Condition 1 for the CI task. Within this group, according to the follow-up analysis, the Type As decreased HRV by -0.99 beats, while Type Bs increased their variability by +0.19 beats ($F(1,36)=5.56$, $p<.05$). The JAS analyses also resulted in a significant main effect for LC ($F(1,108)=4.26$, $p<.05$). The direction was the same as with the FTAS analysis: Externals had greater variability levels (M=6.8) than internals (M=5.0). There were no other significant effects for HRV.

SBP: There was only one significant effect for SBP during the Anagram task and that was with the FTAS

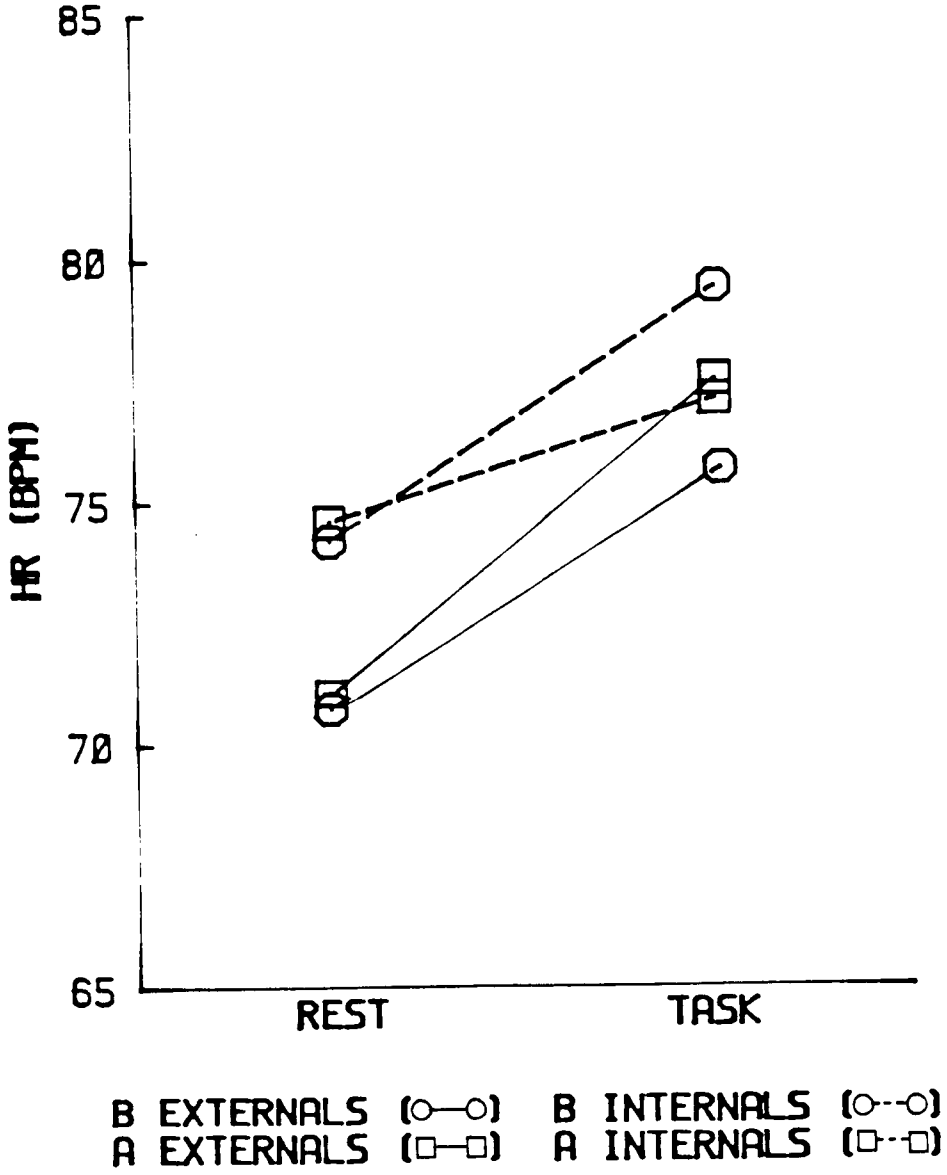


Figure 6. Heart rate during Anagram task: R by JAS by LC interaction.

categorization. This was a level interaction of Condition by FTAS by LC ($F(2,107)=5.03$, $p<.0001$). Follow-up analyses indicated that Conditions 1 and 2 contained the source of the interaction. For subjects from Condition 1 of the CI task, there was a FTAS simple main effect ($F(1,35)=5.60$, $p<.05$) in which Type As had greater SBP levels (M=128.0 mm Hg, S.D.=16.0) than Type Bs (M=116.9 mm Hg, S.D.=12.6). Subjects that had been exposed to Condition 2 had a more complex pattern of SBP levels. Here the double interaction of FTAS by LC was significant ($F(1,36)=4.81$, $p<.05$). Further simple main effect analysis revealed that this was due to external As having higher SBP levels (M=130.8 mm Hg) than external Type Bs (M=120.6 mm Hg). Also, among Type As, externals had higher SBP levels (M=130.8 mm Hg) than internals (M=116.9 mm Hg). This was verified by a Tukey test (HSD=12.9). This effect is similar to the SBP effect during the CI task (see Figure 5). Figure 7 illustrates the FTAS by LC interaction in Condition 2.

There were no significant JAS effects other than the R main effect.

DBP: The FTAS analysis revealed a significant R by FTAS by LC interaction ($F(1,107)=3.93$, $p<.05$). However, analysis of covariance with change scores of rest to task indicated that this was due to baseline contributions. Specifically, the resting value for internal Bs was lower

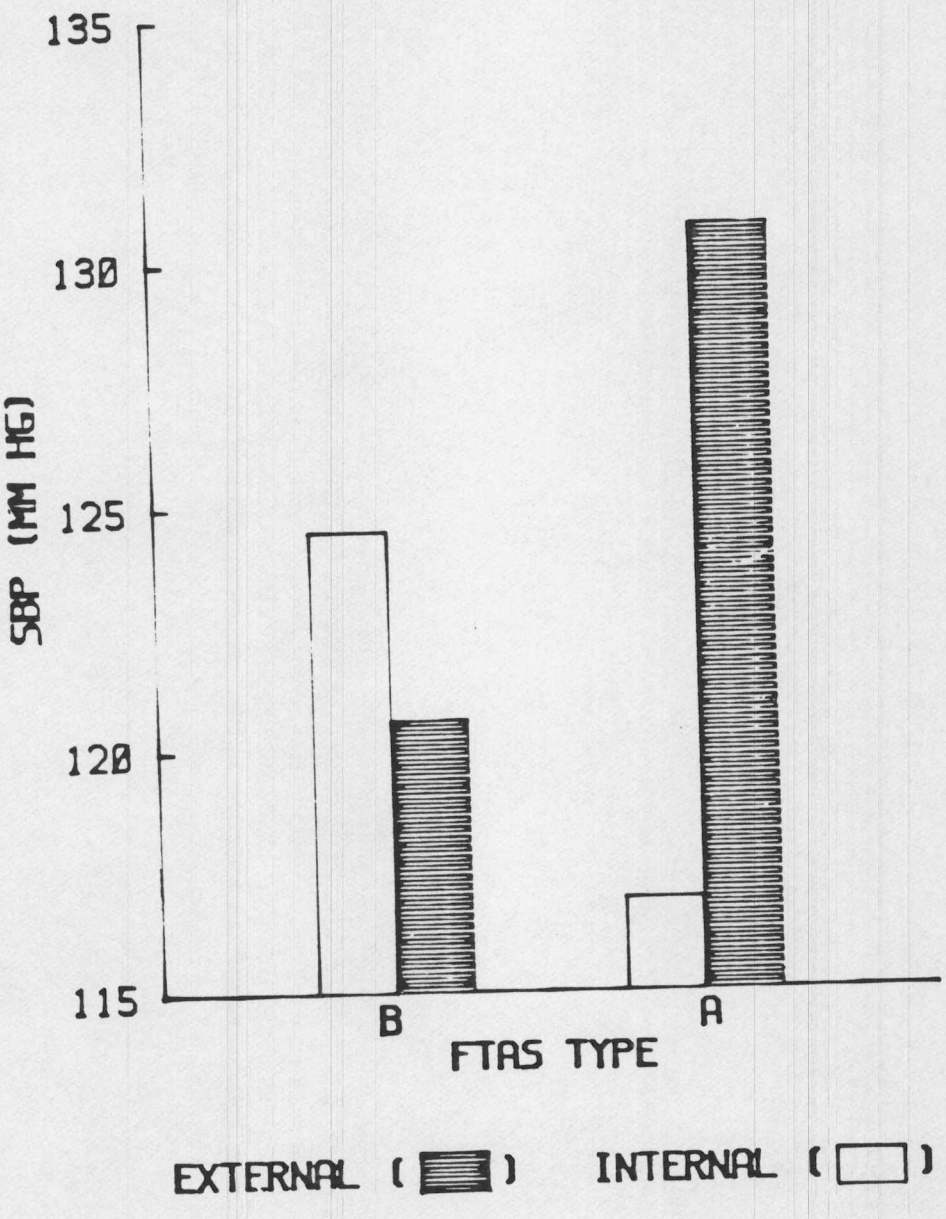


Figure 7. Systolic blood pressure during Anagram task: FTAS by LC interaction in Condition 2 subjects.

than the other three groups (M=69.3 mm Hg versus M=75.0 mm Hg). The reactivity effect did not remain.

There was also a significant R by Condition by FTAS interaction ($F(2,107)=4.34$, $p<.01$). Although covariance analysis of change scores still revealed a significant Condition by FTAS effect ($F(2,112)=3.75$, $p<.05$), further analysis showed the source to be due solely to baseline differences in Condition 2. Type As had a DBP baseline of M=76.1 mm Hg (S.D.=9.5), while Type Bs had a mean baseline of 69.8 mm Hg (S.D.=16.6). The reactivity effect did not remain. An R by JAS by LC interaction was also significant among the JAS analyses ($F(1,108)=3.84$, $p<.05$). Similar to the R by FTAS by LC effect, the baseline values of the internal Type Bs accounted for the effect. Internal Bs had a mean rest of 70.7 mm Hg (S.D.=16.0) and the other groups had a mean rest of 75.2 mm Hg (S.D.=9.9). Reactivity differences again did not emerge when baselines were taken into account in subsequent analyses.

TABLE 5

Summary of Physiological Results

Variable	Task	
	Concept Identification	Anagram
HR (FTAS)	A Ext > B Ext (R) A Ext > A Int (R)	Int > Ext (B)
(JAS)	-----	A Ext > A Int (R) Int > Ext (B)
HRV (FTAS)	A Ext↓ ; A Int↑ (R) B Int↓ ; A Int↑ (R) Ext > Int (L)	Condition 1: A↓ ; B↑ (R)
(JAS)	A Ext↓ ; A Int↑ (R)	Ext > Int (L)
SBP (FTAS)	Condition 2: A Ext > B Ext (L) B Int > B Ext (L)	Condition 1: A > B (L) 2: A Ext > B Ext (L)
(JAS)	-----	-----
DBP (FTAS)	-----	B Int < Others (B)
(JAS)	Condition 3: Ext > Int (R)	B Int < Others (B)

Ext=External; Int=Internal; R=Reactivity effect; L=Levels effect; B=Baseline effect

CHAPTER VIII

DISCUSSION

This study examined the relation of coronary-prone behavior and control in 120 female clerical workers. Control was studied both as a personality characteristic, locus of control, and as an experimental manipulation, a learned helplessness paradigm. Thus subjects were divided into three groups, each of which received differing levels of learned helplessness training on the CI task. One group (Condition 1) received noncontingent feedback on their performance; another group (Condition 2) received noncontingent feedback for one-third of the problems; the third group (Condition 3) received no feedback at all on their performance. Learned helplessness was then tested by their performance on a subsequent anagram task. During both tasks and intervening rest periods, cardiovascular measures (HR, HRV, SBP, DBP) were continuously monitored. Behavioral and physiological comparisons were then made for CPB, locus of control, and experimental condition.

Locus of control and CPB were found to be independent characteristics in this sample. This is in contrast to some findings in which there was a tendency for Type A subjects to have an internal locus of control (Dembroski, MacDougall, & Musante, 1984; Glass, 1977a). However, these studies employed college-age males as subjects. There are

four additional studies which did not find a significant association (Burke & Weir, 1980a; Frost & Wilson, 1983; Keenan & McBain, 1979; Schmied & Lawler, 1986). Two of these studies also used adult women as subjects. So the weight of evidence leans towards the independence of CPB and locus of control. For this sample, at least, the many interactions found may be assumed to be the result of independent, yet synergistic, effects.

The CI task in the present experiment acted as the learned helplessness training or pretreatment task. This was the task in which control was specifically manipulated. Therefore, it had been predicted to be the stronger elicitor of A-B physiological differences of the two tasks. The CI task was indeed successful in producing differential engagement by various subgroups. However, the pattern of responsivity was rather complex.

The stratified levels of control during the task had been included in order to get a more sophisticated pattern of cardiovascular reactivity. It should be recalled that in previous studies, in which differing degrees of the control-relevant stressor were administered, it was shown that the intermediate condition produced the greatest effects (Light & Obrist, 1983; Obrist et al., 1978; Van Schijndel, de Mey, & Naring, 1984). The intermediate condition in the present study, Condition 2, produced significant differences in SBP levels. This was one of the strongest

physiological effects of the study, occuring at the $p<.0001$ chance level. The pattern of the effect was such that among the externals, FTAS Type As had higher pressures than Bs. Among the Type Bs, internals had higher pressures than externals. So there was an A-B difference only within the subset of external subjects. The only other Condition 2 effect was the occurrence of DBP baseline differences between internals and externals. Even at rest externals had higher DBP than internals. Thus externals went into the task with higher DBP and, of those, the Type As went on to have higher SBP levels as well.

The pattern of external As and internal Bs having the highest SBP levels during the task is reminiscent of the SBP results of Chesney et al. (1981). In that study of male managers, Type As low in work autonomy and Type Bs high in work autonomy had the highest systolic and diastolic blood pressures (a one-time reading), compared with the other subgroups. Low autonomy would be similar to low control in the work setting.

Condition 3 had the only condition specific reactivity effect. This was with DBP, which externals increased more than internals. So while doing nothing more than guessing at the CI task, these external subjects were experiencing greater DBP increases than internals. Thus when control was not at all threatened, the personality characteristic of locus of control was important in determining

reactivity. If one views Condition 3 as being high in control, then this result is somewhat consistent with De Good (1975) in which incongruent personality/situation combinations produced greater physiological arousal. Hence, externals were more reactive during a high control situation. However, it could be argued that Condition 3 is not so much high in control as it is not lacking in control, compared with the other conditions. By the same token, internals should be more reactive in the conditions lacking in control, such as 1 or 2. Although this did not turn out to be the case with reactivity, there was the SBP levels effect described above for Type B internals during Condition 2.

Interestingly, subjects in Condition 1 did not exhibit any physiological effects unique to that experimental condition. These were the subjects who were presumably most behaviorally engaged in the task and yet had the least control. In fact for most subjects in this condition, frustration and sometimes explicit anger were observed as they performed the bogus task. This would often then be followed by the subject giving up on the task by the end. Apparently, however, neither the frustration nor the giving-up during the task translated into any distinguishable physiological effects.

There were overall task reactivity effects in addition to the condition-specific results. These overall effects,

involving HR and HRV, showed a consistent pattern of cardiovascular arousal by external As relative to both external Bs and internal As. Heart rate increased more and to higher levels in external As. Heart rate variability, in contrast, decreased more in external As compared with internal As. The internal As in fact increased variability during the task. The response of external As is suggestive of greater sympathetic activity. The internal Bs also responded with decreased HRV, while internal As increased HRV.

So the CI task produced a generalized arousal with the two variables, at least in certain subgroups, across conditions. The control-related responses, however, were limited to pressor responses again in certain subgroups. The most consistent results were with the external As. With the exception of DBP, this group was the most aroused for each physiological variable. Even with DBP, it was the externals who were the most reactive. Interestingly, among these results emerged a subgroup of Type Bs that were more responsive as well. These were the internal Bs. With one variable, HRV, these subjects were more reactive than their Type A counterparts. This topic will be discussed in more detail below.

The anagram task also elicited differential physiological engagement but the pattern here involved broader distinctions than in the CI task. This task had as well

the behavioral component of interest to the study, namely the test for learned helplessness. This will be discussed prior to the physiological results.

Learned helplessness did occur in Condition 1 subjects as predicted. These subjects took more trials to solve the anagram pattern than the other two groups. Thus having no control over the CI task in the guise of receiving noncontingent feedback affected subsequent performance on the anagram task. This was consistent with other human learned helplessness studies (e.g., Hiroto & Seligman, 1975; Pittman & Pittman, 1979). Condition 2 and 3 subjects performed virtually identically.

The results of the rating scale analysis also helped to confirm the learned helplessness effect. Although all the subjects rated the task equally solvable before they did the task, Condition 1 subjects rated it significantly more difficult and less solvable after the task. Condition 2 subjects' ratings were similar to those of Condition 1, even though their performance matched Condition 3 subjects. This was most likely due to having received the noncontingent feedback for some of the problems, although not enough to affect subsequent performance.

Unlike the Pittman and Pittman (1979) results, subjects in Condition 2 did not exhibit differential learned helplessness between internals and externals. This is not entirely unexpected, since Hiroto and Seligman (1975) had

found that at least six sets of the CI problems (as in Condition 1) had to be administered to induce learned helplessness.

In contrast, Condition 3 subjects did exhibit differential effects. For these subjects, the anagram task was the first 'real' task of the experimental session, since they had merely guessed at answers during the CI task. Here a differential CPB behavioral effect was seen only among external subjects and a differential LC behavioral effect was seen only among Type Bs. External As performed worse than external Bs and internal Bs performed worse than external Bs on the trials to criterion measure.

Even though the external As and internal Bs had poorer performances, one cannot say they exhibited learned helplessness. Remember this group received no learned helplessness training. Could there be a learned helplessness effect occuring during the anagram session itself? Given that the session was relatively long, being comprised of twenty anagrams, it is conceivable that repeated failure to solve the anagrams in the beginning could lead to giving up later in the task. It had been noted in fact during the experiment that many people who had initial difficulty in solving the anagrams seemed to resolve themselves to a failure experience, long before the end of the task.

Therefore, the anagrams were divided into quadrants of five anagrams each, with a mean solution time computed for

each quadrant. A post hoc analysis was then done on the four means with Type by LC groupings for Condition 3. The interaction of R by FTAS by LC was indeed significant ($F(1,36)=3.68$, $p<.01$) and is graphed in Figure 8. Follow-up analysis of covariance with change scores from the first quadrant mean indicated that the source of the interaction came from changes in mean solution times from the second to the third quadrant and the third to the fourth quadrant. Furthermore, it is the A externals and B internals who show the greatest decreases in solution times. The other two groups either plateau or even decline in performance. So among externals, As decrease their solution times steadily and are superior to Bs--although they are worse at figuring out the overall anagram pattern (indexed by trials to criterion)! Type B internals show the steepest drop in solution times between the second and third quadrants but it is the A externals that show the greatest consistency in improvement. It is as if speed is of the utmost importance to the A externals at the expense of a correct pattern solution. So the external As did in fact hyperrespond compared with the internal As, external Bs, and even the internal Bs at the end. Apparently, however, they were not as efficient as the other groups in the process. This was not followed by behavioral hyporesponsivity, at least within the confines of the experiment. The counterproductive hyperresponsivity by the external As certainly fits

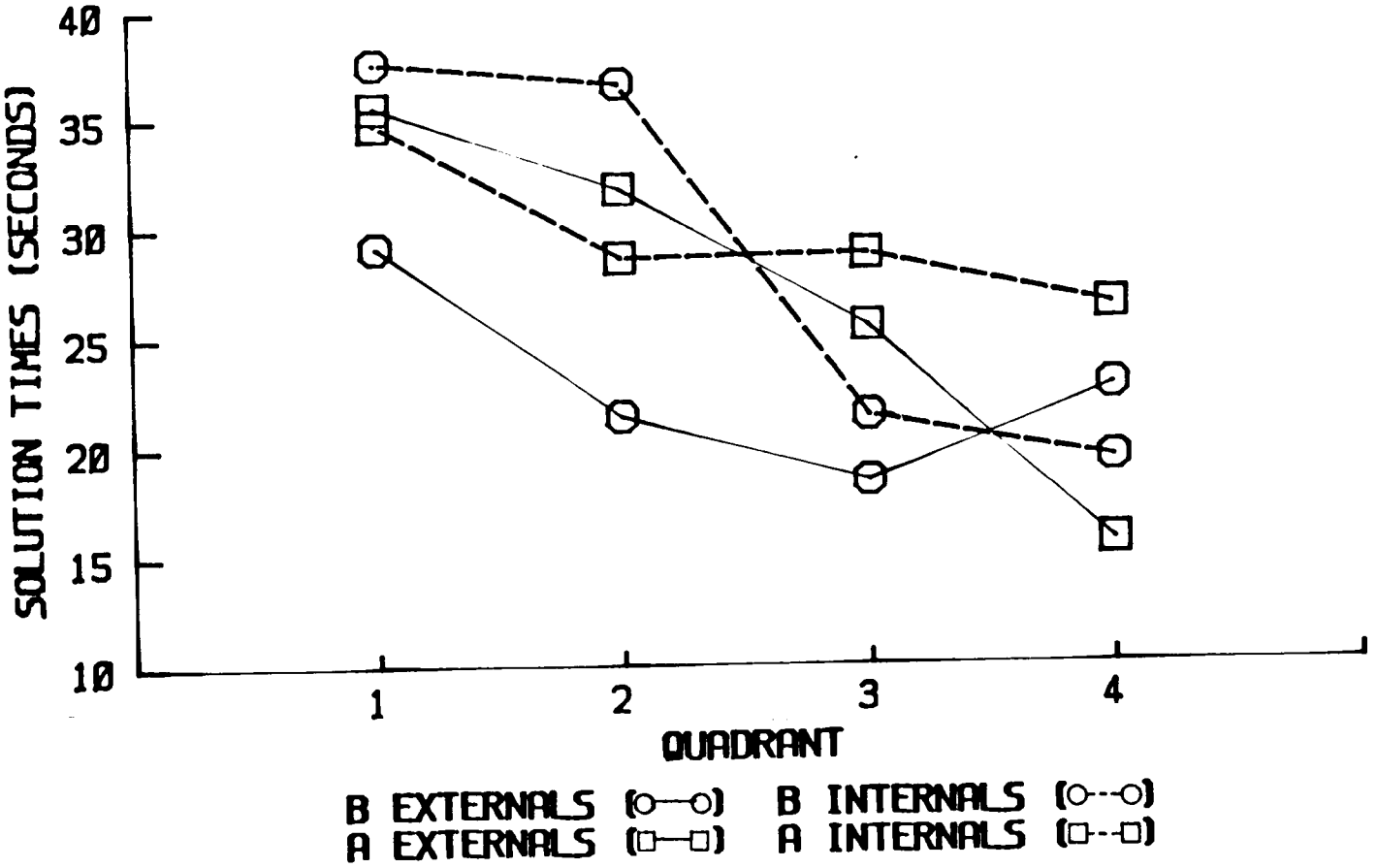


Figure 8. Anagram mean solution times in quadrants for Condition 3: R by FTAS by LC interaction.

with the stereotype of the Type A individual trying to accomplish too much at once. Again, however, the locus of control variable has interacted with CPB to complicate the scenario.

Physiological responses of the group experiencing learned helplessness (Condition 1 subjects) were the result of CPB effects. There were A-B differences for these subjects in SBP levels and HRV reactivity. Type As had higher SBP responses and decreased variability compared with Type Bs. Both effects were indicative of sympathetic arousal. So the poor performance by Condition 1 subjects was associated in the Type As with sympathetic nervous system responding. Type Bs, in contrast, accompanied their behavioral learned helplessness with depressed sympathetic activity, as indexed by an increase in HRV and lower levels of SBP. The literature would suggest diminished sympathetic activity universally to be the case among the learned helplessness subjects. Instead there was an uncoupling of behavioral and physiological responses among the Type As. In this sense, the behavioral hyporesponsivity associated with learned helplessness may have resulted in greater frustration for Type As, which was then accompanied by greater cardiovascular arousal. So Type As exhibited learned helplessness similar to Bs but were quite different physiologically in how they handled it.

Contrary to expectations, locus of control did not

interact with conditions for a behavioral learned helplessness effect. Perhaps not surprisingly, no physiological association specific to the learned helplessness condition appeared either. Instead, locus of control emerged as a distinguishing variable for the anagram task in general, usually in conjuction with CPB. The isolated effects were primarily baseline differences between internal and external subjects, with internals having the higher HR resting values, lower DBP baselines, and lower HRV levels.

The interactions of locus of control and CPB were with HR and SBP. External As increased HR more than internal As, as during the CI task. However, unlike the CI task, this effect was with JAS-defined As rather than FTAS-defined Type As. External As also had higher SBP levels than external Bs among the subjects who had experienced Condition 2 during the CI task. This was the same effect previously discussed for the CI task. This could have been simply a carry-over effect reflecting a sustained arousal from the intermediate control of the first task. The internal Bs did not maintain their arousal over external Bs, as had been seen in the first task as well. However, external As also had higher levels than internal As. It is suggestive that external As may have slower physiological recovery times.

It is interesting that no physiological effects specific to the Condition 3 subjects emerged. Although

behaviorally there were the differential effects with external As and internal Bs, this was not accompanied by any distinguishable physiological correlates. However, A-B physiological differences had not been particularly predicted during the anagram task. For those subjects the anagram task represented a challenging but not a control-relevant task. So while behavioral differences were elicited, sympathetic activity did not differentiate either As and Bs or internals and externals. One possibility for As and Bs at least is that while initial contact with a challenging task is adequate for eliciting the behavior differences, it is not necessarily sufficient to produce physiological differences. The control-relevant task was more successful in eliciting such differences. This lends support to Glass' (1977a) control hypothesis of CPB. However, the pattern of hyperresponsivity-hyporesponsivity was not so clearly established. This is in part because the nature of the tasks did not lend itself to that kind of behavioral distinction. In other words, if one were to observe the predicted hyperresponsivity by Type As, it would be during the first task. There were of course no behavioral measures taken from that task. Therefore, it could not be compared with the second anagram task. The speedy solution times seen in the Condition 3 external Type A subjects during the anagrams is certainly suggestive of the hyperresponsivity expected in an initial exposure to a

task. This was overlaid with the poor trials to criterion scores. Are these effects totally separate phenomena that merely overlap in that particular condition and task? More experimentation with a varied task agenda would be needed to tease out the effects. For instance, genuine behavioral measures would be needed from both a preliminary and subsequent task for comparison. Alternatively, two matched groups could be given separate tasks differing in the control factor but each of a lengthy enough duration to let any hyper-/hyporesponsivity effects emerge. The lack of differential results in previous experiments may have been due in part to too brief a task period.

Physiologically, there was a reasonable amount of support for the control hypothesis as well. As with the behavioral effects, there was differentiation between Type A and B individuals--but only among certain subsets. The pattern of external As and internal Bs being the most responsive is similar to the results of Lawler and Schmied (in press). Recall that in that study of female clerical workers, high powerless (external) As had higher heart rates than powerless Bs during the interview. Low powerless (internal) Bs had the greatest HRV decreases during the vigilance task. It is as if increased cardiovascular responding occurs when there is a disparity between the subject's expectations of control (i.e., locus of control) and motive for control (i.e., CPB).

If an individual has the CPB pattern such that there is the desire for control and yet past learning experiences lead that individual to have low expectations for personal control over life events, this presumably results in conflict. This conflict would then be exacerbated in situations that are in fact control-relevant. Thus emerges the cardiovascular reactivity. Similarly, the Type B individual with a relatively passive attitude may yet have the expectations that one can influence and be in control of life events. Then when faced with a control-relevant experience, this internal Type B exerts herself (behaviorally and physiologically) to meet the situation demands.

This might help explain, too, why not all Type As are reactive in certain situations and why some Type Bs are. The small samples often used in reactivity studies may have been skewed in distribution of locus of control and thus created a false representation of reactive CPB individuals. Obviously, it will now be important to examine the interplay of locus of control and CPB in males, as well as in other female samples of non-clerical occupations.

The finding of a subset of Type Bs that is reactive is not unique to this study. As mentioned above, Lawler and Schmied (in press) also found similar results. Allen (1982) also noted that a particular subset of male Type Bs (those with a negative family history for hypertension) exhibited greater physiological levels than other groups.

This same pattern was also seen with females in Lane, White, and Williams (1984). Friedman, Hall, and Harris (1985) have also divided Type A and B individuals into subgroups, of which certain As and Bs tend to be less healthy than others. Their subgroupings were based on nonverbal expressive style. The etiological significance of these reactive Type Bs is as yet unclear. One can speculate that perhaps these are the Type Bs at greater risk for CHD. There will be some Type Bs who will develop CHD, just as there are many Type As who will not develop CHD.

It should be readily apparent from the results that the FTAS measure of CPB was the stronger predictor of reactivity than the more commonly used JAS. In some instances where there was a significant JAS classification effect, it was merely the same effect as with the FTAS (e.g., HR, HRV). Interestingly, in all these cases, the effects were stronger than with the FTAS. In other instances, the JAS produced only baseline differences (e.g., HR, DBP). Nevertheless, the FTAS on the whole gave more complete results.

This was not totally unexpected due to the mixed results of using the JAS with female samples. It is important to note that this study makes the third of reactivity studies of employed women in which the JAS did produce some differential A-B physiological effects. The other two studies were those by Lawler, Rixse, and Allen (1983) and

Lawler and Schmied (in press). A control variable was involved in both studies using females from a low control occupation. This lends support to the notion that for women, employment is a key factor in discriminating CPB. For both the JAS and FTAS, one third of the score is based on employment related questions. However, the nature of these questions differs considerably. The FTAS questions are more in regard to perceptions of personal engagement and interaction at work. An example is "Do you feel like work often stretches you to the very limits of your energy and capacity?" In contrast, the JAS is more concerned with the pragmatic aspects of the work setting. For instance, one question asks "How often do you bring work home with you at night?" So perhaps the more phenomenological aspect of the FTAS is better related to the CPB experience. If the FTAS is in fact more relevant to employed female samples, this might account for the negative results using the FTAS by MacDougall, Dembroski, and Krantz (1981) with college-aged females. This type of sample would have little experience from which to base their answers to the employment-related questions. I would suggest that the FTAS is not an appropriate CPB instrument for an unemployed sample. The JAS at least does have forms available for unemployed samples.

On the other hand, the addition of a control-relevant task or a personality measure of control, such as locus of

control, needs to be undertaken with a sample of young females also. It may be that adding in the control variable in some capacity might succeed in differentiating As and Bs. In one sense, students could be considered as being in a low autonomous situation, too. For instance, they usually have no control over the pace of a course, when exams are scheduled, or how long an exam might be.

It should be noted as well that it was the control aspect of the first task which elicited the most physiological responses. The CI task in general produced more effects than did the anagram task. Also the chief effects found in the anagram task were directly influenced by the first task, as evidenced by the interactions with experimental condition. Remember that both tasks (with the exception of Condition 3 in the CI tasks) were challenging and both involved to some degree an interpersonal stressor. An experimenter was always present during both tasks to present the stimuli, time the responses, and give feedback. However, only the CI task was control relevant. It can be concluded then for this sample that it was the control factor that elicited the differential physiological responses rather than the challenge or interpersonal stressor. The latter is continually touted as the best elicitor for responses in women, although there have been mixed results to that effect.

This study has answered each of the questions

initially posed by the author. The key points seem to be that in this study of female clerical workers, there was an interactive effect of CPB and locus of control on behavioral and cardiovascular responding. This interaction was largely influenced by the control-relevant task. The experimental paradigm was successful in producing learned helplessness in the appropriate group and this group exhibited differential A-B physiological responses.

Additionally, however, many more questions have been opened. How important is control in eliciting reactivity in males? Is it also associated with occupation? How would this paradigm affect women in high control occupations? The implication is that there are basic gender differences in the way in which CPB is brought to manifest itself physiologically. For males all that is necessary to elicit differential reactivity seems to be a challenging situation. Employment does not seem to be a critical factor. However, it is when women are engaged in traditionally male-dominated occupations that reactivity emerges, without the control aspect being readily apparent. Perhaps CPB is a different phenomenon for men and women, involving different sets of beliefs, motives for control, and so forth. This is certainly supported by the questionable concordance of CPB measures in female and male samples. So there may certainly be in women a CPB pattern that shares some characteristics with those of men but that also has

non-overlapping regions that are critical in determining the cardiovascular reactivity that is associated with the pathogenesis of coronary disease.

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APPENDICES

APPENDIX I

LETTER OF SOLICITATION

The University of Tennessee, Knoxville
College of Liberal Arts
Department of Psychology

KNOXVILLE TN 37996-0900
(615) 974-2531

April 5, 1986

Dear Madam:

The U.S. Department of Labor has indicated that secretarial work is the second most hazardous occupation in terms of general health. Yet relatively few research studies have been done on secretaries to see why that is so. The job is known to be quite stressful because of characteristics such as having a heavy workload combined with time pressures.

Therefore, we are conducting a study of stress and health in secretaries and are seeking volunteers from the secretarial community to participate. We would like volunteers to come to our laboratory at The University of Tennessee for a two-part testing session lasting a total of an hour. The first part will involve the completion of four questionnaires on stress and personality characteristics. The completed questionnaires will be strictly confidential and none of the individual information collected in the study will be made available to anyone else. As an additional safeguard, a code number, known only to the individual and ourselves, will be assigned to each participant.

The second part of the session will involve recording your pulse rate and blood pressure while you relax and perform fairly challenging mental puzzles. None of these measures taken is at all painful nor involve any risk to personal safety. In addition to serving as a free blood pressure screening, the results of the study will be made available to all participants.

If you wish to participate in this study, please fill out the attached, pre-addressed card and return it by Campus Mail. We will contact you upon receipt in order to schedule your visit. If you have any questions or know of other female secretaries who would like to participate as well, please call Lori Schmied at 974-2799 or Dr. Kathleen Lawler at 974-4361. Your time and support in this project will be of great service to the medical community, while also being a benefit to you.

Sincerely,

Kathleen Lawler, Ph.D.
Associate Professor

Lori Schmied
Graduate Assistant

aw

APPENDIX II

CONCEPT IDENTIFICATION TASK EXAMPLE



(RED) (BLACK)

APPENDIX III

LIST OF ANAGRAMS

1. CORHA - ROACH
2. IHCRA - CHAIR
3. OOCNL - COLON
4. IUMCS - MUSIC
5. OAWNG - WAGON
6. AUHNM - HUMAN
7. EOPRW - POWER
8. OOMRT - MOTOR
9. GUJED - JUDGE
10. NRTDE - TREND
11. NUFYN - FUNNY
12. MRCPA - CRAMP
13. CEBHA - BEACH
14. NRDKI - DRINK
15. SOHEU - HOUSE
16. IRTNA - TRAIN
17. ORBKO - BROOK
18. TOMHN - MONTH
19. RLCKE - CLERK
20. GOFYG - FOGGY

APPENDIX IV

CONSENT FORM

INFORMED CONSENT

This research focuses on personality characteristics that might influence physiological responding while you perform two tasks. The experiment involves two parts: Paper-and-pencil questionnaires and physiological testing. During the first part you will fill out four questionnaires. These questionnaires will be identified only by your subject number. This part will take 15 minutes.

During the second part, we will be measuring your heart rate and blood pressure. This will be accomplished by attaching 3 surface electrodes to monitor heart rate and an automatic-inflating blood pressure cuff. While these responses are being monitored, you will rest, perform a cognitive concept-identification task, and solve anagrams. The total time for this part of the experiment is 43 minutes, of which 13 minutes are rest intervals.

This study is purely voluntary and you may withdraw from the project at any time. No risks of personal injury are possible. From your participation you will learn of any indication of high blood pressure. Any questions you have concerning the procedures of this project will be answered and results of the final analysis will be available to you. Should you have any subsequent questions, you may contact either Dr. Lawler or Ms. Schmied at A313 Walters Life Science Building, 974-2799 or 974-3295.

I volunteer to participate in the investigation conducted by Dr. Kathleen Lawler and Ms. Schmied. I have read the above description, I have had all my questions answered, and I agree to participate in this experiment. I also realize that I may terminate the experimental session at any time by request without penalty.

Date _____ Signature _____

Printed name _____

Researcher's Signature _____

APPENDIX V

PERSONAL HISTORY FORM

Participant Information Sheet

Name _____

Address _____

_____

Campus Address _____

_____

Work Phone _____

Marital Staus: Married Single Widow Divorced

How many children do you have?_____

What is your height? _____ _____ Age? _____ Weight? _____

Do you smoke cigarettes? _____ If yes, how many packs per day? _____

What is your job title? _____

How many years of education have you had? _____

Are you currently taking any medications? _____ If so, please describe:

_____

_____

Do you have now, or have you ever had, high blood pressure? _____

If yes, have you ever had any medications for it? _____

If it were not necessary for you to work for a living, would you prefer to stay at home or would you still wish to work? What is the main reason for this choice?

_____

_____

_____

APPENDIX VI

JENKINS ACTIVITY SURVEY

JENKINS ACTIVITY SURVEY

For each question, choose the alternative that is true for you.

1. Do you ever have trouble finding time to get your hair cut or styled?
   a. Never _____
   b. Occasionally _____
   c. Almost always _____

2. How often does your job "stir you into action"?
   a. Less often than most people's jobs _____
   b. About average _____
   c. More than most people's jobs _____

3. Is your everyday life filled mostly by
   a. problems needing a solution? _____
   b. challenges needing to be met? _____
   c. a rather predictable routine of events? _____
   d. not enough things to keep me interested or busy? _____

4. Some people live a calm, predictable life. Others often find themselves facing unexpected changes, frequent interruptions, inconveniences, or "things going wrong." How often are you faced with these minor (or major) annoyances or frustrations?
   a. Several times a day _____
   b. About once a day _____
   c. A few times a week _____
   d. Once a week _____
   e. Once a month or less _____

5. When you are under pressure or stress, what do you usually do?
   a. Do something about it immediately _____
   b. Plan carefully before taking any action _____

6. Ordinarily, how rapidly do you eat?
   a. I'm usually the first one finished. _____
   b. I eat a little faster than average. _____
   c. I eat at about the same speed as most people. _____
   d. I eat more slowly than most people. _____

7. Has your spouse or a friend ever told you that you eat too fast?
   a. Yes, often _____
   b. Yes, once or twice _____
   c. No, never _____

8. How often do you find yourself doing more than one thing at a time, such as working while eating, reading while dressing, or figuring out problems while driving?
   a. I do two things at once whenever practical. _____
   b. I do this only when I'm short of time. _____
   c. I rarely or never do more than one thing at a time. _____

9. When you listen to someone talking, and this person takes <u>too long</u> to come to the point, how often do you <u>feel</u> like hurrying the person along?
   a. Frequently _____
   b. Occasionally _____
   c. Almost never _____

10. How often do you actually "put words in the person's mouth" in order to speed things up?
    a. Frequently _____
    b. Occasionally _____
    c. Almost never _____

11. If you tell your spouse or a friend that you will meet somewhere at a definite time, how often do you arrive late?
    a. Once in a while _____
    b. Rarely _____
    c. I am never late. _____

12. How often do you find yourself hurrying to get places even when there is plenty of time?
    a. Frequently _____
    b. Occasionally _____
    c. Almost never _____

13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already 10 minutes late. What will you do?
    a. Sit and wait _____
    b. Walk about while waiting _____
    c. Usually carry some reading matter or writing paper so I can get something done while waiting _____

14. When you have to "wait in line" at a restaurant, a store, or the post office, what do you do?
    a. Accept it calmly _____
    b. Feel impatient but not show it _____
    c. Feel so impatient that someone watching can tell I am restless _____
    d. Refuse to wait in line, and find ways to avoid such delays _____

15. When you play games with young children about 10 years old (or when you did so in past years), how often do you purposely let them win?
    a. Most of the time _____
    b. Half the time _____
    c. Only occasionally _____
    d. Never _____

16. When you were younger, did most people consider you to be
    a. definitely hard-driving and competitive? _____
    b. probably hard-driving and competitive? _____
    c. probably more relaxed and easygoing? _____
    d. definitely more relaxed and easygoing? _____

17. Nowadays, do you consider yourself to be
    a. definitely hard-driving and competitive? _____
    b. probably hard-driving and competitive? _____
    c. probably more relaxed and easygoing? _____
    d. definitely more relaxed and easygoing? _____

18. Would your spouse (or closest friend) rate you as
    a. definitely hard-driving and competitive? _____
    b. probably hard-driving and competitive? _____
    c. probably relaxed and easygoing? _____
    d. definitely relaxed and easygoing? _____

19. Would your spouse (or closest friend) rate your general level of activity as
    a. too slow - should be more active? _____
    b. about average - busy much of the time? _____
    c. too active - should slow down? _____

20. Would people you know well agree that you take your work too seriously?
    a. Definitely yes _____
    b. Probably yes _____
    c. Probably no _____
    d. Definitely no _____

21. Would people you know well agree that you have less energy than most people?
    a. Definitely yes _____
    b. Probably yes _____
    c. Probably no _____
    d. Definitely no _____

22. Would people you know well agree that you tend to get irritated easily?
    a. Definitely yes _____
    b. Probably yes _____
    c. Probably no _____
    d. Definitely no _____

23. Would people you know well agree that you tend to do most things in a hurry?
    a. Definitely yes _____
    b. Probably yes _____
    c. Probably no _____
    d. Definitely no _____

24. Would people who know you well agree that you enjoy a "contest" (competition) and try hard to win?
    a. Definitely yes _____
    b. Probably yes _____
    c. Probably no _____
    d. Definitely no _____

25. How was your temper when you were younger?
    a. Fiery and hard to control _____
    b. Strong but controllable _____
    c. No problem _____
    d. I almost never got angry. _____

26. How is your temper nowadays?
    a. Fiery and hard to control _____
    b. Strong but controllable _____
    c. No problem _____
    d. I almost never get angry. _____

27. When you are in the midst of doing a job and someone (not your boss) interrupts you, how do you usually feel inside?
    a. I feel O.K. because I work better after an occasional break. _____
    b. I feel only mildly annoyed. _____
    c. I really feel irritated because most such interruptions are necessary. _____

28. How often are there deadlines on your job?
    a. Daily or more often _____
    b. Weekly _____
    c. Monthly or less often _____
    d. Never _____

29. These deadlines usually carry
    a. minor pressures because of their routine nature. _____
    b. considerable preasure, since delay would upset my entire work group. _____
    c. Deadlines never occur on my job. _____

30. Do you ever set deadlines or quotas for yourself at work or at home?
    a. No _____
    b. Yes, but only occasionally _____
    c. Yes, once a week or more _____

31. When you have to work against a deadline, what is the quality of your work?
    a. Better _____
    b. Worse _____
    c. The same (Pressures make no difference.) _____

32. At work, do you ever keep two jobs moving forward at the same time by shifting back and forth rapidly from one to the other?
    a. No, never _____
    b. Yes, but only in emergencies _____
    c. Yes, regularly _____

33. Are you content to remain at your present job level for the next five years?
    a. Yes _____
    b. No, I want to advance. _____
    c. Definitely no; I strive to advance and would be dissatisfied if not promoted in that length of time. _____

34. If you had your choice, which would you rather get?
    a. A small increase in pay <u>without</u> a promotion to a higher level job. _____
    b. A promotion to a higher level job <u>without</u> an increase in pay. _____

35. In the past three years, have you ever taken less than your allotted number of vacation days?
    a. Yes _____
    b. No _____
    c. My type of job does not provide regular vacations. _____

36. In the last three years, how has your personal yearly income changed?
    a. It has remained the same or gone down. _____
    b. It has gone up slightly (as the result of cost-of-living increases or automatic raises based on years of service.) _____
    c. It has gone up considerably.

37. How often do you bring your work home with you at night, or study materials related to your job?
    a. Rarely or never _____
    b. Once a week or less _____
    c. More than once a week _____

38. How often do you go to your place of work when you are not expected to be there (such as nights or weekends)?
    a. It is not possible on my job. _____
    b. Rarely or never _____
    c. Occasionally (less than once a week) _____
    d. Once a week or more _____

39. When you find yourself getting tired on the job, what do you usually do?
    a. Slow down for a while until my strength comes back _____
    b. Keep pushing myself at the same pace in spite of the tiredness _____

40. When you are in a group, how often do the other people look to you for leadership?
    a. Rarely _____
    b. About as often as they look to others _____
    c. More often than they look to others _____

41. How often do you make yourself written lists to help you remember what needs to be done?
    a. Never _____
    b. Occasionally _____
    c. Frequently _____

For questions 42-46, compare yourself with the average worker in your present occupation, and mark the most accurate description.

42. In amount of effort put forth, I give
    a. much more effort. _____
    b. a little more effort. _____
    c. a little less effort. _____
    d. much less effort. _____

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43. In sense of responsibility, I am
    a. much more responsible. _____
    b. a little more responsible. _____
    c. a little less responsible. _____
    d. much less responsible. _____

44. I find it necessary to hurry
    a. much more of the time. _____
    b. a little more of the time. _____
    c. a little less of the time. _____
    d. much less of the time. _____

45. In being precise (careful about detail), I am
    a. much more precise. _____
    b. a little more precise. _____
    c. a little less precise. _____
    d. much less precise. _____

46. I approach life in general
    a. much more seriously. _____
    b. a little more seriously. _____
    c. a little less seriously. _____
    d. much less seriously. _____

For questions 47-49, compare your present work with your work settings of five years ago. If you have not been working for five years, compare your present job with your first job.

47. I worked more hours per week
    a. at my present job. _____
    b. five years ago. _____
    c. Cannot decide. _____

48. I carried more responsibility
    a. at my present job. _____
    b. five years ago. _____
    c. Cannot decide _____

49. I was considered to be at a higher level (in prestige or social position)
    a. at my present job. _____
    b. five years ago. _____
    c. Cannot decide _____

50. How many different job titles have you held in the last 10 years? (Be sure to count shifts in kinds of works, shifts in new employers, and shifts up and down within a firm.)
    a. 0-1 _____
    b. 2 _____
    c. 3 _____
    d. 4 _____
    e. 5 or more _____

51. How much schooling did you receive?
    a. 0-4 years _____
    b. 5-8 years _____
    c. Some high school _____
    d. Graduated from high school _____
    e. Trade school or business college _____
    f. Some college (including junior college) _____
    g. Graduated from a four-year college _____
    h. Post-graduate work at a college or university _____

52. When you were in school, were you an officer of any group, such as a student council, glee club, 4-H club, sorority or fraternity, or captain of an athletic team?
    a. No _____
    b. Yes, I held one such position _____
    c. Yes, I held two or more such positions _____

APPENDIX VII

FRAMINGHAM TYPE A SCALE

FTAS Questionnaire

Would the following traits and qualities describe you?

	Yes	No
Being hard-driving and competitive	____	____
Usually pressed for time	____	____
Being Bossy or dominating	____	____
Having a strong need to excel in most things	____	____
Eating too quickly	____	____

Do you feel like the following at the end of an average day of work?

Often feel very pressed for time	____	____
Work stays with you so you are thinking about it after working hours	____	____
Work often stretches you to the very limits of your energy and capacity	____	____
Often feel uncertain, uncomfortable, or dissatisfied with how well you are doing	____	____
Do you get upset when you have to wait for anything?	____	____

APPENDIX VIII

ROTTER'S LOCUS OF CONTROL SCALE

ROTTER INVENTORY

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

In some instances you may discover that you believe both statements or neither one. In such case, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.

8. a. Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what they're like.

9. a. I have often found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
    b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
    b. There is some good in everybody.

15. a. In my case getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
    b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
    b. There really is no such thing as "luck."

19. a. One should always be willing to admit mistakes.
    b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.
    b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades I get.
    b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.
    b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.

APPENDIX IX

TASK RATING SCALE

TASK FEEDBACK

Please indicate below your perceptions of the concept indentification (the first) task:

How successful were you in performing the task?

1	2	3	4	5	6	7
Totally Unsuccessful	Very		Moderately		Very	Totally Successful

Before you started, how sovable did you think the task was?

1	2	3	4	5	6	7
Totally Unsolvable	Very		Moderately		Very	Totally Solvable

After you finished, how solvable did you think the task was?

	2	3	4	5	6	7
Totally Unsolvable	Very		Moderately		Very	Totally Solvable

VITA

Lori A. Schmied was born in Memphis, Tennessee on November 28, 1958. She attended elementary schools in Germantown, Tennessee and graduated as valedictorian from Germantown High School in May 1976. The following September she entered The University of Tennessee, Knoxville in the Pre-Pharmacy program. She entered The University of Tennessee Center for the Health Sciences, College of Pharmacy in September 1979. She re-entered The University of Tennessee in June 1980 and graduated summa cum laude with a Bachelor of Arts degree in Psychology in December 1980.

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The author is a member of Phi Beta Kappa, Phi Beta Phi, The Society of Behavioral Medicine, and the Society for Psychophysiological Research. Her future work will involve research on coronary-prone behavior and women and other areas of interest in the Behavioral Medicine field.

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