ELECTRODERMAL AND CARDIOVASCULAR ACTIVITY IN PSYCHOPATHY: INDICANTS OF A COPING RESPONSE

A Thesis

Submitted to the College of Graduate Studies and Research in Partial Fulfillment of the Requirements

For the Degree of

Master of Arts

in the

Department of Psychology

by

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Saskatoon, Saskatchewan

1986

ABSTRACT

The most well accepted theory of pscyhopathy, and the one which has spawned the largest amount of research, was developed by Cleckley (1976). Recently, Hare (1980a, 1985b) created the Psychopathy Checklist based upon 16 characteristics of psychopathy elaborated by Cleckley. The checklist is a valid and reliable method for assessing criminal psychopathy (Hare, 1983, 1985a; Hare & McPherson, 1984; Wong, 1984). Numerous studies have investigated the psychophysiological responsivity of psychopaths. In a particularly productive line of research, subjects' heartrates (HR) and skin conductance responses (SCR) have been measured during a countdown prior to the onset of an aversive stimulus. During the countdown, psychopaths have been found to display accelerated HR accompanied by small increases in SC while non-psychopaths have shown less accelerated HR accompanied by dramatic increases in SC (Hare, 1978; Hare, Frazelle & Cox, 1978). It has been suggested that these findings are indicative of the psychopath's use of an efficient coping system (Hare, 1978; Hare, Frazelle & Cox, 1978; Schalling, 1978). According to this hypothesis, the increased HR demonstrated by psychopaths helps to attenuate the impact of the impending aversive stimulus. This suggestion is substantiated since the psychopath's SC, which may be indicative of anxiety (Hare, 1978; Spziler & Epstein,

1976), does not increase during the countdown. Since the Psychopathy Checklist was only developed recently, it has not been employed to select subjects in these studies. Subjects in the present study were 32 male patient volunteers from the Regional Psychiatric Centre in Saskatoon. This study was performed to determine; 1) whether the Psychopathy Checklist is a useful measure for assessing psychopathy in psychophysiological research; and, 2) whether the pattern of HR and SCR shown by psychopaths is indicative of a coping response. The present results are consistent with earlier findings (Hare & Craigen, 1974; Hare, Frazelle & Cox, 1978) indicating the efficacy of the checklist for subject selection. In order to test the second point, the HR and SCR of psychopathic and non-psychopathic subjects were compared across two countdown tasks. In the first task, subjects were confronted with a 120 db tone following the countdown. Subjects were given the option of preventing the tone onset in the other task. It was hypothesized that the pattern of increased HR and small increases in SC shown by psychopaths is indicative of a coping response and would disappear in the tone-prevention task where there was no need to "cope" internally. The results substantiated this hypothesis. However, non-psychopaths demonstrated increases in HR and SCR in both tasks. The theoretical implications of these findings and suggestions for future research programs are also discussed.

ACKNOWLEDGEMENTS

This thesis was completed under the supervision of Dr. Stephen Wong. I would like to express my sincere gratitude for his friendship, patience and encouragement.

I owe a debt of gratitude to the other members of my thesis committee, Dr. Arthur Gordon and Dr. Merrill Hiscock, for their interest and insightful comments. Also, I appreciate the interest shown by the external examiner, Dr. Allan Boulton.

I received much assistance and support from Mr. Tony Greenwood and Dr. Cindy Presse of the RPC. Tony's expertise in electronics and Cindy's careful reading of the thesis and her encouraging words enabled me to complete this project. I would also like to extend my thanks and appreciation to James Collins for taking his time to prepare all of the graphs in this thesis. Ron Templeman and Dorothy Reid's suggestions and help with the statistical analyses are gratefully acknowledged.

I would like to thank Kathi Crowe, Laura Garratt and Maureen Stubbs for volunteering to do the Psychopathy Checklist ratings. I also thank Laurie Bonnett for her friendship and help with the thesis preparation.

Thank-you to the 32 patients of the RPC who willingly donated their time to me and this project.

The moral support I received from my fellow classmates and colleagues at the RPC has been greatly appreciated. I'll miss you all!

I valued the company and friendship shared with Wayne Welsh while we were both struggling to complete our theses.

This project was made possible in part by a Training Fellowship I received from the Saskatchewan Health Research Board.

Finally, I would like to extend a very warm thank-you to my wife, Kathleen, who has offered me much love and continuous emotional support throughout my studies.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

DEDICATION

This thesis is dedicated to my grandmother,

Pauline Irene Powell.

Loving, Caring, Giving ...

My true inspiration.

Thank-you!

1. INTRODUCTION

1.1 An Historical Perspective of Psychopathy

The history of psychiatric nosologies has been scattered with a variety of terms used to describe individuals who behave in ways considered as repugnant to the social mores of the time. Manie sans delire, moral insanity, moral imbecility, degenerate constitution, congenital delinquency, constitutional inferiority, sociopathy, antisocial personality disorder and psychopathy are among the many semantic variations of the main theme.

While the diagnostic labels have continued to evolve over the past 160 years, the behavioural and personality characteristics that they denote have remained relatively unchanged. The most commonly given characteristics include the absence of any appreciable alteration in the "intellectual functions" such as perception, judgement, imagination or memory. However, there is a pronounced disorder of the "affective or moral functions", often accompanied by a blind impulse to act violently. Psychopaths display very little

anxiety and guilt regarding their belligerent or destructive behaviour. Perhaps Maudsley's (1974) poignant analogy can most vividly describe the underlying conception of psychopathy. He wrote, "as there are persons who cannot distinguish certain colours, having what is called colour blindness, so there are some who are ... deprived of moral sense" (p.139).

Initial recognition of psychopathy as a specific disorder is typically attributed to Phillipe Pinel who was appointed to the infamous French asylum, the Bicetre, in 1792 (Rotenberg & Diamond, 1971). He ascribed the label, manie sans delire (insanity without delirium), to an aristocrat who was given to savage and seemingly unprovoked aggressiveness. The man was confined to the Bicetre for killing a woman who had verbally assaulted him by pushing her into a well. However, according to Pinel, "when unmoved by passion" he showed good judgement and very capable management of his affairs. In Pinel's own words:

> I was not a little surprised to find many maniacs who at no period gave evidence of any lesion of understanding, but who were under the dominion of instinctive and abstract

> fury, as if the faculties of affect alone had sustained injury.
>
> (Millon, 1981, p.185)

Until Pinel argued the legitimacy of his diagnosis, it was universally held that all mental disorders were disorders of the mind. Therefore, since the mind was equated with reason and intellect, only a disintegration in the faculties of reason and intellect would be judged as insanity. However, beginning with Pinel there arose the belief that one could be insane (manie) without a confusion of mind (sans delire).

Almost instantly, the concept of moral insanity, which was equivalent to manie sans delire, was accepted by American and British psychiatry. Both the American psychiatrist Benjamin Rush and the British psychiatrist J. C. Pritchard discussed the concept. While Rush believed that the disorder was congenital, Pritchard maintained that it was a result of an oppressed environment. By 1913 the British Mental Deficiencies Act adopted the term "moral imbeciles" as one describing:

> Persons who, from an early age, display some permanent moral defect, coupled with strong vicious or criminal propensities on which

punishment has had little or no deterrent effect.

It was toward the end of the nineteenth century when German psychiatrist J. L. Koch proposed that the label of moral insanity be replaced by the term "psychopathic taint" (as discussed by Millon, 1981). The word "psychopathic" was a generic label for all personality disorders and the word "taint" was used to describe those with a propensity toward egocentric behaviour and impulsive fury. By the turn of the century, Emil Kraeplin had referred to individuals displaying such behaviours as "psychopathic personalities" (see Lewis, 1974). This terminology was adopted in the original (1932) nomenclature of the American Psychiatric Association (APA). In the first edition of the APA's Diagnostic and Statistical Manual of Mental Disorders (DSM: 1952), a new term, "Sociopathic Personality Disorders", became the diagnostic category with a subcategory of "antisocial reaction". However, there was little change in the actual description of the disorder.

In the second edition of DSM, DSM-II (1968), the phrase "Sociopathic Personality Disorder" was replaced with the diagnosis "Personality Disorder, Antisocial

Type". Individuals with the disorder were described as being

> basically unsocialized and whose behaviour patterns bring them repeatedly into conflict with society. They are incapable of significant loyalty to individuals, groups or social values. They are grossly selfish, callous, irresponsible, impulsive, and unable to feel guilt or to learn from experience or punishment. Frustration tolerance is low. They tend to blame others or offer a plausible rationalization for their behaviour (p. 173).

While the most recent edition of the DSM, DSM-III (1980), has adopted the label "Antisocial Personality Disorder" for the disorder, the description of it has not been greatly altered, other than having a more specific list of criteria. These criteria, in abbreviated form, are as follows:

1) current age at least 18.
2) onset before age 15 with a minimum of three behavioural indications.
3) persistence beyond age 18 with a minimum of four behavioural indications.
4) a pattern of continuous antisocial behaviour in which the rights of others are violated.
5) antisocial behaviour not due to either severe mental retardation, schizophrenia or manic episodes.

Perhaps the most influential text on psychopathy has been The Mask of Sanity by Hervey Cleckley. Throughout all five editions, the first of which was published in 1941, Cleckley has described and elaborated 16 explicit behavioural and personality characteristics of psychopathy. Cleckley's clinical profile has provided a framework for much of the theory and research on psychopathy. Cleckley (1976) stated that psychopathy

> consists of an unawareness and a persistent lack of ability to become aware of what the most important experiences of life mean to others (p. 371) .... Without suffering or enjoying in significant degree the integrated emotional consequences of experience, the psychopath will not learn from it to modify and direct his activities as do other men (p. 373) .... [Their] typical activities seem less comprehensible in terms of life-striving or of a pursuit of joy than as an unrecognized blundering toward the negation of nonexistence (p. 398).

The 16 characteristics of psychopathy will be described, and Cleckley's concepts discussed further, in a later section of this thesis.

While a variety of terms have been applied to the disorder over the past 160 years, many of the behaviours and personality characteristics used to describe the psychopath have remained constant.

Indeed, as is apparent above, the most salient characteristics used to describe psychopaths tend to be their lack of affect, anxiety and guilt.

1.2 Criminal Psychopathy

Psychopathy is a form of personality disorder which has a serious impact on society in general. It has been reported that the proportion of psychopaths in Canadian prisons ranges from 15% - 30% (Wong, 1984). Compared with other male criminals, psychopaths commit a significantly larger number of violent and aggressive crimes (Hare & Jutai, 1983; Hare & McPherson, 1984). While incarcerated, they also display more violent and aggressive behaviour than do non-psychopathic offenders (Hare and McPherson, 1984; Wong, 1984). Given their belligerence while incarcerated, psychopaths create considerable problems for correctional staff and are often referred to psychiatric facilities for treatment. However, there is no objective evidence to suggest that there are any effective treatment programs for these men (Hare, 1978; Martinson, 1974; McCord, 1982; Ogloff & Wong, 1985; Ogloff, Wong & Greenwood, 1986; Suedfeld & Landon, 1978). Due to the number and severity of

crimes psychopaths commit, research efforts directed towards understanding and treating psychopaths benefit not only those suffering from psychopathy, but also society as a whole which is afflicted by the oftentimes menacing behaviour of psychopaths.

1.3 The Concept of Psychopathy

In order to fully understand the concept of psychopathy, it is important to be aware of the current conceptions. The prevalent theoretical perspectives of psychopathy will be discussed in the following section.

1.3.1 Primary and Secondary Psychopathy

Blackburn (1975, 1983) and others (see Karpman, 1961) have suggested that psychopaths may not form a homogeneous group. In order to test this assumption, Blackburn (1975) performed a cluster analysis on MMPI scores of 79 non-psychotic male offenders who were classified as suffering from Psychopathic Disorder. No specific diagnostic criteria were used for assessing psychopathy other than their "abnormally aggressive or seriously irresponsible conduct". Blackburn assumed that the sample represented a heterogeneous population

of antisocial individuals showing some form of non-psychotic personality disorder. The results of the cluster analysis indicated that four profile types emerged and two were identifiable as measuring primary and secondary psychopathy. Blackburn found that both primary and secondary psychopathy groups could be distinguished from other antisocial groups by impulsivity, aggressiveness, and hostility. These two groups could be distinguished from one another by anxiety and social-avoidance tendencies.

Blackburn, therefore, distinguished between primary and secondary psychopaths. He described primary psychopaths as those individuals who broadly display the common characteristics of psychopathy. He believed that secondary psychopaths display similar behavioural characteristics but also show signs of neurotic anxiety and emotional reactions, such as guilt or shame.

This distinction has been criticized on the grounds that the antisocial behaviour of secondary psychopaths is motivated by neurotic conflicts (Hare, 1970). Hare (1970) further argued that while secondary psychopaths demonstrated some psychopathic

characteristics, they also displayed personality characteristics which were in complete contrast to psychopathic characteristics. Specifically, secondary psychopaths experienced guilt and remorse for their behaviour, and were able to form meaningful, affectional relationships with others. It may be that "secondary psychopaths" are really only non-psychopathic criminals who share some of the characteristics of psychopathy not because they are psychopathic, but simply because their behaviour is deviant. Therefore, the distinction between primary and secondary psychopathy is not meaningful in increasing our understanding of psychopathy, per se.

1.3.2 Psychopathy Within a Dimensional Model

Eysenck has argued that psychopathy, among other psychiatric categories, can be described and understood in terms of its position within his dimensional theory of personality. Initially, he considered psychopaths to be "neurotic extraverts", who obtained high Neuroticism (N) and Extraversion (E) scores on his personality inventory (Eysenck, 1967). The personality inventory referred to is now called the Eysenck

Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975). Eysenck's conception of psychopathy was criticized for being too broad and equating psychopathy with criminality (Eysenck & Eysenck, 1978; Hare, 1968). Another basis for criticism was that while psychopaths may in theory be extraverts, they are not neurotic ones (Hare, 1968). In light of these criticisms, Eysenck and Eysenck (1978) now consider "primary psychopathy" to be associated with their EPQ psychoticism (P) dimension, and "neurotic" or "secondary psychopathy" to be associated with the N and E dimensions. At one point, Eysenck and Eysenck even suggested that P may acutally stand for psychopathy rather than psychoticism (Eysenck & Eysenck, 1972).

Hare (1982) performed a series of comparisons between the EPQ dimensions and psychopathy. Psychopathy was assessed using both the 7-point global rating scale and a 22-item psychopathy checklist. Both assessments were based upon interview and extensive case history data. Psychopathy was significantly correlated with the P scale (r = .16) and the Lie scale (r = .14), but not with the E or N scales. Although the relationship between psychopathy and P was

significant, it accounted for less than 3% of the variance. Additional analyses, employing the discriminant function analysis procedure, indicated that inmates with high levels of psychopathy were significantly less psychiatrically abnormal, according to the EPQ, than were those with the lower levels of psychopathy. A series of analyses were made between the P scale and items on the 22-item checklist. The P scale correlated significantly with 6 checklist items , and with factors 1 (r = .30) and 4 (r = .19) of a principal components analysis of the checklist. The analysis demonstrated that factor 1 was related to an impulsive, unstable lifestyle with a lack of long-term commitments. Factor 4 was found to be related to the early appearance of antisocial behaviour. While Hare suggested that the P scale reflected criminal and antisocial aspects of psychopathy, he argued that the results have no direct implications for the suggestion that psychopathy and psychoticism are related in some fundamental way.

Therefore, while the EPQ may be sensitive to some factors associated with criminality and antisocial behaviour, it does not appear to be an adequate tool

for assessing psychopathy. Likewise, Eysenck and Eysenck's conception of psychopathy does not appear particularly useful for helping to understand the psychopath.

1.3.3 Psychopaths as Stimulation Seekers

Quay (1965) proposed that much of the antisocial behaviour of psychopaths is a reflection of their desire for the attainment of thrills or excitement, and the relief of boredom, and that psychopaths have "an inordinate need for increases or changes in the pattern of stimulation." He suggested two possible reasons for this. First the psychopath may be hyporeactive to stimulation, so that more sensory imput is needed to produce efficient or subjectively pleasurable stimulation. Alternatively, the psychopath may habituate more rapidly to stimulation, thereby generating a need for stimulus change. The supposition that the psychopath may habituate more rapidly to stimulation will be tested in the present study. This will be done by presenting subjects with five identical trials in order to determine whether a pattern of habituation is represented across trials.

To date, there appears to have been only a few empirical tests of the hypothesis that psychopaths are 'pathological stimulation seekers'. Wiesen (1965) showed that onset of stimulation was reinforcing for psychopathic but not neurotic students, while the converse applied when stimulus cessation was the reinforcer. Subjects in this study were university students selected on the basis of Minnesota Multiphasic Personality Inventory (MMPI) criteria of psychopathy and neuroticism. Skrzypek (1969) demonstrated that a short period of exposure to unpatterned stimulation produced a greater increase in the preference for complex patterns in psychopathic subjects than in neurotic delinquents. Again, subjects were selected according to their MMPI scores. However, in a study employing the Sensation Seeking Scale (SSS:Zuckerman, 1975) as an operational measure of the need for stimulation, Blackburn (1969) found that psychopaths, as diagnosed clinically, did not differ in level of sensation seeking from age-matched non-psychopathic offenders. It should be noted that the SSS was positively related to psychopathy. These results were confirmed by Presse (1984).

This conception has received some empirical support and stimulation seeking appears to be a possible indicant of behavioural differences between psychopaths and non-psychopaths. However, many non-psychopaths have also been found to be sensation seekers (see Zuckerman, 1975). Therefore, stimulation seeking may simply be another general characteristic of psychopathy, rather than a conceptualization which aids in increasing our understanding of psychopathic behaviour.

1.3.4 The Clecklian Concept of Psychopathy

Cleckley (1976), in the fifth edition of The Mask of Sanity, offered the most detailed and generally accepted clinical account of psychopathy and its many manifestations. Based on his extensive experience, he described the 16 most predominant characteristics of the disorder. These 16 characteristics include: superficial charm and good intelligence; absence of delusions and other signs of irrational thinking; absence of nervousness or psychoneurotic manifestations; unreliability; untruthfulness and insincerity; lack of remorse or shame; inadequately

motivated antisocial behaviour; poor judgement and failure to learn by experience; pathologic egocentricity and incapacity for love; general poverty in major affective reactions; specific loss of insight; unresponsiveness in general interpersonal relations; fantastic and uninviting behaviour with drink and sometimes without; suicide rarely carried out; sex life impersonal, trivial and poorly integrated; and failure to follow any life plan. The first three characteristics are positive in nature and emphasize the fact that the psychopath's behaviour is not simply the manifestation of some disturbed mental functioning. Cleckley indicated that the psychopath does not have the ability to experience the emotional components of personal and interpersonal behaviour. According to Cleckley, while psychopaths may appear to respond in an emotionally appropriate manner, their responses are most often lacking in any actual feeling.

Cleckley emphasized the point that criminal behaviour is neither necessary nor sufficient for the diagnosis of psychopathy. Accordingly, the characteristics he defined are not necessarily linked with criminality. Cleckley's characteristics place

some emphasis on the behavioral indicants of psychopathy, but focus primarily upon the salient personality variables which have been associated with psychopathy.

In addition to being the most widely accepted clinical conception of psychopathy, Cleckley's has also been used as the basis to develop more objective diagnostic instruments of psychopathy (Hare, 1980a, 1985b). Furthermore, psychophysiological research using these diagnostic instruments has been successful in differentiating groups of psychopaths and non-psychopaths (Hare, 1970, 1978, 1982).

Overall, the Clecklian concept of psychopathy incorporates both behavioural and personality factors of psychopathy. It has also proven to be an efficacious method of specifically describing the unique characteristics of psychopathy. Therefore, the present research project will employ the Clecklian concept of psychopathy and one of the diagnostic instruments developed from it.

1.4 Diagnosis of Psychopathy

Although Cleckley's clinical descriptions of the psychopathic personality are rich, vivid, and generally well accepted, an objective diagnostic instrument for assessing psychopathy is necessary for research purposes. A variety of methods have been employed to assess psychopathy. These have included projective methods, self-report personality inventories, behaviour rating scales and clinical diagnoses.

1.4.1 Projective Methods

In an attempt to tap some of the underlying traits of psychopathy, some clinicians and investigators have employed projective techniques. When using projective techniques, the individual being assessed is presented with some ambiguous stimuli designed to elicit a variety of responses. Due to the ambiguity of the stimuli, the responses elicited are assumed to be indicative of the underlying needs, motives, feelings and attitudes of the individual being assessed (Fisher, 1967). Many of the more common projective techniques have been employed in the assessment of psychopathy

(e.g., Rohrschach Inkblot Test, Thematic Apperception Test and Sentence Completion Tasks, etc.). While projective techniques have enabled the clinician to identify some of the common personality characteristics of psychopathy in individuals (Kingsley, 1961), they do not provide any specific criteria for subject selection. Further difficulties arise due to the controversial nature of the reliability of projective techniques (Fisher, 1967) coupled with the degree of experience required by the clinician employing a projective method. Therefore, it is simply not feasible, and may be unreliable, to use projective techniques to select subjects in psychopathy studies.

1.4.2 Self-Report Measures

Self-report measures have included the Socialization subscale of the California Personality Inventory (So) (Gough, 1969). The So scale was designed by Gough (1960) who believed that the key element of psychopathic behaviour was an incapacity within the individual to look upon himself as a social

object. This incapacity resulted in a failure

> to elaborate an adequate and realistic set of social expectancies and critiques...[The] capacity to build up, to sustain, to integrate, and to organize the residuals which ordinarily accrue as a consequence of interactional experience is lacking.
>
> (Gough, 1948, p. 362)

Gough's conception of psychopathy is clearly similar to Cleckley's. Like Cleckley, Gough developed a list of characteristics which may be used to identify psychopaths. He refered to these as the "common attitudes" characterizing psychopaths. These common attitudes are listed in Table 1. As is evident from this table, Gough's attitudes have much in common with Cleckley's 16 characteristics. Items to assess these attitudes were incorporated into the Socialization scale (Gough, 1960; Gough & Peterson, 1952). Hare (1978) has suggested that the So scale may facilitate the selection of a relatively homogeneous or "pure" group of psychopaths when used in conjunction with clinical assessments of psychopathy or case-history data. In Hare's research, criminal subjects whose So scores fall below the median-split of scores for criminal subjects are classified as

Table 1

"Common Attitudes " Characterizing Psychopaths

(Gough, 1948, p. 365)

1. Overevaluation of immediate goals as opposed to remote or deferred ones.

2. Unconcern over the rights and privileges of others when recognizing them would interfere with personal satisfaction in any way.

3. Impulsive behaviour, or apparent incongruity between the strength of the stimulus and the magnitude of the behavioural response.

4. Inability to form deep or persistent attachments to other persons or to identify in interpersonal relationships.

5. Poor judgement and planning in attaining defined goals.

6. Apparent lack of anxiety and distress over social maladjustment and unwillingness or inability to consider maladjustment qua maladjustment.

7. A tendency to project blame onto others and to take no responsibility for failures.

8. Meaningless prevarication, often about trivial matters in situations where detection is inevitable.

9. Almost complete lack of dependability and of willingness to assume responsibility.

10. Emotional poverty.

psychopaths while those whose scores fall above the median-split are considered non-psychopathic.

Hare and his colleagues have administered a number of self-report measures to criminal subjects participating in psychophysiological studies (Hare & Cox, 1978). The only self-report measure which showed any consistency and theoretically meaningful relationship with the psychophysiological measures obtained (heart rate and skin conductance) was the So scale.

The other self-report personality measures which have been used rather extensively for subject selection in psychopathy studies are the Psychopathic Deviance (Pd) and Hypomania (Ma) subscales of the Minnesota Multiphasic Personality Inventory (MMPI: Dahlstrom & Welsh, 1960). The Pd subscale items tap complaints about family and authority figures in general, self and social alienation and boredom. Other items are sensitive to the denial of social shyness and the assertion of social poise and confidence (Greene, 1980). Items on the Ma subscale measure the milder degrees of manic excitement, characterized by an elated but unstable mood, psychomotor excitement, and flight

of ideas. The items cover a wide range of content areas including cognitive and behavioural overactivity, grandiosity, egocentricity and irritability (Greene, 1980). Typically, for an individual to be diagnosed as psychopathic based upon his or her MMPI scores, the scores on both the Pd and Ma subscales must fall at least two standard deviations above the mean (T > 70) (Hare, 1985a).

The use of personality inventories to assess psychopathy has been criticized since they rely completely upon self-report measures. This may pose a particular problem given that an important characteristic of psychopathy is pathological lying. Of course, if individuals do not answer the questionnaire items truthfully, the questionnaire score will be invalid. Therefore, while the So scale may be a valuable supplement to other psychopathy assessment measures, those studies which rely entirely on self-report inventories as the only subject selection measure may not be adequately defining their experimental groups.

1.4.3 Global Rating Scale

Researchers have also assessed psychopathy by ordering prison inmates along a seven point scale according to the extent to which their behaviour and personality over a long period of time were consistent with Cleckley's conception of psychopathy (Hare, 1982). These global clinical ratings were found to be both reliable (with inter-rater reliability of .85 or above being routinely being reported) and valid (since they are associated with the well accepted Clecklian characteristics) when employed in studies by Hare and his colleagues (Hare, 1979; Hare & Cox, 1978). However, the global clinical rating method may have been of little use to other investigators since they require the rater to have substantial clinical skill (Hare, 1980a). Also, due to its rather subjective nature, it has proven difficult to communicate this assessment procedure to other investigators (Hare, 1985a).

Therefore, while the global clinical ratings have proven reliable in some situations, they have definite

limitations for selecting subjects in psychopathy studies.

1.4.4 DSM-III: Antisocial Personality Disorder

Psychopathy diagnoses may also be made using criteria such as those specified by the DSM-III for the Antisocial Personality Disorder. Unfortunately, it has been suggested that this method may have limited utility in making differential diagnoses among criminals since the Antisocial Personality Disorder diagnosis places too much emphasis on delinquent, criminal and other undesirable social attributes often found among prison inmates (Hare, 1980a; Millon, 1981). For example, Hare (1979, 1980) found that 76% of a sample of 146 prison inmates met the diagnostic criteria for Antisocial Personality Disorder in a draft of the DSM-III criteria whereas only 33% of the inmates were diagnosed as psychopaths using global clinical ratings. Accordingly, Hare suggested a revision in the numbers of behavioural indications required to satisfy the DSM-III criteria. The more stringent criteria he recommended were incorporated into the final draft of the DSM-III criteria and resulted in approximately 40%

of the criminals being diagnosed as having Antisocial Personality Disorder (Hare,1980). Therefore, it is clear that the DSM-III criteria may be rather arbitrary since the number of individuals being diagnosed as having Antisocial Personality Disorder changes dramatically with changes in the diagnostic criteria. Hare suggests that this occurs because these criteria are not directly linked to any theoretical foundation of psychopathy (Hare, 1980).

Overall, Hare (1980) and Hare and Cox (1978) have criticized many of the diagnostic methods reviewed above on the grounds that there has been little evidence to indicate that they are conceptually and empirically related to one another, or that they are measuring the well-accepted Clecklian characteristics of psychopathic behaviour. Furthermore, they have suggested that the differential diagnosis of psychopathy within criminal populations should be based primarily upon extensive analysis of the individual inmate's behaviour over a long period of time rather than what he chooses to say about himself in interviews or on questionnaires. Finally, they have commented that it is difficult to compare research findings

reported by different investigators when they have used clearly different subject selection procedures..

1.4.5 The Psychopathy Checklist

In order to overcome the deficiencies of the aforementioned assessment procedures, Hare developed the Psychopathy Checklist (1980a), which he recently revised (Hare, 1985b). The checklist allows one to assess psychopathy using procedures which are explicitly related to the clinical conception of psychopathy. In addition, the checklist requires the rater to consider both objective information obtained from an individual's institutional files, as well as data obtained from the individual during a brief, relatively unstructured, interview.

Both the original and the revised checklist are presented in Table 2. The revised checklist is comprised of 20 items which describe characteristics of criminal psychopathy. It varies from the original 22-item checklist insofar as two items were deleted and the labels of many of the checklist items were changed while the criteria were expanded to make it easier to

Table 2

Items From the Original (22-item) Psychopathy Checklist

1. Glibness/Superficial charm
2. Previous diagnosis as psychopath (or similar)
3. Egocentricity/grandiose sense of self-worth.
4. Proneness to boredom/low frustration tolerance.
5. Pathological lying and deception.
6. Conning/lack of sincerity.
7. Lack of remorse or guilt.
8. Lack of affect and emotional depth.
9. Callous/lack of empathy.
10. Parasitic lifestyle.
11. Short-tempered/poor behavioural controls.
12. Promiscuous sexual relations.
13. Early behavioural problems.
14. Lack of realistic, long-tem plans.
15. Impulsivity.
16. Irresponsible behaviour as a parent.
17. Frequent marital relationships.
18. Juvenile delinquency.
19. Poor probation or parole risk.
20. Failure to accept responsibility for own actions.
21. Many types of offence.
22. Drug or alcohol abuse not direct cause of antisocial behaviour

Items From the Psychopathy Checklist (Hare, 1985b)

1. Glibness/superficial charm.
2. Grandiose sense of self worth.
3. Need for stimulation/proneness to boredom.
4. Pathological lying.
5. Conning/Manipulative.
6. Lack of remorse or guilt.
7. Shallow affect.
8. Callous/lack of empathy.
9. Parasitic lifestyle.
10. Poor behavioural controls.
11. Promiscuous sexual behaviour.
12. Early behavioural problems.
13. Lack of realistic, long-term goals.
14. Impulsivity.
15. Irresponsibility.
16. Failure to accept responsibility.
17. Many short-term marital relationships.
18. Juvenile delinquency.
19. Revocation of conditional release.
20. Criminal versatility.

use. One item (#22) was deleted from the original checklist since it was difficult to score, and the other item (#2) was removed since it provided relatively little useful information (Hare, 1985b). Item 16 was expanded to include all irresponsible behaviour instead of simply irresponsible behaviour as a parent.

Hare (1985b) reported that preliminary indications revealed that results from the original and the revised versions of the checklist are substantively identical and classify prison inmates in the same way. Therefore, scores may simply be prorated to facilitate comparisons between studies which use the original 22-item checklist and those which use the revised Psychopathy Checklist (Hare, 1985b). Likewise, research findings from studies employing the original checklist may be assumed to be equally valid for the revised Psychopathy Checklist.

Psychopathy Checklist items are scored according to the degree of "fit" between the individual being assessed and the checklist items. If the item does not describe the individual whatsoever, the item is given a score of zero; if the item describes the individual to

some degree, the item is given a one; and, if the item describes the individual accurately, the item is scored a two. Thus, the maximum obtainable score of 40 would indicate an extremely high level of psychopathy.

The Psychopathy Checklist has demonstrated a high degree of internal consistency and inter-rater reliability (Hare, 1980a; Hare & Frazelle, 1980; Schroeder, Schroeder & Hare, 1983). Specifically, Schroeder, Schroeder and Hare (1983) presented evidence indicating that the checklist is both reliable and valid for use with incarcerated white males. In particular, they reported high interrater agreement, (r = .84 to .93), test-retest reliability (r = .84 to .92) and internal consistency (alpha coefficients = .82 to .91). Estimates based on generalizability (G) theory provided a single index which further corroborated the adequacy of the checklist. The generalizability coefficients obtained (.85 to .90) indicate that over 85% of the variance observed was due to individual differences in persons above and beyond variance due to differences across raters and items. Moreover, Shroeder, et al. cited preliminary evidence that checklist scores validly reflect the construct of

psychopathy. They obtained close agreement between checklist scores and independent global ratings of psychopathy (*r* = .83). Discriminant analyses indicated that 75.4% of the inmates assigned to groups on the basis of global scores could be correctly classified, on the basis of checklist scores, into low, medium and high psychopathy groups. Also, 84.5% could be correctly classified as meeting or not meeting the DSM-III criteria for Antisocial Personality Disorder (*r* = .74).

Additional research has supported the reliability and validity of the checklist and has demonstrated that it is a useful measure of psychopathy in a population of male prisoners (Hare, 1983, 1985a; Hare & McPherson, 1984; Kosson, Nichols, and Newman, 1985; Schroeder, Schroeder and Hare, 1983; Wong, 1984). For example, Wong (1984) reported that the behavioural characteristics of subjects who were assessed as having a high level of psychopathy were in accordance with the theoretical implications of psychopathy. Specifically, the psychopaths had a much more extensive criminal history and a worse institutional record than subjects with low psychopathy ratings. Psychopaths were also

found to have violated parole and mandatory supervision more frequently and to have had more incidents of being unlawfully at large.

In a study by Hare (1985a), the agreement among several methods used to assess psychopathy were compared. A correlation matrix containing the inter-correlations among measures compared is displayed in Table 3. The global rating scale and the checklist correlated highest at .80. This would be expected since the checklist items and the global rating scale were both based upon Cleckley's 16 characteristics of psychopathy. The global rating scale and checklist both correlated significantly with the DSM-III criteria for Antisocial Personality Disorder. The only non-significant correlation was between the global clinical rating and the combined scores from the Psychopathic Deviance and Hypomania subscales of the Minnesota Multiphasic Personality Inventory (MMPI: Dahlstrom & Welsh, 1960). It should be noted that the So scale correlates negatively with the other measures since higher scores on the So scale indicate higher levels of Socialization, and decreased levels of

Table 3

Correlation Matrix of Psychopathy Assessment Procedures (Hare, 1982)

Variable	1	2	3	4	5
1. Global rating		.80*	.57*	-.29*	.27
2. Checklist			.67*	-.32*	.35*
3. DSM III				-.37*	.33*
4. So					-.42*
5. Pd + Ma					

* *p* Familywise < .05; *p* Test < .0016.

psychopathy; whereas, increasingly higher scores on the other measures indicate increasing levels of psychopathy, and to the extent indicated by the negative correlation, a lack of socialization.

These results clearly indicate the validity of the Psychopathy Checklist in relation to other assessment measures of psychopathy. Conversely, the self-report measures, especially the MMPI subscales do not correlate as highly with the other, well-accepted, measures of psychopathy. Also, the correlations among the self-report measures are very low.

Since the Psychopathy Checklist appears to be a reliable and valid indicator of psychopathy, it will be employed to select subjects in the present study. Also, since the psychophysiological responsivity of psychopathic subjects grouped according to their So scale scores has been found to be consistent and theoretically valid, the So scale scores will also be used to further delimit groups of subjects in the present study.

1.5 Psychophysiological Characteristics of Psychopathy

One area of research that has received considerable attention recently is the investigation of the psychophysiological correlates (e.g., skin conductance and cardiovascular activity) of the psychopath's lack of anxiety regarding impending punishment. Of particular interest is a procedure to assess a subject's anticipatory psychophysiological responses to an unpleasant stimulus (e.g., a 120 db, 1000 Hz tone). The rationale for this approach is that psychopaths appear to display psychophysiological activity that may be indicative of a defensive response (i.e., increased heart rate accompanied by a relatively low skin conductance response). It has been suggested that this may serve to modulate the anxiety arousing nature of an impending aversive situation (Hare, 1978; Hare, Frazelle & Cox, 1978). This may explain, in part, why psychopaths appear to be less sensitive to the threat of punishment (Hare, 1978, Schalling, 1978). One objective of the present study will be to attempt to determine whether the psychophysiological differences

found between psychopaths and non-psychopaths are the result of psychopaths' defensive or "coping" responses.

1.5.1 Skin Conductance Correlates of Psychopathy

1.5.1.1 Anticipatory SC Activity

Research over the past three decades comparing the skin conductance responses (SCR) of psychopaths and non-psychopaths has indicated that lack of guilt and anxiety, which is one of the major characteristics of psychopathy, can be measured psychophysiologically using SCR. Lykken (1957), in one of the earliest studies investigating conditioned arousal in psychopaths, used an electric shock as the unconditioned stimulus. He found that conditioned SC responses were acquired less readily by psychopathic subjects than by non-psychopathic ones. Lykken's conclusion that psychopaths do not acquire conditioned SC responses as readily as non-psychopaths has been supported by subsequent studies (Hare, 1970, 1978; Hare & Quinn, 1971). One general interpretation of these findings is that the psychopaths, perhaps through their inability to use physical or emotional cues, do not

generate sufficient anticipatory fear to acquire a strong conditioned response. Hare (1965) has also argued that the failure of these cues to generate anticipatory fear is probably most evident when the aversive event is temporally remote.

In order to directly assess the level of a subject's anticipatory arousal to an aversive stimulus, researchers have used "signalled" stimuli which forewarn the subject of their onset. In a series of such studies, Hare (1965, 1970) and Hare, Frazelle and Cox (1978) employed a countdown procedure in which subjects listened to a tape-recorded voice counting down from five to one over a 12 second period prior to the onset of an aversive tone (120 db, 1000 Hz). The skin conductance responses (SCR) and heart rate (HR) changes were recorded during the countdown and were used as the psychophysiological indicants of the subject's responses in anticipation of the loud tone. Compared to non-psychopaths, psychopaths displayed significantly smaller increases in SCR in anticipation of the loud tone.

These findings have been linked to the clinical observation that psychopaths are not readily influenced

by threats of punishment or by the possibility that their behaviour may have unpleasant consequences for themselves or others (Cleckley, 1982; Hare, 1970). Accordingly, several researchers have hypothesized that this aspect of psychopathy may be the result of insufficient anticipatory fear arousal for the commencement and reinforcement of avoidance behaviour (Hare, 1978; Lykken, 1967; Trasler, 1978). As articulated by Loeb & Mednick (1977), "reduced autonomic responsiveness and defecits in capacity for classical conditioning produce the inability to learn from experience attributed to the psychopath" (p. 245). Thus, since the psychopath tends to not display anticipatory arousal to an impending aversive stimulus, it has been suggested that psychopaths are not deterred by the social sanctions which serve to limit impulsive and socially unacceptable behaviour. For most people, increased levels of anxiety are uncomfortable. Increased levels of anxiety tend to regulate behaviour since people typically try to avoid anxiety arousing situations. Therefore, while a non-psychopath may become anxious at the thought of going to prison for

committing a crime, the psychopath may not become as anxious and may very well commit the crime.

1.5.1.2 Tonic Skin Conductance Level

Several investigators have studied SC levels in psychopathic and non-psychopathic individuals under conditions of "rest", usually preceding the onset of experimental procedures. The SC level recorded during this period is known as the tonic SC. While subjects are typically not given any specific instructions during this period, it seems naive to believe that they are not cognitively active. Undoubtedly, there is also a large amount of variance among "resting" instructions given to subjects across studies. Furthermore, it is important to realize the large amount of variance in the nature of the cognitive activity among subjects during this period. Therefore, it is clear that the term "rest" state is used only in a relative sense to refer to the level of SC activity observed in a given experimental situation.

The results of studies employing tonic SC have been generally inconsistent. For example, when tonic SC was measured during a "rest" period in which

subjects were instructed to close their eyes and try to remain relaxed, some investigators found the tonic SC of psychopathic subjects to be lower than that of less psychopathic ones (Hare, 1965, 1968; Schalling, Lidberg, Levander & Dahlin, 1968). Hare and his colleagues' selection criteria were based on the Clecklian personality characteristics of psychopathy and the So scale was used as the subject selection criteria in the Schalling et al. study.

Unlike Hare and his colleagues, Fox and Lippert (1963) and Goldstein (1965) reported no significant difference in tonic SC between psychopathic and non-psychopathic groups for the rest period prior to the onset of their experimental procedures. The subject selection criteria were not clarified in these two studies. Instead, the authors stated that the "psychopathic" subjects were suffering from character disorders commonly referred to as psychopathic or sociopathic. Perhaps the procedural differences employed in the studies, including subject selction procedures, could, in part, account for the diverse results.

In order to remove the effect of the differences of various subject selection procedures, Hare (1978) combined and re-analyzed the results of eight earlier studies in which subjects were selected according to their global rating scores (see Hare, 1978 for a complete list of the studies). While the tonic SC of psychopathic subjects was lower than that of the non-psychopaths in each of the studies, the results were statistically significant in only two of the studies (Hare, 1965, 1968). However, the combined analysis yielded a highly significant overall difference between psychopathic and non-psychopathic inmates. Therefore, Hare (1978) concluded that the tonic SC of psychopaths is lower than that of non-psychopaths.

If one considers the positive findings of other studies, coupled with Hare's (1978) combined results, there appears to be reasonable support for the hypothesis that the the tonic SC of psychopaths is lower than that of non-psychopaths. Since it is difficult to actually know what subjects are experiencing during the tonic period, it is difficult to speculate what the theoretical implications of

finding differing tonic SC levels between psychopaths and non-psychopaths are. However, since SC level has generally been thought to be indicative of arousal (Hare, 1978), one may assume that the lower tonic SC level demonstrated by psychopaths may be indicative of their lower level of arousal during the period prior to the onset of the experiment.

Measures will be taken in the present study to determine whether the psychopathic subjects will display lower tonic SC levels than the non-psychopathic subjects.

1.5.1.3 Electrodermal Recovery Time

Recovery time is generally measured by recovery half-time, which is the length of time it takes for an individual's SC arousal to decrease to a level half-way between the basal and peak levels following the presentation of an aversive stimulus (e.g., 120 db tone). This measure is representative of the time it takes a subject to "recover", or return to the baseline SC level, following stimulus presentation. There have been relatively few studies in which recovery time has been a consideration. However, in such studies, the

results tend to indicate that the electrodermal recovery time for criminals is greater than that for non-criminals (Hemming, 1981; Mednick, 1975). Hare (1975a) reported that in a study where psychopaths and non-psychopaths were presented with a series of fifteen 900 Hz, 80db tones, and a sixteenth, 350 Hz, 70db tone, the recovery rate for psychopaths was significantly slower only for the unique sixteenth tone. Therefore, psychopaths may only display slower recovery rates following those stimuli which are unexpected or startling.

In another study which investigated recovery times, psychopathic and non-psychopathic subjects were presented with a series of 1000 Hz tones ranging in intensity from 80 to 120 db (Hare, Frazelle & Cox, 1978). While both groups displayed a sharp increase in recovery half-time as the intensity of the tones increased, the only significant differences between groups occurred with the left hand and the 120 db tone. In this case, psychopaths displayed the longer recovery half-times. These results also indicate that differences may only occur between the electrodermal

recovery of psychopaths and non-psychopaths for those stimuli which are particularly startling or aversive.

There is even less data available concerning the recovery time in studies which incorporated signalled stimuli. However, Hare (1978) reported on the computation of recovery half-times of an earlier study (Hare & Quinn, 1971) in which significantly longer recovery half-times were found for psychopathic as compared to non-psychopathic subjects for stimuli preceded by a conditioned stimulus.

Accordingly, Hare (1978) concluded that "support for the hypothesis that psychopaths exhibit slow electrodermal recovery may therefore be specific to tones with aversive, startling properties and, interestingly, to responses obtained from the left hand" (p. 127). Mednick (1974) has argued that if dissipation of anticipatory fear serves as a reinforcer for the inhibition of an antisocial act, then the rate at which fear dissipates might be a critical variable. In essence, relatively rapid dissipation of fear should result in more effective avoidance learning. This conceptualization predicts that psychopaths will be characterized by slow fear dissipation, as indicated by

slower (longer) recovery half-times following exposure to a stimulus. Venables (1975) has also stated that SC recovery may be related to inhibition and excitation. He suggests that slow recovery may be related to a decrease in excitation while fast recovery may be related to an increase in inhibition. Hare (1978) has further stated that slow recovery in psychopathy may be related to a defensive or "coping" orientation. He explained that slower recovery half-time indicates that the cues required for successful avoidance of an aversive stimulus are attenuated and the impact of the aversive stimulus or punishment is reduced.

While specific details of the above theoretical positions vary somewhat, they are all closely related since they attempt to use the typically slower electrodermal recovery time of psychopaths to further explain the lower level of fear arousal demonstrated by them. A more direct test of differences between electrodermal recovery times of psychopaths and non-psychopaths will be performed in the following study by comparing recovery rates of psychopaths and non-psychopaths both before and after they have made a successful avoidance response.

Finally, an alternate explanation has been considered. Since there is some evidence that cortical control of electrodermal activity may be ipsilateral, i.e. the activity of the left hand may be controlled by the left hemisphere (Gruzelier & Venables, 1974; Luria & Homskaya, 1970), results from earlier findings may have some bearing on Flor-Henry's (1969, 1972) theory that psychopathy is associated with dysfunction of the temporal-frontal limbic system of the left or dominant hemisphere. Hare (1979) reasoned that if psychopaths do have something wrong with their left hemisphere, it would be logical to expect that their ability to process semantic information would be impaired since language is controlled by the left hemispheres in most right-handed individuals. In one study, Hare (1979) presented psychopathic and non-psychopathic subjects with 3-letter words to the left and right visual fields. The subject's task was to identify the words, each exposed for only 40 or 80 msec. All of the subjects were right handed and presumably left hemisphere dominant for language. Since words presented in the right visual field have direct input to the left hemisphere, Hare believed they should be

more readily identified than those presented in the left visual field if the left hemisphere was functionally intact. Hare found that both psychopathic and non-psychopathic subjects demonstrated the normal right visual field advantage. Other procedures which required more complex sematic processing such as verbal dichotic listening tasks have since been performed to further test this (Hare & McPherson, 1984). All of the results indicated that psychopaths and non-psychopaths did not differ in the number of correct responses made.

These data do not support the hypothesis that psychopathy is associated with dysfunction of the temporal-frontal limbic system of the left or dominant hemisphere. Therefore, the previously discussed explanation appears more valid.

1.5.2 Conclusions Concerning Electrodermal Activity

Hare (1978) has concluded that "while psychopaths tend to be less electrodermally aroused during some of these [experimental] procedures than do other subjects, it is difficult to say what the reasons for the differential arousal are" (p.111). In view of the clinical characteristics of psychopathy, one possible

interpretation of these differences is that the lower SCR displayed during experiments with aversive or unpleasant features reflects a relative lack of anticipatory fear, anxiety and apprehension (Hare, 1978; Hare, 1980b; Katkin, 1965; Kilpatrick, 1972; Szpiler & Epstein, 1976).

Other interpretations are also possible, especially concerning those experimental procedures which were not particularly stressful or aversive. In such cases, the low SCR of psychopaths may have been related to motivational or cognitive factors rather than to emotional ones (Kilpatrick, 1972). Therefore, the lower SCR demonstrated by psychopaths during various experiments may be related to drowsiness, boredom, or to a lower level of anticipatory anxiety and stress.

While this interpretation may seem valid for SCR differences occurring during a long, tedious study, it does not seem valid for the lower tonic SC levels often demonstrated by psychopaths during an initial, brief, "rest" period. Instead, one might expect psychopaths, who tend to be more impulsive and active overall, to have a great deal of difficulty relaxing. Therefore,

one might hypothesize that since psychopaths are less able to relax, they will be more aroused, and should therefore display initially higher levels of tonic SC than non-psychopaths. However, psychopaths do not display greater tonic SC levels.

Also, in a series of studies investigating the components of boredom, Hill and Perkins have determined that boredom is not associated with characteristic psychophysiological changes (Hill & Perkins, 1985; Perkins, 1981; Perkins & Hill, 1985). Therefore, the differences in SCR found between psychopathic and non-psychopathic subjects cannot be simply attributed to motivational or cognitive differences.

In light of the available evidence, it does appear as though psychopaths are less able to learn from experience than non-psychopaths. This seems especially true in situations where an aversive stimulus has been employed (e.g., electric shocks and loud tones). It has been hypothesized that psychopaths' lower levels of anticipatory anxiety to aversive stimuli, and lower levels of SCR to more intense unsignalled stimuli, may be the cause of their apparent inability to avoid punishment and to perform well in tasks mediated by

fear and anxiety (Hare, 1970, 1978, 1980b). Therefore, compared to the average individual, psychopaths may not be as sensitive to crime-deterring social sanctions. This is because their actions are not as readily regulated by the fear or anxiety elicited by such situations. This explanation has been used to explain the oftentimes extensive and bizarre criminal histories of psychopaths.

1.5.3 Heart Rate Correlates of Psychopathy

1.5.3.1 Tonic Heart Rate Activity

Initial studies measuring tonic HR failed to find any differences between groups of psychopathic criminals and control groups (Lindner, 1942; Rullman and Gulo, 1950). The authors were not specific in their subject selection criteria, but stated that subjects had sociopathic or psychopathic personalities. In a more recent study, Goldstein (1965) obtained similar results. Once again, however, the subjects were described as being sociopathic or psychopathic; yet, no specific selection criteria were reported. In a study in which the subjects were selected according

to the Clecklian criteria, Hare (1968) also found that there were no statistically significant differences between tonic HR in psychopathic and non-psychopathic groups. A related study also failed to find differences between the tonic HR of criminals and non-criminals (Schacter & Latane, 1964). In a series of recent studies, Hare and his colleagues have again reported that the tonic HR does not differ between groups of psychopaths and non-psychopaths (Hare, Frazelle & Cox, 1978).

In several reviews of the literature, Hare (1970, 1975a, 1978) has concluded that most investigators have been unable to demonstrate a consistent relationship between psychopathy and tonic HR. Since no tonic HR differences have been reported between psychopaths and non-psychopaths, there does not appear to be any theoretical connection between tonic HR and psychopathy. Measures of tonic HR will be recorded in the present study to determine again whether any differences will occur among groups.

1.5.3.2 Anticipatory Heart Rate Activity

Interestingly, while there is evidence indicating that psychopaths display lower levels of electrodermal activity during the countdown procedure, just prior to the onset of signalled stimuli, psychopaths' HRs tend to be similar to other subjects (Hare & Quinn, 1971; Hare & Craigen, 1974; Hare, Cox & Frazelle, 1978). In fact, in two of these studies, the psychopaths' HRs tended to accelerate to an extent greater than those of the non-psychopaths (Hare & Craigen, 1974; Hare, Cox, & Frazelle, 1978). According to Hare (1978), "although the psychopaths were poor electrodermal conditioners, they were good cardiovascular ones." (p.132) That is, while they did not display increased levels of electrodermal activity to signalled stimuli, they did display accelerated HRs.

The differences in HR between subject groups in the Hare & Craigen (1974) and Hare, Frazelle & Cox (1978) studies are particularly interesting since the differences are very consistent across the two studies, although the nature of the studies varied considerably. In the Hare & Craigen study, each subject (referred to

as A) was engaged in a mixed-motive game situation with another subject (referred to as B). Subject A was required to choose the intensity of the shock to be delivered to himself and B. However, B was then given a chance to retaliate. In actuality, B's choices were controlled by the experimenter. In the 10 second period prior to the onset of the shock, subjects heard a tone. The procedure in the Hare, Frazelle & Cox (1978) study followed the countdown method in which subjects heard a countdown from 9 to 0 prior to the onset of a loud tone. While the procedure for both studies varied, the pattern of anticipatory HR was similar between the studies. In both studies, the HR of psychopathic subjects increased quickly and peaked (increase of 4 BPM) approximately 7 seconds prior to the shock or loud tone. The HR then steadily decreased to the 3 second point and began to increase again immediately preceding the tone or shock presentation (increase of 1-2 BPM).

Anticipatory HR will be measured in the present study to determine whether the pattern of anticipatory HR discussed above will be replicated.

1.5.4 The Relationship Between Cardiovascular and Electrodermal Activity

It has been hypothesized that the pattern of HR acceleration and small increases in electrodermal activity may reflect the operation of an efficient coping process and the inhibition of fear arousal (Hare, 1975c, 1978). Lacey and Lacey (1974) suggested that the increased HR in anticipation of an aversive stimulus may be indicative of a defensive response, while a decrease in HR may be indicative of an orienting response. This occurs since cardiac deceleration is associated with decreased pressure in the carotid sinus resulting in "sensory-intake". Conversely, cardiac acceleration and increased carotid pressure are associated with a decrease in cortical arousal and "sensory-rejection". Accordingly, the defensive response would act to lessen the impact of the unpleasant stimulus while the orienting response alerts the organism to the impending occurrence of the stimulus (see also, Graham & Clifton, 1966). Hare (1978) and others have suggested that the accompanying increase in SCR, as displayed by non-psychopaths, is

indicative of an increase in the subjective level of anxiety. Since psychopaths display an increase in HR, accompanied by small increases in SCR, it indicates that they are "coping" with the impending stimulus, in the sense that they have developed an adequate level of insensitivity to it.

Hare (1978) has further suggested that while heart rate may be indicative of a coping attempt, electrodermal responses may be more indicative of the success of such an attempt. Thus, increased levels of SCR would be indicative of an increased level of anxiety and unsuccessful coping, while decreased levels of SCR would be indicative of lower levels of anxiety and successful coping. Spziler and Epstein (1976) have also hypothesized that an increase in one's level of electrodermal activity may be indicative of anxiety and the lack of a coping response. Clearly, these hypotheses converge in suggesting that psychopaths display physiological activity which enables them to attenuate their level of anxiety.

It should be noted that while the psychopath's apparent coping strategy may appear effective in many given situations, it would not be socially adaptive.

This would be true if the psychopath was unable to learn from past negative experiences once the aversiveness of them was attenuated. Accordingly, psychopaths would tend to repeatedly perform socially unacceptable behaviour which might often result in their incarceration.

1.6 Assessment of Handedness

Given the relationship of handedness to cerebral organization, it may be important to know the subject's handedness status (Lezak, 1983). This is especially true since Hare and his colleagues (Hare, 1978; Hare, Cox and Frazelle, 1978; Hare & Quinn, 1971) only found differences in electrodermal recovery half-time with the left hand. Therefore, the handedness of subjects will be assessed in the present study. This will be done by administering the Handedness Inventory (Briggs & Nebbes, 1975) to subjects (See Appendix A). This inventory was chosen since it takes into account the fact that for many left-handed and ambidextrous persons, lateral preference is not easily dichotomized. Scores from The Handedness Inventory determines whether

an individual has a right or left hand preference, or whether he or she is ambidextrous.

1.7 Summary

An historical overview of psychopathy showed that while the specific diagnostic labels have varied over time, the primary features they denote have remained relatively stable. The more common characteristics associated with psychopathy include lack of affect, anxiety and guilt. Research has demonstrated that the behavioural characteristics of psychopaths have resulted in their performing a disproportionate number of violent and aggressive crimes. Once incarcerated, psychopaths tend to create considerable management problems for prison authorities.

While many diverse conceptions have been formulated in the attempt to increase our understanding of psychopathy, only the Clecklian concept appears to have succeeded. Cleckley has contributed significantly to our knowledge by carefully describing 16 behavioural and personality characteristics commonly displayed by psychopaths. This conception has proven useful as a basis for the development of reliable assessment

instruments of psychopathy (e.g., the Psychopathy Checklist). It has also allowed researchers to obtain psychophysiological results which appear useful in differentiating groups of psychopaths and non-psychopaths (see Hare, 1978).

The evidence demonstrating psychophysiological differences between groups of psychopaths and non-psychopaths has been discussed. The findings from early studies suggest that psychopaths do not generate sufficient anticipatory fear to acquire a strong conditioned response (Hare, 1965; Lykken, 1957). Hare (1978) and Szpiler and Epstein (1976) have suggested that an increase in SCR is indicative of an increase in the subjective level of anxiety. Therefore, since psychopaths tend to display lower levels of SCR than non-psychopaths in response to aversive stimuli, it appears that psychopaths experience a lower level of anxiety to such stimuli.

Levels of tonic HR and SC for psychopaths and non-psychopaths have been compared in a variety of studies. The preponderance of evidence has indicated that psychopaths display lower levels of tonic SC than do non-psychopaths (Hare, 1965, 1968, 1978; Schalling,

Lidberg, Levander & Dahlin, 1968). However, no similar differences in tonic level of HR between psychopaths and non-psychopaths have been reported (Goldstein, 1965; Hare, 1968; Hare, Frazelle & Cox, 1978; Lindner, 1942; Ruilman & Gulo, 1950). The differences in tonic SC levels between psychopaths and non-psychopaths have been used to further support the argument that psychopaths demonstrate lower levels of anxiety than non-psychopaths.

Although there have been relatively few studies which have measured electrodermal recovery time, some of the available data indicated that psychopaths display longer recovery times following the presentation of an aversive stimulus than non-psychopaths do (Hemming, 1981; Mednick, 1975). Other studies revealed that psychopaths only display longer recovery times when presented with particularly startling stimuli (Hare, 1975a) and, in at least one case, only in the left hand (Hare, Frazelle & Cox, 1978). Mednick (1974) has argued that slow recovery times result in slow fear dissipation and less effective avoidance learning. This hypothesis has been

supported, in slightly altered forms, by others (Hare, 1978; Venables, 1975).

Hare and his colleagues developed a countdown procedure to directly measure the level of a subject's anticipatory arousal to aversive stimuli (e.g., loud tone or shock). The results from a number of studies indicated that psychopaths tend to display significantly smaller increases in SCR compared to non-psychopaths (Hare, 1965, 1970; Hare & Craigen, 1974; Hare, Frazelle & Cox, 1978; Hare & Quinn, 1971). Conversely, the anticipatory HR of psychopaths in one of these studies tended to be similar to those of non-psychopaths (Hare & Quinn, 1971), while the psychopaths anticipatory HR actually increased in other studies (Hare & Craigen, 1974; Hare, Frazelle & Cox, 1978). Lacey and Lacey (1974) have suggested that cardiac acceleration, as displayed by psychopaths, results in increased carotid pressure and is associated with a decrease in cortical arousal and "sensory-rejection". Therefore, it has been hypothesized that this pattern of anticipatory HR acceleration and small increases in anticipatory SCR displayed by psychopaths may reflect the operation of

an efficient coping process and the inhibition of fear arousal (Hare, 1975c, 1978).

The lower level of anxiety displayed by psychopaths and explanations for the inverse relationship between anticipatory SCR and HR have been used to explain the relatively high level of criminal activities demonstrated by psychopaths. It has been suggested that psychopaths are not as affected as most people are by social sanctions which tend to create anxiety and help regulate behaviour. Therefore, their behaviour is less regulated by anxiety arousing stimuli, such as the fear of causing harm to someone or being sent to prison, and they are more likely to perform these behaviours.

1.8 Hypotheses for the Present Study

While Hare and others have interpreted psychophysiological data as indicating that psychopaths employ defensive responses to cope with the threat of punishment, this hypothesis has not been directly tested by direct manipulation of the subjects' defensive responses. The present study will attempt to do this. An attempt will also be made to replicate

findings from the Hare, Frazelle & Cox (1978) study by measuring HR and SCR changes in anticipation of a 120 db tone.

1.8.1 Hypotheses for the Study Replication

A number of methodological variations to the Hare, Frazelle and Cox (1978) study will also be made in order to clarify the results. Hare et al. found that differences in SCR between subjects are only evident when subjects with high psychopathy ratings and low Socialization (So) scores are compared with subjects with low psychopathy ratings and high So scores. The necessity to select subjects based on combined psychopathy and socialization scores may reflect a deficiency of the original global seven point psychopathy ratings used in Hare's earlier studies. For the present study, the 20 item Psychopathy Checklist (Hare, 1985b) will be used as one of the instruments for subject selection. In order to replicate the Hare et al. (1978) study, subjects' Socialization scores on the CPI will also be obtained and used for assignment of subjects to groups.

The countdown in the original experiment had a 12 second duration. The change in HR occurred one second after the countdown began and was almost back to the baseline level approximately four seconds before the onset of the tone. The countdown period in the original experiment was not long enough to determine whether HR changes occurred in response to the possible arousing properties of the start of the countdown, or whether the HR changes occurred at some critical point prior to tone onset. In the following study, the duration of the countdown will be 30 seconds. This should be of sufficient duration to reliably determine the temporal location of the anticipatory HR changes.

The hypotheses concerning the replication of the Hare et al. (1978) study are as follows:

1. The Psychopathy Checklist will sufficiently differentiate non-psychopathic and psychopathic subjects, indicating that the So scores will no longer be required to "purify" groups.

2. The pattern and magnitude of HR increase will be similar to that of the original study in indicating that this increase does not merely occur as a result of the properties of the onset of the countdown.

1.8.2 Hypotheses for the Test of the Coping Response

In addition, the study will test the hypothesis that HR and SCR changes are the result of a defensive response in anticipation of the tone. In this experiment, the subject will be given the option of preventing the onset of the tone by pressing a button immediately following the 30 second countdown. Since subjects will be able to easily prevent the onset of the tone by an external means, they should no longer have a need to employ an internal, defensive coping response, in anticipation of the tone. Accordingly, the physiological differences which have occurred between psychopaths and non-psychopaths previously should dissipate if the differences were purely a result of a defensive response. Furthermore, psychophysiological responding should be different within the Hi-P group on a task in which a mandatory tone is delivered as compared to a task in which the subjects are able to prevent tone onset.

It is hypothesized that the overall pattern of psychophysiological responding will be indicative of the psychopaths' employment of a successful coping

response, as discussed previously. The hypotheses for the test of the coping response are as follows:

1. The tonic level of SC will be lower for subjects in the non-psychopathic group than for subjects in the psychopathic group.

2. The SCR will increase across the countdown for all subjects.

3. The increase in level of SCR for subjects in the non-psychopathic group will be greater than for subjects in the psychopathic group.

4. The increase in SCR will be lower for both non-psychopaths and psychopaths when they are given the option of preventing tone onset than when the tone presentation is mandatory.

5. The electrodermal recovery time will be longer for the psychopaths than the non-psychopaths in the mandatory tone presentation condition.

6. The electrodermal recovery time will not differ between psychopaths and non-psychopaths in the optional tone prevention condition.

7. The tonic HR will not differ across subjects among groups.

8. The increases in HR within the Hi-P group will be greater in the mandatory tone task than it is in the optional tone prevention task.

9. In the mandatory tone task, the psychopaths will display greater increases in HR across the countdown than will the non-psychopaths.

10. The increase in HR will not differ between the groups in the optional tone prevention task.

11. Psychopathic subjects will assess the aversiveness of the tone as being less intense than the non-psychopathic subjects as indicated by their responses on a tone rating form.

2. METHOD

2.1 Subjects

Subjects included 32 male inmate volunteers from the Regional Psychiatric Centre, Prairies (RPC). They ranged in age from 18 to 42 years with the mean age being 26.91 years (sd = 6.77). Subjects were serving sentences ranging in length from 8.5 months to life with the exception of one subject who was on remand from the provincial court. Ten subjects were serving life sentences while the mean length of sentence for the rest of the subjects was 5.89 years (sd = 4.53). Only subjects who were not taking any form of prescribed medication were included in the study. None of the subjects' levels of nonverbal or "fluid" intelligence fell more than 1 - 1/2 standard deviations above or below the mean (M = 58.96 percentile, sd = 21.83), based on the Raven's Standard Progressive Matrices test (Raven, 1956). Subjects' scores on the Symbol Digit Modalities Test (Smith, 1973), a screening test for neuropsychological dysfunction, were also

within the normal range (+/-1.5 sd) (M = -.50 sd, sd = .80).

2.2 Assessment of Psychopathy and Socialization

Subjects completed the CPI So scale (Appendix B) as part of the initial test battery they were given on admission to the RPC. Their levels of psychopathy were assessed using the Psychopathy Checklist (Hare, 1985a). Each subject was assessed individually by one of three research assistants who received extensive training in administering the checklist. Training initially involved the research assistants becoming familiar with the checklist items, using the Psychopathy Checklist Manual prepared by Hare (1985a). Each of the items of the checklist was discussed with them in detail by the author. The research assistants then observed at least two psychopathy interviews performed by the author. They then completed checklist ratings for the subjects they observed being interviewed using both the interview data and data obtained from the subjects' institutional files. The author then discussed their ratings with them. Finally, the author observed each research assistant performing at least one interview.

This procedure was repeated until the author was confident that the rater was able to independently complete the checklist. Each Psychopathy Checklist was completed after a thorough reading of the patient's file followed by a semi-structured interview with the patient, as suggested by Hare (1985a). A semi-structured interview format was designed for this purpose (Appendix C). The interview format was based on one prepared by Serin (1984). While interviewers were instructed to address each of the questions outlined in the interview format, they were also given the liberty of asking more specific questions in order to complete a more accurate completion of the assessment. Nine subjects were assessed twice, by two different research assistants, in order to establish the Psychopathy Checklist inter-rater reliability level.

High and Low Psychopathy scores were delimited by a median split of subjects' Psychopathy Checklist scores. Those in the Low Psychopathy group scored 22 or less and those in the High Psychopathy group scored above 23. High or Low Socialization groups were delimited by a median split of subjects' scores on the

So scale of the CPI, as suggested by Hare, Frazelle and Cox (1978). Subjects with So scores below 25 were assigned to the Low So group and subjects whose scores were 25 or above were assigned to the High So group. Based on Psychopathy Checklist scores and So scores, subjects were assigned to experimental cells as indicated in Table 4. The experimental cell names will be abbreviated as follows: High Psychopathy/High Socialization (Hi-P/Hi-S); High Psychopathy/Low Socialization (Hi-P/Lo-S); Low Psychopathy/High Socialization (Lo-P/Hi-S); and Low Psychopathy/Low Socalization (Lo-P/Lo-S). The mean Psychopathy Checklist and Socialization scores for each cell are also presented in Table 4.

The combination of So scores and psychopathy ratings was used to select subjects who would form relatively homogeneous or "pure" groups of psychopaths, as suggested by Hare (1978). However, as predicted in the hypothesis section, the Psychopathy Checklist will be an efficacious method for selecting subjects. Therefore, a second set of analyses were performed separating groups of subjects based upon their Psychopathy Checklist scores alone. Subjects with

Table 4

Assignment of Subjects to Cells

Psychopathy X Socialization Experimental Groups

PSYCHOPATHY CHECKLIST SCORES

SOCIALIZATION SCORES	High (23-40)	Low (0-22)
High (25-54)	Psychopathy = 27.13 8 Socialization = 26.50	Psychopathy = 12.44 9 Socialization = 29.33
Low (0-24)	Psychopathy = 27.38 8 Socialization = 18.63	Psychopathy = 14.57 7 Socialization = 21.71

Psychopathy Experimental Groups

PSYCHOPATHY CHECKLIST SCORES

High Psychopathy (27 +)	M = 31.43 n = 7
Medium Psychopathy (18 - 26)	M = 22.92 n = 13
Low Psychopathy (- 18)	M = 11.00 n = 12

checklist scores above 27 were assigned to the High Psychopathy group; subjects whose scores fall between 18 and 26 were assigned to the Medium Psychopathy group; and, subjects with scores below 18 were assigned to the Low Psychopathy Group. These experimental groups, along with the mean Psychopathy Checklist scores are also presented in Table 4.

2.3 Apparatus

Bilateral SCR and HR were measured using a Model R612 Beckman Dynograph equipped with two Type 9844 Beckman Skin Conductance couplers and one Type 9857 Beckman Cardiotachometer coupler. Beckman biopotential (Ag-AgCl) electrodes were used to record SC. The electrolyte was a .05M solution of KCl in an Agar base which is approximately equivalent to physiological saline. The electrolyte jelly was made by dissolving 0.5 g of KCl and 2.0 g of agar-agar in 100 ml of distilled water following the procedure described by Venables and Sayer (1963). The electrolyte was replaced every three days to ensure that no deterioration occurred.

Heart rate was measured using a Beckman Pressure Transducer with a cardiotachometer coupler. The tones were generated by a Hewlett Packard model 200 AB audio oscillator. The audio oscillator and headphones were calibrated using a Bruell & Kjaer Type 2203 precision sound level meter (Slow A Scale) to deliver a 120db tone at a frequency of 1000 Hz. The tone and countdown were recorded onto a high quality Sony ES90 metal cassette tape using a Sony TC-FX77 stereo cassette deck. The countdown and tone were played back to subjects during the experimental sessions using a Sony TC-FX77 stereo cassette deck. The tone level was measured daily to ensure that it remained at 120 db by measuring the voltage output using a Micronta 22-198A digital multimeter. Subjects heard the tone through a pair of Sony model DR-30 dynamic stereo headphones. For tasks two and three, subjects pressed a red (1 cm x 1.5 cm) momentary button mounted on a metal box to stop the cassette player and this prevented the onset of the tone. The button also triggered a pen deflection on one channel of the dynagraph to mark the temporal location of the press.

2.4 Procedure

After signing an informed consent form (Appendix D), subjects completed a handedness inventory (Briggs & Nebes, 1975: See Appendix A). Electrodes were then attached to the first and third fingers (medial phalanx) of both the subject's hands using a double collar method. This was done by attaching one side of a double-sided adhesive electrode collar securely on the subject's finger after cleaning the finger carefully with an alcohol pad. Care was taken to ensure that there were no gaps between the collar and the skin surface. A second double-sided collar was firmly attached to the electrode. The electrode was completely filled with electrode paste. The collar on the electrode was carefully aligned with, and then attached to the one on the subject's hand. A piece of surgical tape was used to further secure the electrode to the finger. It was found that this method of electrode attachment completely prevented electrode paste from escaping onto the skin surface surrounding the electrode paste - skin contact area, thus ensuring that the electrode paste - skin contact area remained

constant at .5 cm^2 for each subject. Any misalignment of the two collars could be easily detected and corrected by repeating the entire procedure. Also, the double collar adhesion method provided a very secure attachment for the electrodes.

The detailed SCR recording procedure was in accordance with that outlined by Lykken (1972) and Lykken and Venables (1971). This was done by measuring skin conductance directly with a constant-voltage circuit (.5 volts) using silver/silver-chloride electrodes. SCR was measured directly by recording the level of voltage suppression required to standardize the initial tonic level of subjects' SCR plus or minus the phasic change in actual skin conductance (measured in microvolt per millimeter units).

The HR pressure transducer was securely attached to each subject's left thumb using surgical tape and cardiovascular activity was measured both as beat by beat and as beats per minute (bpm) averaged over 1 second intervals.

Each subject was comfortably seated in a reclining chair and were individually tested in a sound-attenuated chamber. The polygraph, audio

equipment and experimenter were located in an adjoining room. The experimenter was able to visually monitor each subject through a window between the two rooms. After the electrodes and pressure transducer were attached, stereo headphones were placed on the subject's head, the lights were dimmed, and the subject was given instructions that outlined the general experimental procedure (See Appendix E). Specific task instuctions were given prior to the beginning of each of the three different tasks. The order in which subjects were assigned to the tasks was counterbalanced among subjects within each cell. Subjects were given a 10 - minute rest period prior to the onset of the experiment. They were instructed to close their eyes and try to relax during the 10 minute period.

2.4.1 Task 1 -- Mandatory Tone Task. A 120 db, 1000 Hz tone of 1 second duration was presented following a tape-recorded 9 to 0 count-down spanning 30 seconds, as outlined by Hare (1965, 1970, 1978) and Hare, Frazelle and Cox (1978). The count-down and stimulus presentation were repeated over five trials. Following each trial, subjects were asked to rate the

aversiveness of each tone on a seven point Tone Intensity Rating Scale (See Appendix F).

2.4.2 Task 2. -- Count-Down Without Tone Task. For this task, subjects heard the same 9 to 0 count-down, however, they did not receive a tone. Instead, subjects were instructed to press a button on a control panel immediately following the count of 0. This task was included to determine the SC and HR changes induced by the response of pressing the button. Once again, the count-down and button press were repeated over five trials.

2.4.3 Task 3. -- Tone Onset Prevention Task. During this task, subjects heard the same 9 to 0 count-down; however, they were informed that they could press the button (the same one as in Task 2) if they wished to prevent the onset of the tone. Subjects were explicitly informed that they had the option of either pressing the button to prevent tone onset, or not pressing the button, in which case they would hear the tone. As in Task 1, if the subjects heard the tone, they were asked to rate it on the seven point Tone Intensity Rating Scale.

2.5 Dependent Measures.

Tonic measures of skin conductance and HR were measured during the initial resting period. These measures were calculated by averaging separate HR and SCR recording levels over the final minute of the rest period. All measures of SCR were recorded for right and left hands separately.

2.5.1 Task 1. Subjects' SCR and HR levels were recorded as a function of temporal proximity to the onset of the tone. These were then calculated by averaging HR and SCR levels over 3 second periods during the count-down. The peak level of SC and HR which occurred during the task were also recorded. Skin conductance recovery half-time, following the presentation of the tone, was measured as the number of seconds it took for subjects' SCR responses to return to the level halfway between the peak and basal levels (Hare, 1978). Finally, subjects' ratings of tone intensity were also taken as a dependent measure.

2.5.2 Task 2. Subjects' SCR and HR levels were recorded as a function of temporal proximity to the

button press task. These were then calculated as in Task 1. The peak level of SC and HR which occurred during the task was recorded. Skin conductance recovery half-time, following the button press task was also measured.

2.5.3 Task 3. Subjects' SCR and HR levels were recorded as a function of temporal proximity to the count of zero. These were then calculated as in Task 1. The peak levels of SC and HR which occurred during the task were recorded. Skin conductance recovery half-time, following the count of zero, was also measured. In addition, the subject's choice of whether or not to press the button, thereby preventing tone onset, was recorded for each of the trials in this task.

3. RESULTS

3.1 Overview of the Results Section

This section will serve to familiarize the reader with the rationale and general organization of the Results section of this thesis. Initially, the level of inter-rater reliability for each Psychopathy Checklist item and the total checklist score are presented. Next, a description of the demographic variables of the sample is provided. These data are compared with those obtained by Wong (1984) in order to determine how generalizable the present sample is. The subjects' ratings of the subjective level of the intensity of the tone are also compared across groups.

Before analyzing the psychophysiological data, analyses were performed to simplify the data. First, analyses were completed to determine whether differences occurred between trials in which subjects did or did not choose to press the button in order to prevent the tone in Task 3. Since no differences were found for SCR, all trials within Task 3 were considered together for analyses. Since differences in HR were

found between the tasks, only those data for trials in which subjects pressed the button were considered for further analyses. Analyses were also done to determine whether differences occurred between the trials within each task. Since no significant differences found, the five trials within each task were collapsed together for further analyses.

As discussed previously, the psychophysiological data (HR and SCR) have typically been presented in both raw units (μmhos and BPM) and range-corrected form (change in SCR and BPM). Both forms of data are meaningful in terms of the hypotheses outlined earlier. The raw data allow one to determine the absolute level of psychophysiological responsivity and whether the levels vary among groups. However, the range-corrected data are also meaningful since range-correction controls for the differences in absolute level of psychophysiological data among groups. Therefore, these data allow one to make direct comparisons among increases of psychophysiological responses across groups. Since both raw and range-corrected data are meaningful, both were analyzed and are reported here. The analyses of raw SC data followed by the analyses of

range-corrected SC data are presented first. Then, the analyses of raw and range-corrected HR data are presented.

One of the hypotheses of this study suggests that the Psychopathy Checklist will sufficiently differentiate non-psychopathic and psychopathic subjects. This suggests that So scores would no longer be required to "purify" groups. In order to exemplify this point, some of the critical initial analyses employing experimental groups delimited by both Psychopathy Checklist scores and So scores were repeated for the experimental groups delimited by subjects' scores on the Psychopathy Checklist alone. This was done to demonstrate that these findings approximate those obtained earlier when both checklist and So scores were used to delimit groups. The final two subsections present the raw and range-corrected findings for the SC and HR data.

3.2 Inter-rater Reliability of Psychopathy Checklist Ratings

From the total of 32 subjects, nine subjects' levels of psychopathy were assessed twice by two

different research assistants using the Psychopathy Checklist. Each of the research assistants re-rated three subjects. The level of inter-rater reliability among all research assistants was obtained by calculating the Pearson product-moment correlations of the sets of scores for each of the 20 items on the checklist, as well as for the total checklist scores. These correlations are listed in Table 5.

All correlations were statistically significant. The inter-rater reliability correlation for the total checklist score was .82, $p < .01$. The results suggest that good inter-rater reliability exists for all individual item scores and for the total checklist score.

3.3 Demographic Characteristics of the Sample

A summary of the demographic characteristics of the sample can be found in Table 6. In order to determine whether subjects in each of the experimental groups could be considered homogeneous, a number of demographic variables were compared across groups. This was done by performing a 2 X 2 (Psychopathy X Socialization) Analysis of Variance (ANOVA) on each of

Table 5

Inter-rater Correlations for The Psychopathy Checklist

Checklist Item		Correlation
1.	Glibness/superficial charm	.89 **
2.	Grandiose sense of self worth	.92 ***
3.	Need for stimulation/proneness to boredom	.78 **
4.	Pathological lying	.87 **
5.	Conning/Manipulative	.94 ***
6.	Lack of remorse or guilt	.80 **
7.	Shallow affect	.82 **
8.	Callous/lack of empathy	.80 **
9.	Parasitic lifestyle	.86 **
10.	Poor behavioural controls	.60 *
11.	Promiscuous sexual behaviour	.62 *
12.	Ealy behavioural problems	.93 ***
13.	Lack of realistic, long-term goals	.88 **
14.	Impulsivity	.93 ***
15.	Irresponsibility	.92 ***
16.	Failure to accept responsibility	.73 *
17.	Many short-term marital relationships	.74 **
18.	Juvenile delinquency	.93 ***
19.	Revocation of conditional release	.96 ***
20.	Criminal versatility	1.00 ***
	Total Score	.82 *

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

Table 6

Summary Table of Sample Description Data

Demographic Variable	Mean	S.D.
Age	26.91	6.77
Level of Education (in years)	9.88	2.30
Length of Sentence	5.89	4.53
Handedness Inventory Scores	13.41	14.93
Sybol Digit Modalities Test	-.54 sd	.93 sd
Raven's Progressive Matrices	58.96	21.83

The Raven's Standard Progressive Matrices scores are presented as percentile. The ANOVA was significant for this variable, and cell means and standard deviations are as follows:

		Socialization			
		low		high	
		Mean	sd	Mean	sd
Psychopathy	low	*39.25	17.06	53.75	22.41
	high	58.00	19.32	*80.00	7.38

$p < .05$.

the demographic variables. Oneway ANOVAs were also performed on each of the demographic variables for the High, Medium and Low Psychopathy groups. Not one of these results was significant.

The only demographic variable which differed significantly among the four experimental groups was the mean Raven's Standard Progressive Matrices test score ($F(3,28) = 5.53$, $p < .01$). Comparisons of cell means using the Scheffe procedure revealed that the mean percentile rank of scores for the Lo-P/Lo-S group was significantly lower than that of the Hi-P/Hi-S group. A summary of cell means is available in Table 6.

Pearson product-moment correlations were calculated between Raven's scores and Psychopathy Checklist scores and So scores. Neither the checklist-Raven's correlation ($r = .29$) nor the So-Raven's correlation ($r = -.13$) were significant ($p > .05$).

Those subjects who were serving life sentences were excluded from the ANOVA for length of sentence comparisons among experimental groups since actual length of sentence for these individuals cannot be

computed. A chi-square comparison, using Fisher's Exact Test, was performed to determine whether the number of subjects serving life sentences differed significantly among experimental groups (N = 10). The chi-square value was not significant ($p > .05$).

The demographic variables compare well with those obtained in a large study (N = 315) carried out by Wong (1984). The mean age of subjects in his study (M = 30.38, sd = 9.61) was slightly greater than in the present study (M = 26.91, sd = 6.77). The level of education of subjects in the present study (M = 9.88, sd = 2.30) compared favourably with that reported by Wong (M = 9.22, sd = 7.04). Also, the mean length of subjects' sentences was very similar between the present study (M = 5.89, sd = 4.53) and that reported by Wong (M = 5.34, sd = 3.39). Finally, the mean Psychopathy Checklist score for the present sample was somewhat lower (M = 20.31, sd = 6.91) than that obtained by Wong (M = 23.04, sd = 5.85). Overall, the present sample, while being relatively small, appears to be quite representative.

A Pearson product-moment correlation was calculated to determine the magnitude of the

relationship between Psychopathy Checklist scores and Socialization scores. The value of the correlation was significant (r = -.44, p < .0001). The Socialization scale scores correlate negatively with the Psychopathy Checklist scores since higher scores on the Socialization scale indicate higher levels of socialization (and less psychopathy) whereas higher scores on the Psychopathy Checklist indicate increasing levels of psychopathy.

3.4 Analysis of Subjects' Tone Ratings

ANOVAs were performed on the subjects self-ratings of tone intensity in order to determine whether there were differences among groups. These analyses were performed for both the Psychopathy X Socialization experimental cells and the High, Medium and Low Psychopathy cells. None of the results revealed significant differences among groups. The mean tone intensity rating across all subjects was 2.53, sd = 1.54. This indicates that, overall, subjects felt the tone was between "moderately" and "quite" intense.

3.5 Simplification of Data

3.5.1 Analyses of Press/No Press Option for Task 3

As detailed in the Method section, subjects were given the option of pressing a button to prevent the onset of the tone in Task 3. Analyses were performed to determine whether differences occurred between trials in which subjects chose to press the button and trials in which subjects chose not to press the button. These analyses were completed by performing an ANOVA (Psychopathy X Socialization X Press/No Press) with repeated measures (10 countdown variables: 27 second point to 1 second point) for psychophysiological data.

The first analyses were performed on left and right hand SCR data. This was done separately for the experimental groups delimited first by Psychopathy and So scores and second by High, Medium, and Low Psychopathy scores. Similar ANOVAs were also performed on the peak SCR and the SC Recovery Half-Time for both left and right hand SCR data across experimental groups. None of the results for the Press/No Press factor were significant for SCR. Therefore, the Press

and No Press data were collapsed together for subsequent analyses.

Chi-square analyses were also performed on both Psychopathy X So and High, Medium and Low Psychopathy experimental groups to determine whether the number of times subjects chose not to press the button differed among all experimental groups for Task 3. None of the chi-square values were significant ($p > .05$).

These analyses were also completed for HR data across both sets of experimental groups. The Source Table for the analysis of differences between press and no press choices in Task 3 for HR data in the Psychopathy X So experimental groups is presented in Appendix G. A significant Psychopathy X Press/Nopress interaction effect was found for the analysis of experimental groups delimited by Psychopathy and So scores ($F(1,19) = 8.67$, $p < .01$). The means for this interaction are displayed in Table 7. The mean HR for subjects in the Hi-P/No Press group was significantly lower than the mean HR of the other 3 groups.

An identical analysis was performed for HR data in the High, Medium and Low Psychopathy groups. The Source Table for this analysis is in Appendix H. A

Table 7

Cell Means for the Psychopathy X Press/No Press Interaction for Raw HR Data

	Psychopathy			
	Low		High	
	M	sd	M	sd
Press	71.54	13.65	69.52	13.22
No Press	75.31	7.78	59.32[1]	10.10

[1] this mean differs significantly from all of the others at the .05 level.

significant main effect for the Press/No Press factor was found ($F(1,25) = 4.44$, $p < .01$). Subjects' HRs were significantly lower when they did not choose to press the button ($M = 67.31$, $sd = 12.05$) than when they did choose to press the button ($M = 70.53$, $sd = 12.05$).

A significant interaction was found for the Psychopathy X Press/No Press factors ($F(2, 25) = 8.47$, $p < .01$). The means for this interaction are presented in Table 8. Multiple comparisons of means involved in this interaction showed that the subjects in the Lo-P group who chose not to press the button had significantly greater HRs than the subjects in either the Med-P or Hi-P group who also chose not to press the button. Their HRs were also greater than for other subjects in the Lo-P group who chose to press the button. The HR for subjects in the Hi-P group who chose to press the button was significantly greater than for subjects in either the Med-P or Hi-P groups who chose not to press the button. The HR for subjects in the Med-P group who chose to press the button was significantly greater than the HR of subjects in either the Med-P or Hi-P groups who chose not to press the

Table 8

Raw HR Cell Means for the Psychopathy X Press/No Press Interaction

Press/No Press

	Press		No Press	
	M	sd	M	sd
Lo-P	66.34[2,7]	11.48	75.31[1]	7.78
Med-P	72.30[5]	14.70	58.73[2,4,6,8]	11.69
Hi-P	73.16[3]	12.03	60.02[2,4,6]	7.76

[1, 2] The mean with superscript 1 is significantly greater than all of the means with superscript 2.

[3, 4] The mean with superscript 3 is significantly greater than all of the mean with superscript 4.

[5, 6] The mean with superscript 5 is significantly greater than all of the means with superscript 6.

[7,8] The mean with superscript 7 is significantly greater than the mean with superscript 8.

button. The HR for subjects in the Lo-P group who chose to press the button was significantly greater than the HR of subjects in the Med-P group who chose not to press the button.

As is evident from the above HR data, some differences occurred between those subjects who chose to press the button and prevent the tone onset and those subjects who did not press the button. Therefore, in order to ensure that the data were as homogeneous as possible, only those data obtained from trials in which subjects chose to press the button were included in subsequent analyses of HR data. This required removing HR data for 42 out of the 160 trials for Task 3 (26%). Therefore, subsequent differences found for HR among tasks will not be confounded by differential responding among subjects in Task 3.

3.5.2 Analyses of Within-Task Trials

Analyses were performed to determine whether there were differences in SCR among the five trials within each of the three tasks. These analyses were done for SCR and HR across experimental groups delimited by both Psychopathy and So scores and across experimental

groups delimited by High, Medium and Low Psychopathy scores alone. In order to test whether differences occurred among trials within the same task, ANOVAs (Psychopathy X Socialization) with Trials as repeated measures were performed to compare each of the trials within each task.

None of the results from any of these analyses was significant for the Trial factor. Therefore, the means for the five trials in Task 1, 2 and 3 respectively were used for subsequent analyses.

3.5.3 Analyses for Right and Left Hand SCR Data

Analyses were performed to determine whether differences occurred in SCR between subjects' right and left hands. This was done by performing an ANOVA (Psychopathy X Socialization X Left/Right Hand) with the countdown points as repeated measures (27 second point to 1 second point) on SCR data for both the experimental groups delimited by Psychopathy and So scores and Psychopathy scores alone. None of the results was significant for the Left/Right hand factor. In subsequent analyses, the mean SCR measures from the two hands were used.

3.6 Analyses of SC Data for the Psychopathy X Socialization Experimental Groups

3.6.1 Analyses of Raw SC Data

3.6.1.1 Resting SC Level

A 2 X 2 X 3 (Psychopathy X Socialization X Task) ANOVA was performed on Resting SC data. The Source Table is presented in Appendix I. The only significant result was the main effect for Psychopathy, $F(2,25) = 7.02$, $p < .05$. Subjects in the Lo-P group had a significantly lower mean level of Resting SC ($M = 6.02$; $sd = 4.71$) than subjects in the Hi-P group ($M = 2.69$; $sd = 1.73$).

3.6.1.2 SCR During the Countdown

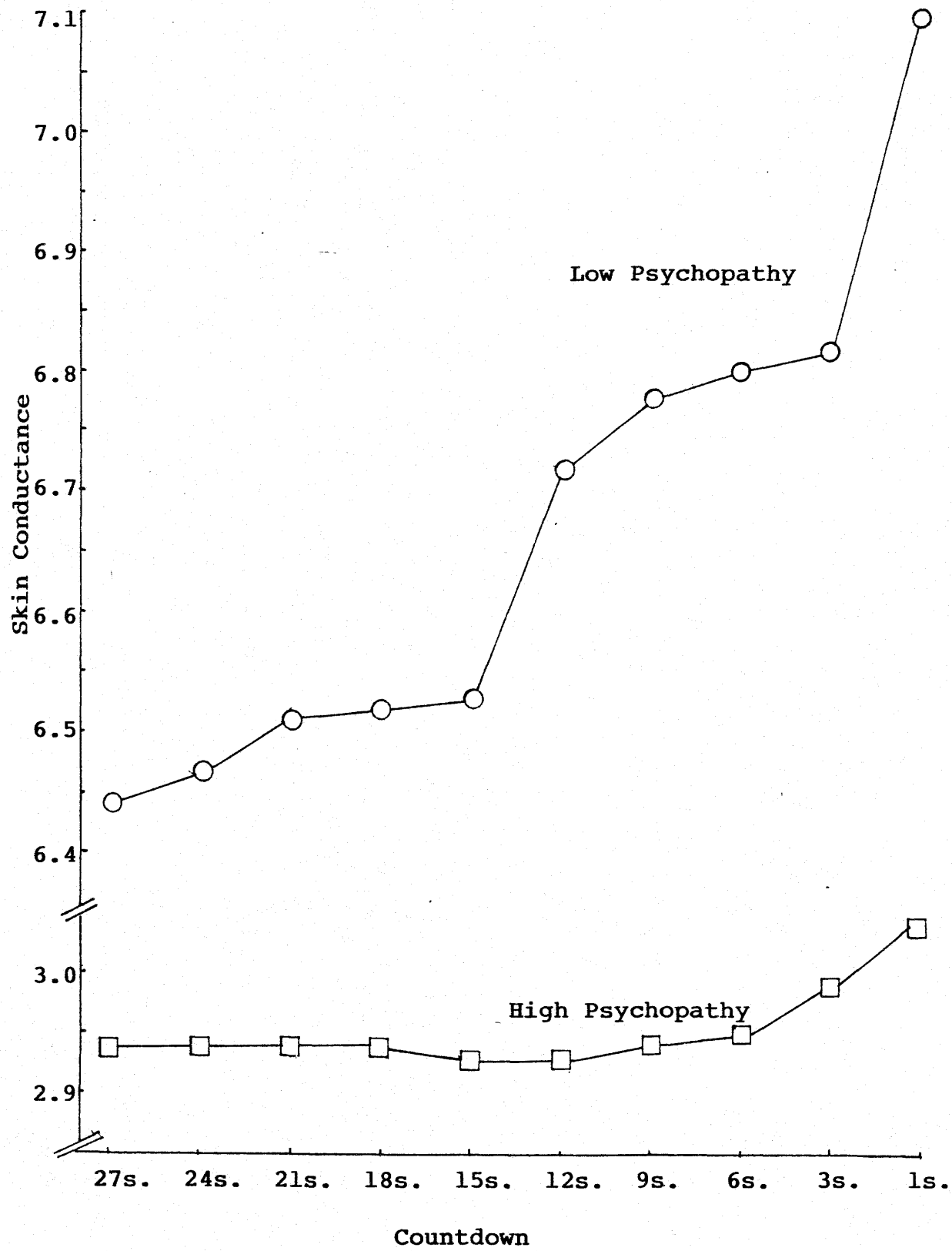
A factorial repeated-measures ANOVA was performed to determine whether SCR changed 1) among experimental groups, 2) among tasks and 3) across countdowns. The independent variables were Psychopathy (low, high) and Socialization (low, high), with Task (1 - 3) and Countdown (27-Seconds to 1-Second) as the within subjects factors. The Source table is presented in

Appendix J. Significant main effects were found for both Psychopathy ($F(1,27) = 4.81$, $p < .05$) and Socialization levels ($F(1,27) = 4.25$, $p < .05$). Subjects in the Hi-P group had lower levels of SCR (M = 3.02, sd = 1.67) than subjects in the Lo-P group (M = 6.33, sd = 5.04). Subjects in the Hi-S group had lower levels of SCR (M = 3.21, sd = 2.54) than subjects in the Lo-S group (M = 5.96, sd = 6.11). A significant main effect was also obtained for Task ($F(2,54) = 4.30$, $p < .05$). Newman-Keuls multiple comparisons revealed that subjects' SCR were higher in Task 1 (M = 4.90, sd = 4.02) than Task 3 (M = 4.56, sd = 3.24). A significant main effect was obtained for Countdown ($F(9,243) = 2.61$, $p < .01$). Cell mean comparisons demonstrated that the overall level of SCR increased throughout the countdown.

The analysis also revealed a significant Countdown X Psychopathy interaction. The means for the interaction are plotted in Figure 1. Comparisons of cell means indicated that the SCR were different between the Hi-P and Lo-P groups at all points along the countdown. There was no significant increase in SCR along the countdown for subjects in the Hi-P group.

Figure 1

Psychopathy X Countdown Interaction



However, the SCR increased significantly from the 12 second point to the 1 second point for subjects in the Lo-P group.

3.6.1.3 Peak SCR

A 2 X 2 X 3 (Psychopathy X Socialization X Task) repeated measures ANOVA was performed on Peak SCR data. The Source Table for this analysis is displayed in Appendix K. Results revealed a significant main effect for Psychopathy ($F(1,26) = 6.44$, $p < .01$). Subjects in the Lo-P group had a significantly higher Peak SCR (M = 7.63, sd = 5.62) than that of subjects in the Hi-P group (M = 3.41, sd = 1.76).

3.6.1.4 Recovery Half-Time

A 2 X 2 X 3 (Psychopathy X Socialization X Task) repeated measures ANOVA was performed on Recovery Half-Time data. The Source Table for this analysis is in Appendix L. A significant main effect was revealed for Task ($F(2,54) = 5.47$, $p < .01$). Multiple comparisons revealed that the Recovery Half-Time for Task 3 (M = 34.82, sd = 24.68) was shorter than that in Task 1 (M = 55.80, sd = 41.52).

3.6.2 Analyses of Range-Corrected SC Data

3.6.2.1 Analysis of Differences During Coountdown

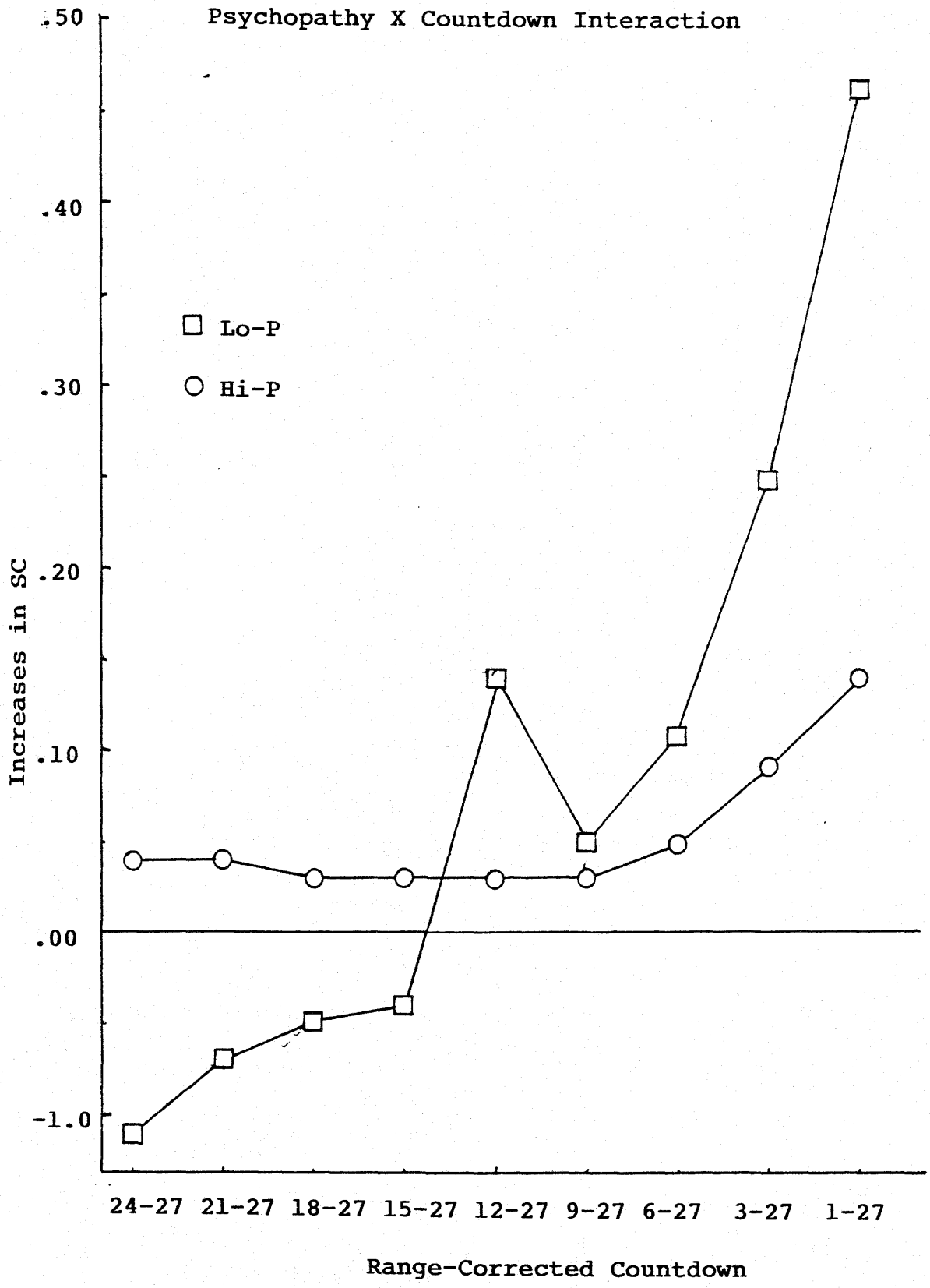
Analyses were performed to correct for the range of individual differences in SCR among subjects across groups. The method for correction employed was one suggested by Hare, Frazelle & Cox (1978). In this method the data were analyzed in terms of changes in raw SC units (μmhos). In order to do this, the level of SCR at the 27 second point was subtracted from the SCR levels obtained at each point in the countdown. This method ensures that any differences occurring across groups are due to actual increases in SCR rather than to individual differences among subjects.

As with the raw data analyses, a factorial repeated-measures ANOVA was performed to determine whether changes in SCR levels were significantly different 1) among experimental groups, 2) among tasks and 3) across countdowns. Therefore, the independent variables were Psychopathy (low, high) and Socialization (low, high), while the within subjects factors were Task (1 - 3) and changes in raw SC units

during the countdown (24-27 Seconds to 1-27 Seconds). The Source Table for this analysis is presented in Appendix M. A significant main effect was found for differences in SCR across the countdown ($F(8,216) = 6.39$, $p < .0001$). Multiple comparisons revealed that the increase in level of SCR increased significantly from the 9-27 second point down to the 1-27 second point of SCR.

The analysis also revealed a significant Psychopathy X (differences during) Countdown interaction effect ($F(8,216) = 3.18$, $p < .001$). The cell means for this interaction are plotted in Figure 2. The increase in SCR was significantly greater for subjects in the Hi-P groups than the Lo-P group for the 24-27 and 21-27 countdown points. The increase in SCR for individuals in the Lo-P group was significantly greater than for individuals in the Hi-P group from the 12-27 second point to the 1-27 second point. The increase in SCR across the countdown for subjects in the Lo-P group was significant. However, none of the increases in SCR level were significant within the Hi-P group.

Figure 2


Psychopathy X Countdown Interaction
.50
.40
.30
.20
.10
.00
-1.0
Lo-P
Hi-P
Increases in SC
24-27
21-27
18-27
15-27
12-27
9-27
6-27
3-27
1-27
Range-Corrected Countdown

3.7 Analyses of HR Data for the Psychopathy X Socialization Experimental Groups

3.7.1 Analyses of Raw HR Data

3.7.1.1 Resting HR

A 2 X 2 X 3 (Psychopathy X Socialization X Task) repeated measures ANOVA was performed on Resting HR data. The results of this analysis revealed no significant differences for resting HR.

3.7.1.2 HR During the Countdown

A factorial repeated-measures ANOVA was performed to determine whether HR changed 1) among experimental groups, 2) among tasks and 3) across countdowns. Therefore, the independent variables were Psychopathy (low, high) and Socialization (low, high), while Task (1 - 3) and Countdown were the within-subjects factors. The Source Table is presented in Appendix N. A significant main effect was found for Psychopathy ($F(1, 26) = 4.24$, $p < .05$). The mean HR for subjects in the Lo-P group ($M = 74.01$, $sd = 12.37$) was significantly higher than the mean HR in the Hi-P group ($M = 67.20$,

sd = 12.96). A significant main effect for Countdown was also obtained ($F(9,252) = 9.64$, $p < .01$). Newman-Keuls multiple comparisons revealed that HR increased significantly along the countdown.

A significant Countdown X Task interaction was found ($F(18, 504) = 1.88$, $p < .05$). The means for this interaction are presented in Figure 3. Multiple comparisons revealed that HR increased significantly within each task. The HR in Task 1 was significantly greater than in Task 3 from the 12 second point down to the 3 second point. Task 3 was significantly greater than Task 1 at the 1 second point. Task 2 and Task 1 only differed significantly from each other at the 12 second point and the 1 second point. The HR in Task 2 was significantly greater than in Task 3 from the 9 second point to the 1 second point.

The final significant interaction of this analysis was for Psychopathy X Socialization X Countdown ($F(9, 252) = 2.15$, $p < .05$). The means for this interaction are presented in Figure 4. HR was significantly higher for subjects in the Lo-P groups than for subjects in the Hi-P groups, regardless of So scores, for all points along the countdown. HR also increased

Appendix J. Significant main effects were found for both Psychopathy ($F(1,27) = 4.81$, $p < .05$) and Socialization levels ($F(1,27) = 4.25$, $p < .05$). Subjects in the Hi-P group had lower levels of SCR (M = 3.02, sd = 1.67) than subjects in the Lo-P group (M = 6.33, sd = 5.04). Subjects in the Hi-S group had lower levels of SCR (M = 3.21, sd = 2.54) than subjects in the Lo-S group (M = 5.96, sd = 6.11). A significant main effect was also obtained for Task ($F(2,54) = 4.30$, $p < .05$). Newman-Keuls multiple comparisons revealed that subjects' SCR were higher in Task 1 (M = 4.90, sd = 4.02) than Task 3 (M = 4.56, sd = 3.24). A significant main effect was obtained for Countdown ($F(9,243) = 2.61$, $p < .01$). Cell mean comparisons demonstrated that the overall level of SCR increased throughout the countdown.

The analysis also revealed a significant Countdown X Psychopathy interaction. The means for the interaction are plotted in Figure 1. Comparisons of cell means indicated that the SCR were different between the Hi-P and Lo-P groups at all points along the countdown. There was no significant increase in SCR along the countdown for subjects in the Hi-P group.

Figure 3

Psychopathy X Countdown Interaction

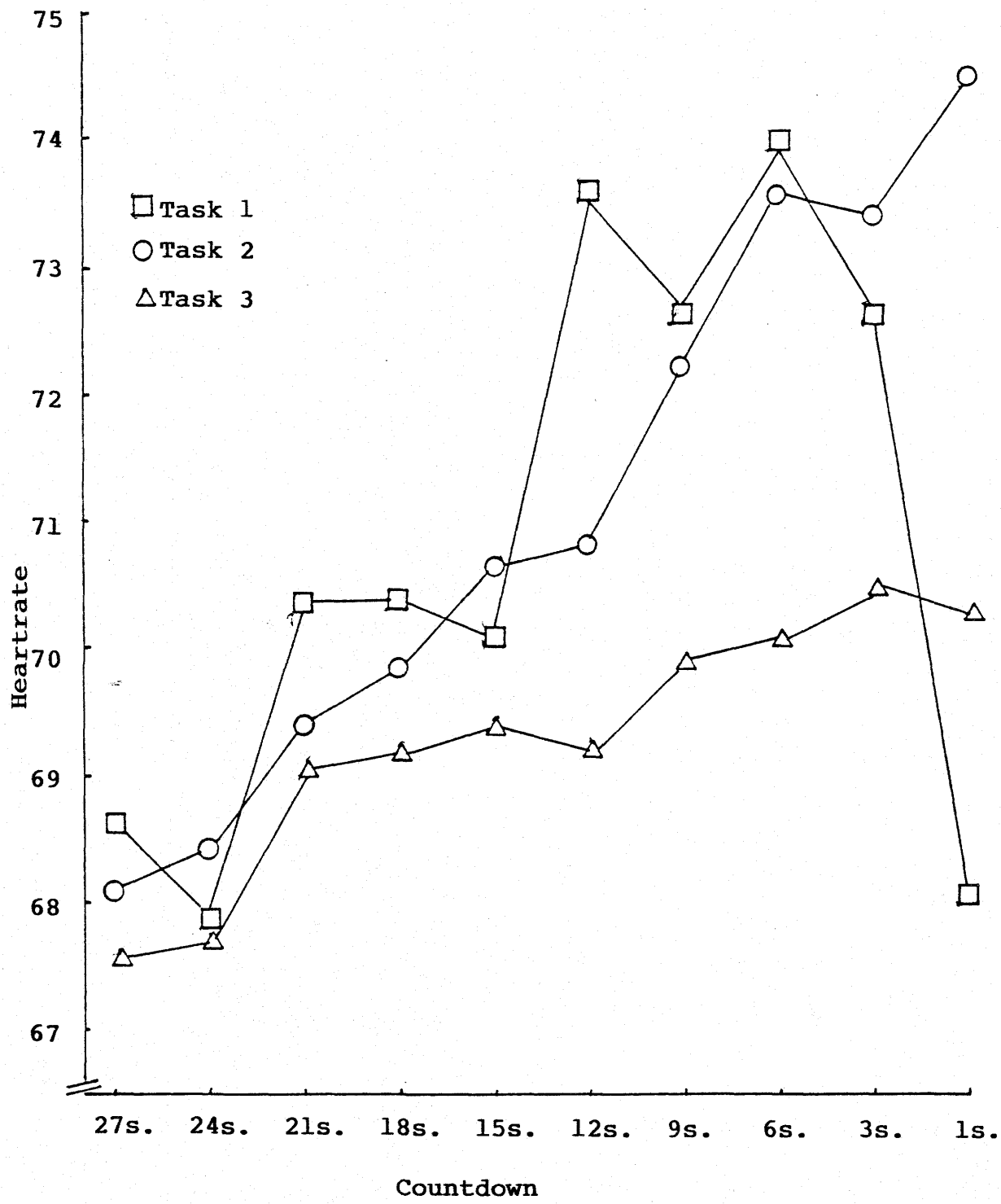
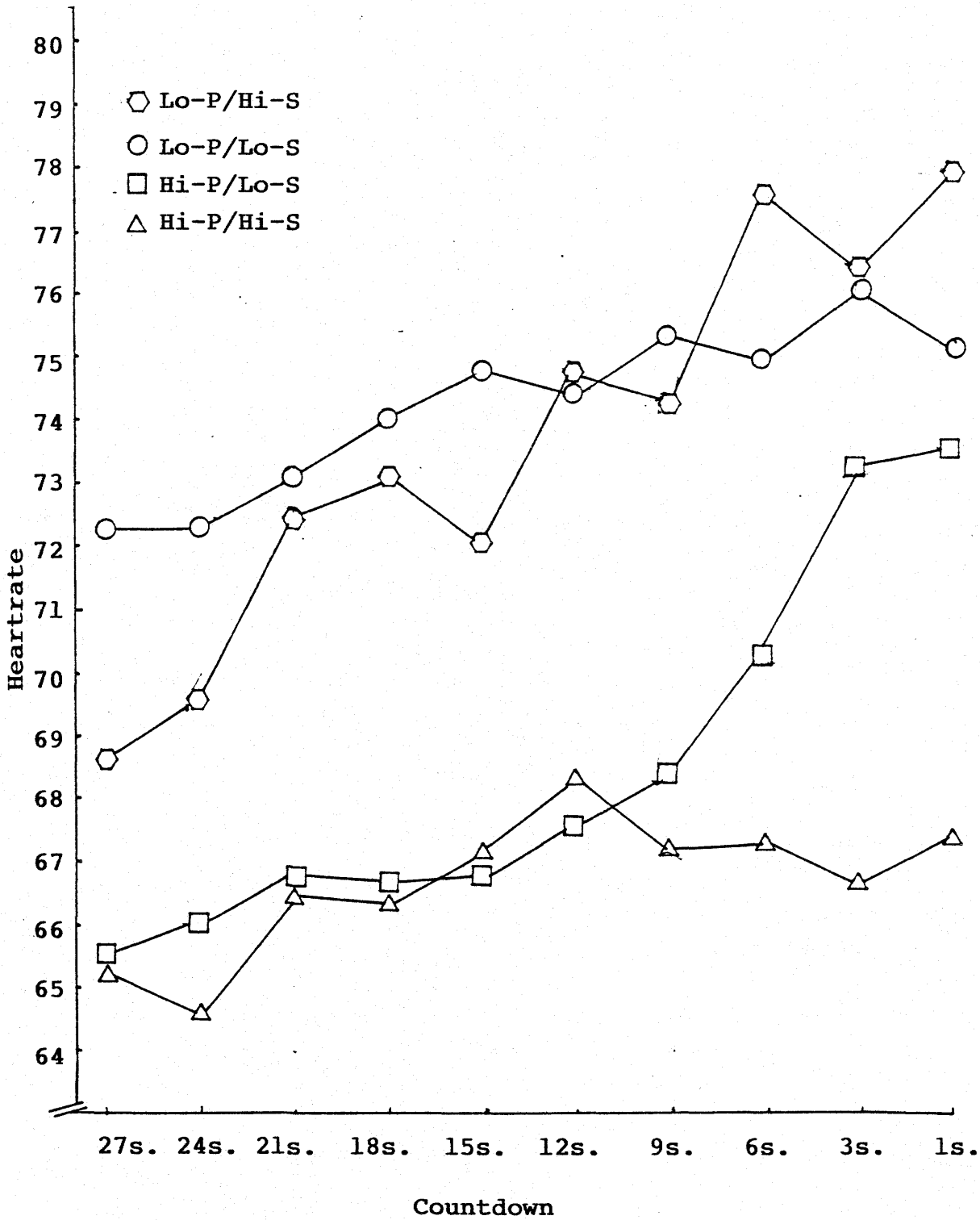


Figure 4

Psychopathy X Socialization X Countdown Interaction



significantly along the countdown within each of the four groups. HR was significantly higher from the 27 second point to the 24 second point for subjects in the Lo-P/Lo-S group than for subjects in the Lo-P/Hi-S group. HR was significantly greater for subjects in the Hi-P/Lo-S group than for subjects in the Hi-P/Hi-S group from the 6 second point to the 1 second point.

3.7.1.3 Peak HR

A 2 X 2 X 3 (Psychopathy X Socialization X Task) ANOVA was performed on Peak HR data. The Source Table for this analysis is displayed in Appendix O. Results revealed a significant main effect for Psychopathy ($F(1,26) = 6.28$, $p < .01$). Subjects in the Lo-P group had a significantly higher mean peak HR ($M = 91.34$, $sd = 13.92$) than subjects in the Hi-P group ($M = 80.79$, $sd = 11.25$).

3.7.2 Analysis of Range-Corrrected HR Data

Analyses were performed to correct for the range of individual differences in HR among subjects across groups. The method for correction employed was one suggested by Hare, Frazelle & Cox (1978). In this

method, the data were analyzed in terms of changes in HR rather than raw HR. To do this, the raw HR at the 27 second point was subtracted from the raw HR obtained at every other point in the countdown. This method ensures that any differences which occur across groups are due to actual increases in HR rather than to individual differences among subjects.

A factorial repeated-measures ANOVA was performed to determine whether range-corrected HR was significantly different 1) among experimental groups, 2) among tasks and 3) across countdowns. Therefore, the independent variables were Psychopathy (low, high), Socialization (low, high), while the within-subjects factors were changes in HR across the countdown (24-27 to 1-27) and Task (1-3). The Source Table for this analysis is presented in Appendix P. A significant main effect was found for Psychopathy, ($F(1,28) = 3.91$, $p < .05$). The overall range-corrected HR for subjects in the Hi-P group ($M = 3.91$, $sd = 2.34$) was significantly greater than for subjects in the Lo-P group ($M = 2.00$, $sd = 2.11$). A significant main effect was also found for the Countdown factor, ($F(8,224) = 8.51$, $p = .0001$).

A significant Countdown X Task interaction was found ($F(16,448) = 2.27$, $p < .05$). The means for this interaction are plotted in Figure 5. Multiple comparisons indicated that there was no significant increase in HR for Task 3, except for the 15 second point. The increases in HR for both Task 2 and 3 were, however, significant. The increase in HR for Task 1 was significantly greater than that for Task 3 from the 12-27 second point to the 1-27 second point. The increase in HR for Task 2 was significantly greater than that for Task 3 from the 9-27 second point to the 1-27 second point. The increase in HR was significantly higher in Task 2 than in Task 1 for only the 12-27 second point and the 1-27 second point.

The Psychopathy X Task X Countdown interaction was also significant ($F(16, 448) = 1.91$, $p < .05$). The means for this interaction are displayed in Figure 6. The increase in HR along the countdown was significant for Task 1 in both the Lo-P and Hi-P groups, although the increase in the Hi-P group was greater. There was no significant increase in HR along the countdown for Task 3 within either the Hi-P group. The increase in HR was greater for Task 3 than Task 1 for the 21-27 to

Figure 5

Task X Countdown Interaction

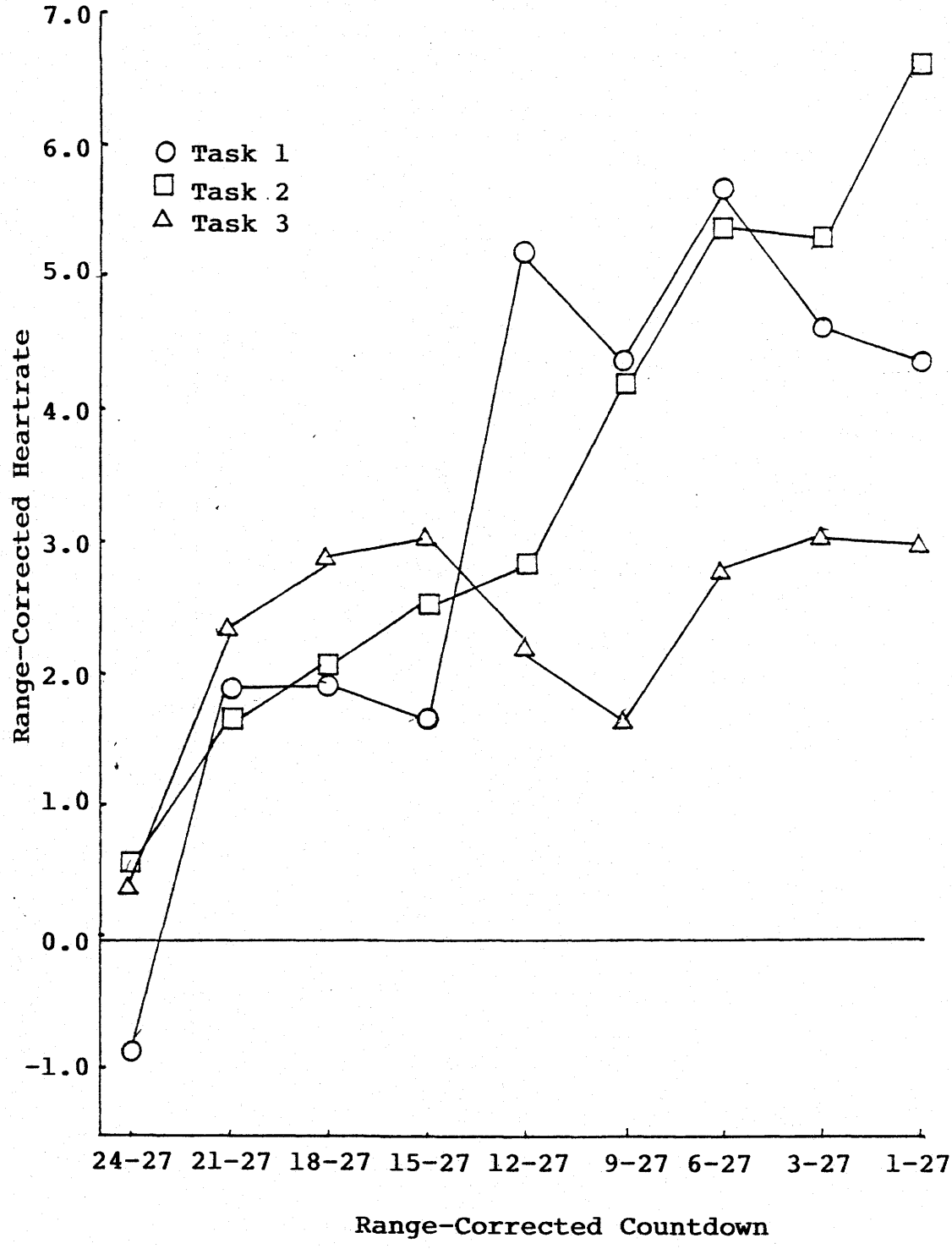
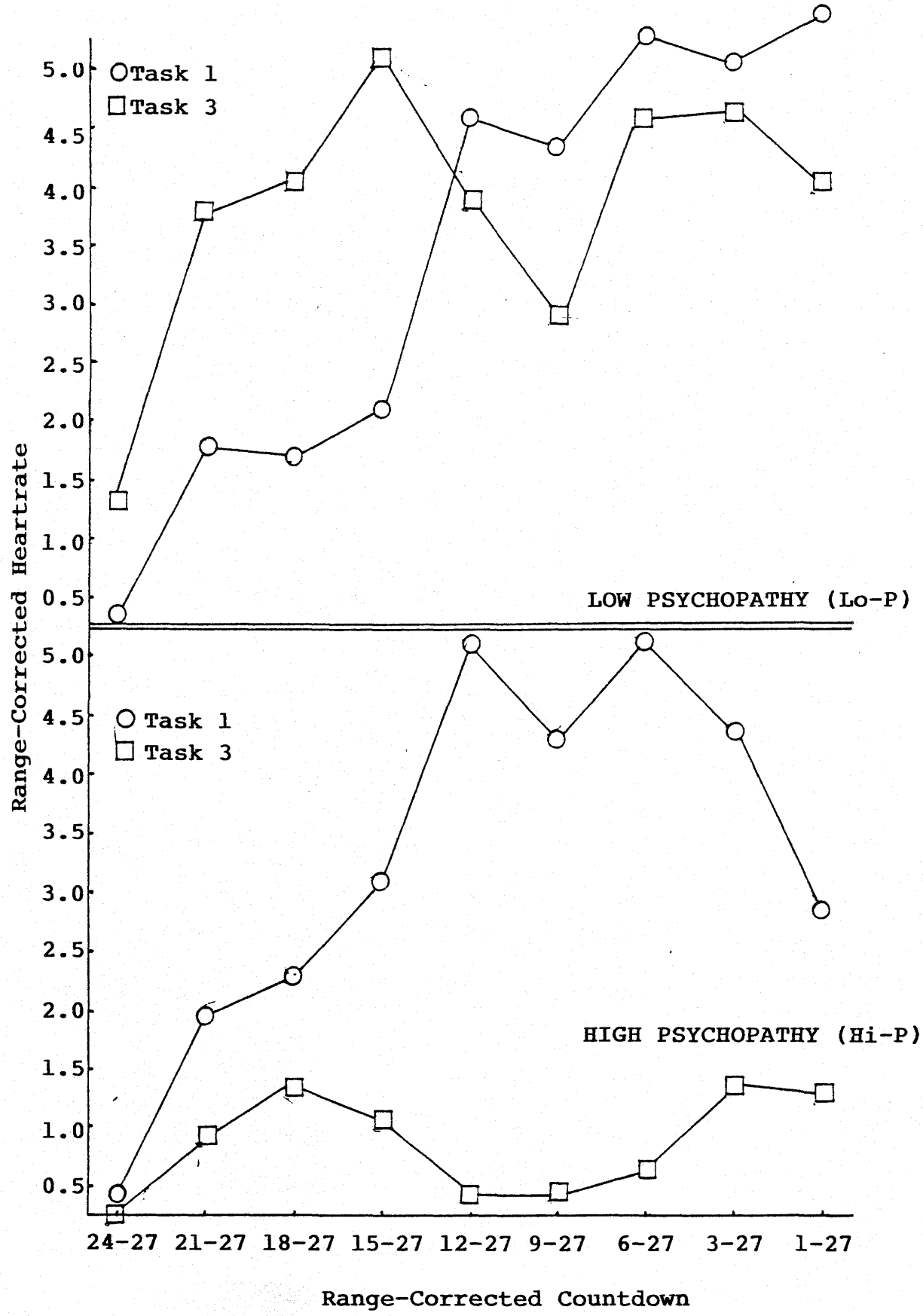


Figure 6

Psyhcopathy X Task X Countdown Interaction



15-27 second points. However, the increase in HR for Task 1 is greater than that for Task 3 within the Hi-P group. This is true for the 15-27 second point to the 1-27 second point.

The final significant interaction in this analysis was the Psychopathy X Socialization X Countdown interaction ($F(8, 224) = 2.41$, $p < .05$). Multiple comparisons of the means in this interaction revealed that the only group which showed significant increases along the countdown was the Hi-P/Hi-S group. Comparisons also revealed that the increase in HR was greater for the Hi-P/Hi-S group than that for any of the other groups at the 1-27 second point.

3.8 Analyses of SCR Data for the High, Medium and Low Psychopathy Experimental Cells

One of the hypotheses of this research was that the Psychopathy Checklist would sufficiently differentiate non-psychopathic and psychopathic subjects, indicating that the So scores were not required to "purify" groups. Therefore, the following sections are intended to reveal the efficacy of employing the Psychopathy Checklist scores alone as a

means of delimiting experimental groups. Analyses were run using High (Hi-P), Medium (Med-P) and Low Psychopathy (Lo-P) groups as experimental cells. The Hi-P group included subjects with Psychopathy Checklist scores of 27 and above. The Med-P group included subjects whose scores ranged from 18 to 26 while subjects in the Lo-P group had scores below 18. These cut-off scores are equivalent to those suggested by Wong (1984) and represent divisions of scores falling one standard deviation above or below the mean in his study. Such cut-offs are obviously more accurate than median-split scores for differentiating groups of psychopaths (Hi-P) and non-psychopaths (Lo-P).

Since the significant findings from the following analyses which do not directly involve psychopathy will be the same as the ones previously reported in the analysis of Psychopathy X Socialization groups, they will not be presented again here. The reader is, therefore, referred back to the previous sections for a presentation of these results.

3.8.1 Analyses for Raw SCR Activity

3.8.1.1 Resting SC Level

A 3 X 3 (Psychopathy X Task) repeated measures ANOVA was performed on Resting SC data. A significant main effect was found for Psychopathy, $F(2,29) = 4.80$, $p < .05$. The Source Table for this analysis is in Appendix Q. Newman-Keuls multiple comparisons of the means revealed that subjects in the Hi-P group had a lower resting level of SC ($M = 5.08$, $sd = 2.25$) than subjects in the Lo-P group ($M = 2.43$, $sd = 1.55$).

3.8.1.2 SCR During the Countdown

A 3 X 3 X 10 (Psychopathy X Task X Countdown) repeated measures ANOVA with tasks and countdowns as repeated measures was performed. The Source Table for this analysis is presented in Appendix S. A significant Psychopathy main effect was found, $F(2,28) = 2.93$, $p < .05$). Newman-Keuls multiple comparisons revealed that all of the means were significantly different from each other. The Hi-P group had the lowest level of SCR ($M = 3.01$, $sd = 2.46$), followed by

the Med-P group (M = 4.17, sd = 3.07), and the Lo-P group which had the highest level of SCR (M = 6.29, sd = 6.07). The results revealed a significant main effect for the Task factor, (F(2,56) = 3.26, p < .05). Mean cell comparisons revealed that the overall SCR in Task 1 (M = 4.90, sd = 3.01) was significantly greater than the overall SCR in Task 3 (M = 4.53, sd = 2.76). The overall SCR for Task 2 (M = 4.76, sd 3.11) was not significantly different from that in either Task 1 or Task 3. Finally, a significant main effect was also found for the Countdown factor, (F(9,252) = 2.19, p < .05). Mean cell comparisons revealed a significant increase in SCR along the countdown.

3.8.1.3 Peak SCR

A Psychopathy X Task ANOVA with repeated measures was performed on Peak SCR data. A significant main effect was found for Psychopathy, (F(2,27) = 5.24, p < .05). The Source Table for this analysis is presented in Appendix S. Multiple comparisons among means indicated that all of the means differed significantly from each other. The Peak level of SCR was lowest for the Hi-P group (M = 3.03, sd = 2.49), followed by the

Med-P group (M = 5.14, sd = 5.00) and the Lo-P group which had the greatest Peak level of SCR (M = 8.16, sd = 6.83).

3.8.2 Analyses of Range-Corrected SCR Data

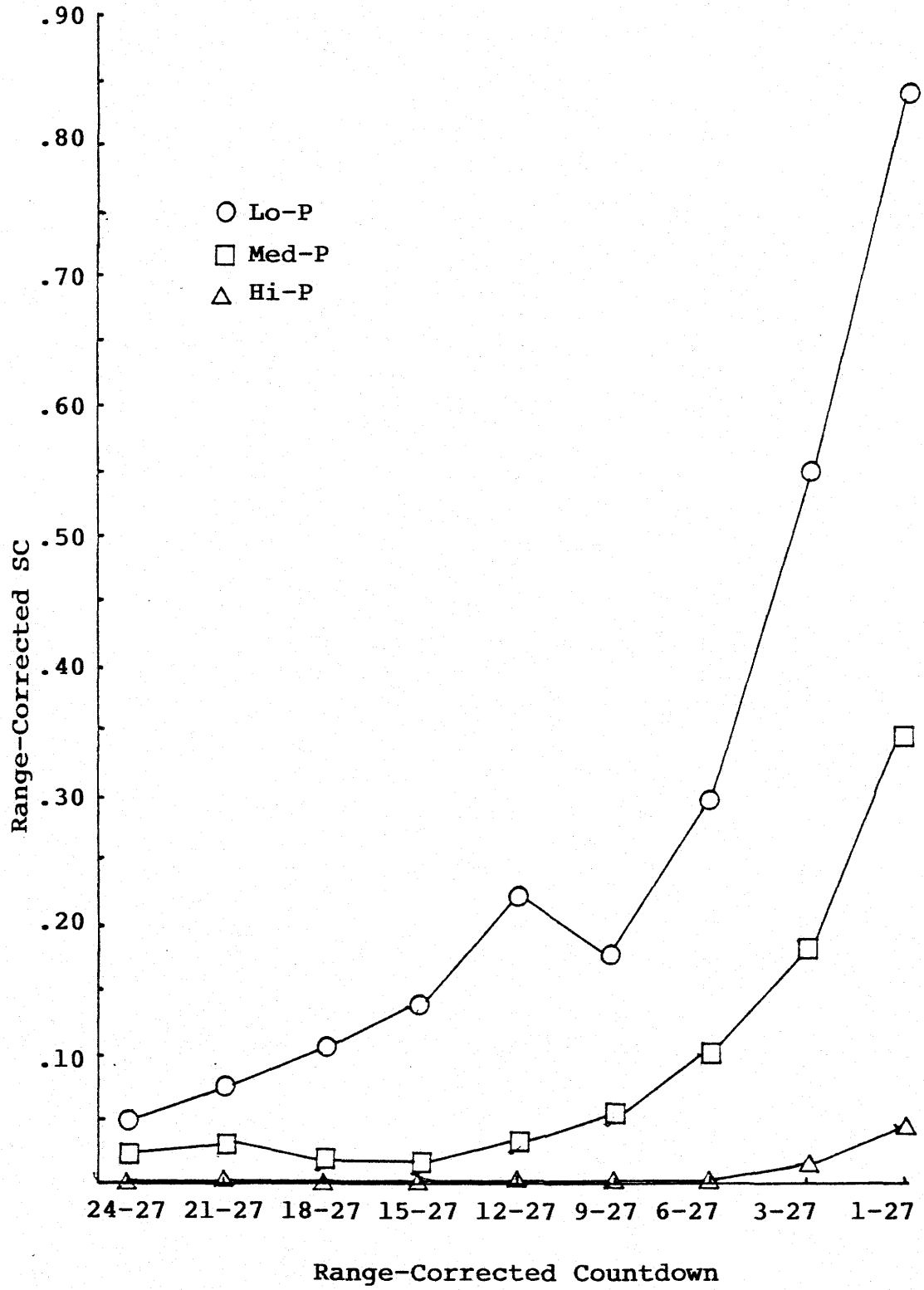
Just as before, analyses were performed to correct for the range of individual differences in SC among subjects across groups. This was done, once again, by using the range-corrected SC scores.

A Psychopathy X Task X Countdown (as a repeated measure factor) ANOVA was performed on the range corrected SC data. The Source Table for this analysis is presented in Appendix T. A significant Countdown main effect was also found, $F(9,252) = 4.69$, $p < .01$. The SCR increased significantly across the countdown.

A significant Psychopathy X Countdown interaction was revealed, $F(18,252) = 6.38$, $p < .01$. The means for this interaction are presented in Figure 7. Multiple comparisons among the means indicated that the level of SCR did not increase significantly along the countdown within the Hi-P group. The increase in SCR level along the countdown was significant within both the Lo-P and Med-P groups. The increase in level of SCR was

Figure 7

Psychopathy X Countdown Interaction



significantly greater for the Lo-P group than that for the Hi-P group from the 15-27 second point along the countdown to the 1-27 second point. The increase in level of SCR was significantly greater for the 3-27 and 1-27 second points for the Med-P group than that for the same points in the Hi-P group. The increase in level of SCR was significantly greater for subjects in the Lo-P group than for subjects in the Med-P group from the 15-27 second point through to the 1-27 second point.

3.9 Analysis of HR Data for the Psychopathy Experimental Cells

3.9.1 Analyses of Raw HR Data

3.9.1.1 Analysis of Resting HR

A Psychopathy X Task ANOVA was performed on Resting HR data. The results of this analysis revealed no significant differences ($p > .05$).

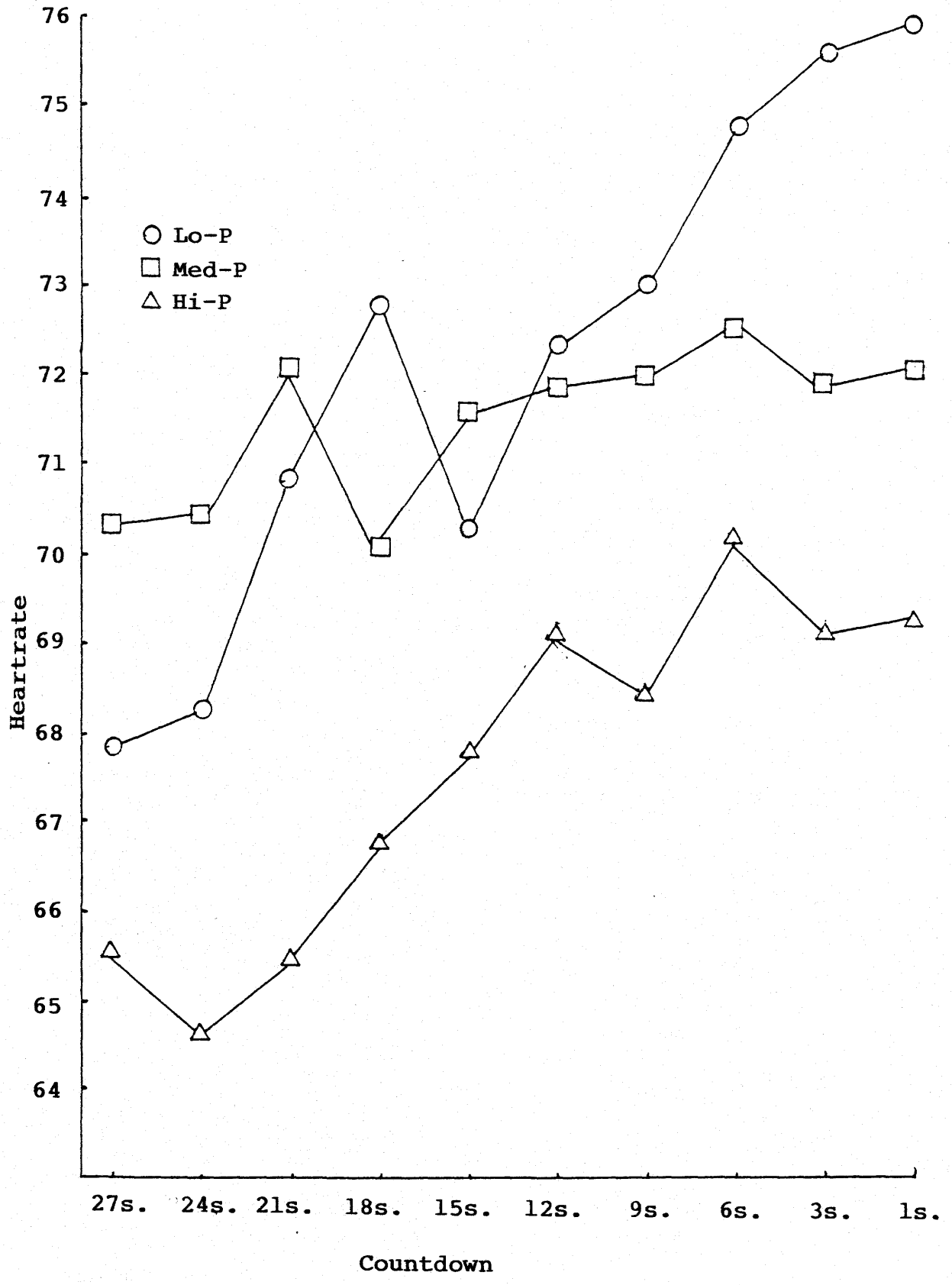
3.9.1.2 Analyses of HR Data During the Countdown

A 3 X 3 X 10 (Psychopathy X Task X Countdown) ANOVA with tasks and countdowns as repeated measures

was performed on the raw HR data. The Source Table for this analysis is presented in Appendix U. The analysis indicated a significant Countdown main effect, ($F(9,261) = 11.69$). Results revealed a significant Psychopathy X Countdown interaction, ($F(18,261) = 2.36$, $p < .01$). The means for this interaction are displayed in Figure 8. Multiple comparisons of the means indicated that the level of HR increased significantly along the countdown within all three Psychopathy groups. The level of HR was significantly greater for the Lo-P and Med-P groups than those for the Hi-P group throughout the countdown. The level of HR was also significantly greater for the Med-P group than for the Lo-P group at the 27 and 24 second points. The level of HR was significantly greater for the Lo-P group than for the Med-P group from the 6 second point to the 1 second point. Subjects in the Lo-P group had a significantly higher HR than subjects in the Hi-P group from the 27 second point to 21 second point and again from the 6 second point to the 1 second point.

Figure 8

Psychopathy X Countdown Interaction



3.9.1.3 Analysis of Peak HR Data

A Psychopathy X Task ANOVA was performed on Peak HR data. The Source Table for this analysis is displayed in Appendix V. A significant main effect was found for Psychopathy, $F(2,28) = 3.88$, $p < .05$. Multiple comparisons among means revealed that the Peak HR for subjects in the Lo-P ($M = 87.97$, $sd = 12.91$) and Med-P group ($M = 87.20$, $sd = 13.25$) were significantly greater than that of subjects in the Hi-P group ($M = 85.74$, $sd = 10.77$).

3.9.2 Analysis of Range-Corrected HR Data

Analyses were again performed to correct for the range of individual differences in HR among subjects across groups. This was done by subtracting the raw HR level obtained from the 27 second point from the raw HR level obtained at each countdown point.

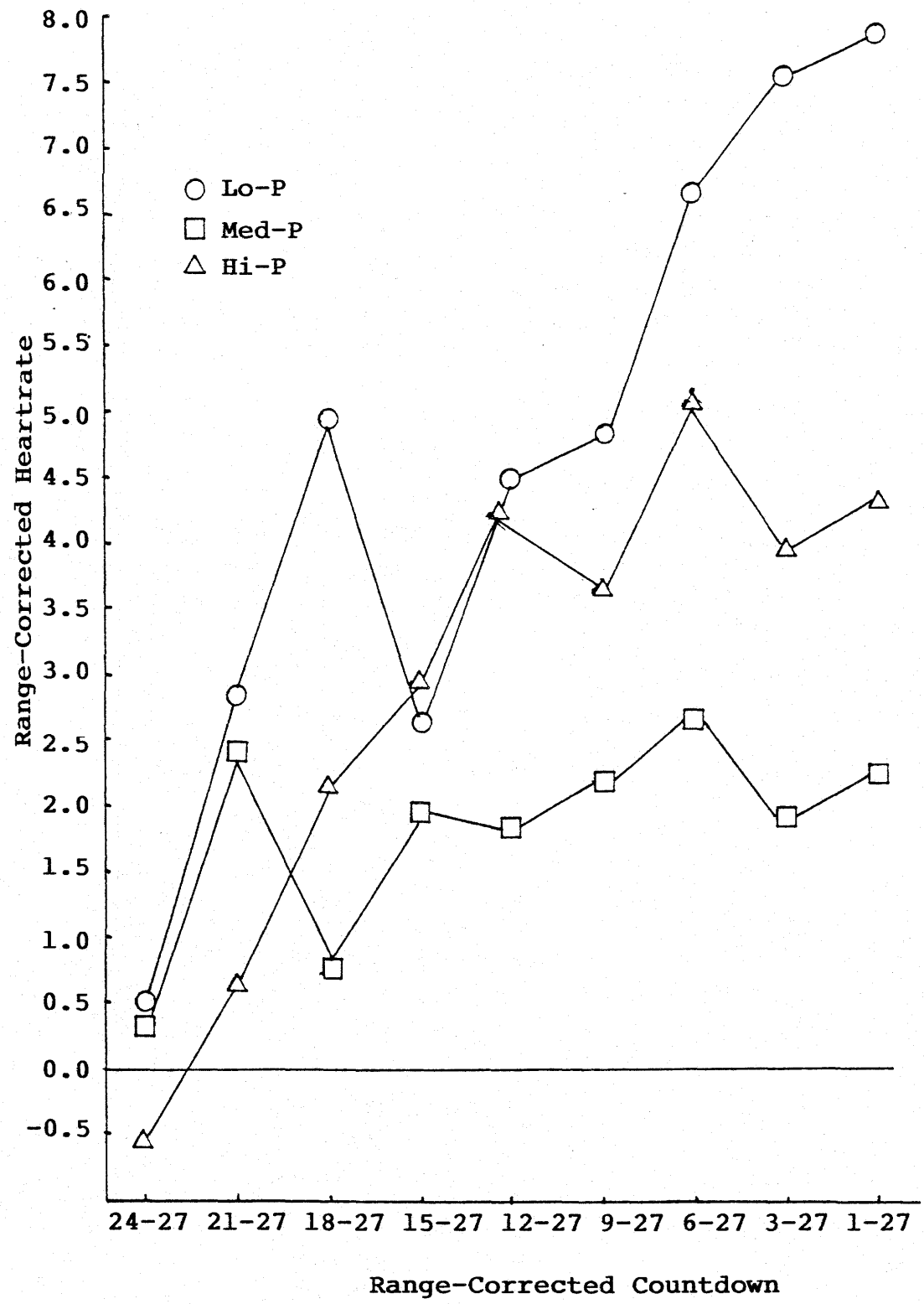
A Psychopathy X Task X Countdown repeated measures ANOVA was performed on the range corrected HR data. The Source Table for this analysis is presented in Appendix W. A significant Psychopathy main effect was found, ($F(2,28) = 5.25$, $sd < .05$). Cell mean

comparisons revealed that the overall range-corrected HR for the Lo-P group (M = 4.71, sd = 6.13) was significantly greater than that of the Med-P group (M = 1.76, sd = 5.43), but not the Hi-P group (M = 2.96, sd = 5.27). A significant main effect was found for the Countdown factor, (F(8,232) = 10.44, p < .0001). Cell mean comparisons revealed that the level of HR increased significantly along the countdown. A significant Psychopathy X Countdown interaction was found, (F(16,232) = 2.24, p < .01).

The means for this interaction are plotted in Figure 9. Comparisons of cell means demonstrated that the level of HR increased significantly along the countdown for subjects in the Lo-P and Hi-P groups, but this was not the case for subjects in the Med-H group. The level of increase in HR was greater from the 6-27 and 1-27 second points for subjects in the Lo-P group than for subjects in the Hi-P group. The level of increase in HR in the Lo-P group was greater than that for subjects in the Med-P group at the 18-27 second point and from the 12-27 second point to the 1-27 second point.

Figure 9

Psychopathy X Countdown Interaction



4. DISCUSSION

4.1 Discussion of Replication Results

One purpose for completing this experiment was to replicate findings reported by Hare, Frazelle & Cox (1978). A number of methodological variations were added to the present study in order to clarify and further understand the implications of the Hare et al. results. Subjects were grouped on the basis of their Psychopathy Checklist (Hare, 1985b) and Socialization (So) scale scores, rather than the global ratings and So scores employed in the Hare et al. study. This was done to determine whether the necessity to use So scores to "purify" psychopathy groups in the Hare et al. study reflected a deficiency in their global ratings.

The differences in SCR obtained between psychopaths and non-psychopaths in the present study appeared quite remarkable. The raw SCR data revealed striking differences among psychopathy groups. These differences were exactly as predicted both from the discussion of previous literature, and the hypotheses

presented earlier. However, the differences obtained in the present study revealed even stronger differences between psychopaths and non-psychopaths than those reported in earlier studies. It would appear that the reason for this is the subject selection procedure employed in the present study. The Psychopathy Checklist appears to have compensated for many of the deficiencies of previous approaches to diagnosing psychopathy.

While the Psychopathy Checklist scores were effective for subject selection, the results of the present study indicated that the So scores contributed relatively little to subject selection. The results obtained for analyses of high, medium and low psychopathy groups were very consistent with those obtained when So scores were included for subject selection. This indicated that the employment of So scores for subject selection was not essential in order to replicate the findings of earlier studies (Hare & Craigen, 1974; Hare et al., 1978). Thus, the Psychopathy Checklist appears to be a substantially more efficacious method for diagnosising psychopathy than the global rating scale employed in other studies

(Hare & Craigen, 1974; Hare et al., 1978). The So scores apparently need no longer be combined with psychopathy scores in order to "purify" groups in order to obtain the well-established psychophysiological response differences between psychopaths and non-psychopaths.

Since increased So scores seem to be indicative of subjects' social compliance, these scores are inversely correlated with psychopathy. The correlation coefficient between Psychopathy Checklist scores and So scores in the present study (r = -.44) supports this moderate inverse relationship. Therefore, one might assume that subjects in the Hi-P/Lo-S groups were the "most psychopathic" of all groups since they appear to have the highest level of psychopathy with the lowest level of social compliance. Likewise, those subjects in the Lo-P/Hi-S group might be expected to be the "least psychopathic" since they appear to have the lowest levels of psychopathy and the highest levels of social compliance. However, the psychophysiological results of this study suggest that the most and least psychopathic groups were the Hi-P/Hi-S and Lo-P/Lo-S

groups respectively. This finding is contrary to that obtained by Hare et al.

The results of the present study, however, indicate that the psychophysiological responses of subjects with respect to Psychopathy Checklist scores alone were completely in accordance with the Hare et al. findings. That is, the Hi-P group displayed the lowest SCR and a pattern of increases in HR similar to that reported by previous researchers (Hare & Craigen, 1974; Hare et al., 1978). However, the psychophysiological responses of subjects with respect to So scores were the opposite of those found by Hare et al. In the present study, those subjects in the Hi-S group (who were presumably the least psychopathic) showed lower levels of SCR than subjects in the Lo-S group (who were presumably the most psychopathic). While the SCR of subjects grouped according to their So scores was the opposite of that expected, no meaningful differences in HR were found between Hi-S and Lo-S groups.

These results are difficult to explain. However, the finding that subjects in the Hi-P/Hi-S group obtained significantly higher mean Raven's Progressive Matrices scores (80th percentile) than subjects in the

Lo-P/Lo-S group (39th percentile) may provide some insight. The Raven's scores are considered to be indicative of subjects' nonverbal intelligence (Raven, 1956). Therefore, subjects in the Hi-P/Hi-S group apparently had the highest levels of intelligence and the lowest levels of SCR while subjects in the Lo-P/Lo-S group apparently had the lowest levels of intelligence and the highest levels of SCR.

Those subjects with higher levels of intelligence may have been better able to relax and cope with the aversive stimulus during the experimental procedure. Indeed, Bandura (1969) and Meichenbaum (1974) have emphasized that the aquisition of coping skills in humans is a complex, centrally-mediated process. Therefore, subjects with higher levels of intelligence may develop and employ a more complex, and effective, coping system than subjects with lower levels of intelligence. Alternatively, subjects who are both psychopathic and intelligent may be prone to, and more capable of, dissimulating on self-report measures such as the So scale. Clearly, such explanations are highly tenuous at this time and further research is required to address this issue to determine whether these

results occurred by chance or whether they are meaningful.

The second hypothesis regarding the replication aspects of this study predicated that the pattern and magnitude of HR increases in the present study would be similar to those found in the earlier studies (Hare & Craigen, 1974; Hare et al., 1978). The results indicated that the pattern and magnitude of increases in HR for the Hi-P groups (in both analyses including and analyses excluding So scores) closely approximate those obtained in the previous studies (Hare & Craigen, 1974; Hare et al., 1978). However, the increase observed in the present study was more gradual across time than that which occurred in the previous studies. This difference can be explained by the longer countdown period employed in the present study. It seems reasonable to assume that, if an increase in HR is indicative of a coping response, and subjects are given a longer time to respond, they will have no need to respond as quickly. Therefore, one might expect subjects' response patterns to be more gradual in this study than that of subjects given a shorter time period in which to respond. Since the pattern and magnitude

of HR increases displayed by psychopaths in this study were similar to those found by Hare et al. (1978) and Hare and Craigen (1974), the present HR results appear to be reliable. We may conclude that these results are not due to any properties of the onset of the countdown but, rather, are related to the duration of the time preceding stimulus presentation.

4.2 Discussion of the Results of the Test of the Coping Response

This section will begin with a discussion of each of the hypotheses specifically related to components of the hypothesized coping response. These components will also be integrated in order to determine whether evidence generally exists to support a coping response hypothesis.

The first hypothesis for this section indicated that the tonic level of SC would be lower for subjects in the non-psychopathic group as compared to subjects in the psychopathic group. The results supported this hypothesis. The present data indicate that psychopaths have a lower level of arousal, as measured by their low level of tonic SC, than do non-psychopaths. As

discussed by Hare (1978) and Szpiler and Epstein (1976), increases in SCR are likely indicative of an increase in the subjective level of anxiety. Therefore, the psychopathic subjects would appear to have had a lower level of anxiety than the non-psychopathic subjects during the resting period in this study.

The second relevant hypothesis stated that the SCR would increase across the countdown for all subjects. The results tend to substantiate this hypothesis. However, while the increases in SC for subjects in the Lo-P group were significant across the countdown in most cases, rarely were the increases in SC along the countdown significant for subjects in the Hi-P group. Nevertheless, these data support the hypothesis since they indicate that the psychopaths' SCR was even lower than had been expected.

These results also substantiate the third hypothesis that the increase in SCR for subjects in the non-psychopathic group would be greater than for subjects in the psychopathic group. These data strongly suggest that the subjects in the Hi-P group

showed lower levels of anxiety to the pending stimulus presentation than did subjects in the Lo-P group.

The fourth hypothesis stated that the increase in SCR would be lower for both non-psychopaths and psychopaths when given the option of preventing tone onset than when the tone presentation was mandatory. This hypothesis was not completely substantiated. Instead, subjects in the Hi-P group did not show any differences in SCR between Task 1 (mandatory tone) and Task 3 (optional tone prevention). This appears to have occurred due to a floor effect on their SCR. That is, since there was no increase in SCR in any of the tasks, no differences between tasks could be expected. Again, while a floor effect was not expected, this finding further suggests that psychopaths have a much lower level of anticipatory anxiety than non-psychopaths. The hypothesis was, however, directly substantiated for subjects in the Lo-P group. These subjects showed greater levels of SCR along the countdown in Task 1 than in Task 3. The overall results for this hypothesis indicate that the psychopaths had equally low level of SCR across tasks while non-psychopaths had lower levels of SCR when they

were given the option of preventing the tone than when the tone onset was mandatory.

These findings seem reasonable in that one would expect a procedure allowing the individual an option to avoid an aversive stimulus would be less anxiety-arousing than a procedure in which the individual has no choice but to confront the aversive stimulus. However, since psychopaths do not display arousal to the aversive tone, one would not expect them to become any less aroused when they are given the option of avoiding the stimulus.

Results from the present study did not support the fifth and sixth hypotheses. As the fifth hypothesis indicated, the electrodermal recovery time was expected to be longer for psychopaths than non-psychopaths in the mandatory tone condition. However, no differences occurred in recovery half-time among the tasks. In fact, the electrodermal recovery half-time, collapsed across tasks, was shorter for subjects in the Hi-P group than that for subjects in the Lo-P group. The sixth hypothesis suggested that the electrodermal recovery time would not differ between psychopaths and non-psychopaths in the optional tone prevention task.

The present results may be related to the floor effect of the SCR in the Hi-P group. Since there was very limited increase in SC, there was no recovery required.

The seventh hypothesis stated that the tonic HR would not differ across subject groups. This hypothesis was supported, and no differences in tonic HR were found among groups of subjects. These data are consistent with previous research discussed earlier and suggest that the base HR does not differ between psychopaths and non-psychopaths.

The results also support the eighth hypothesis. Specifically, the increases in HR in the Hi-P group were greater in the mandatory tone task than in the optional tone prevention task. This lends support to the suggestion that an increase in HR demonstrated by psychopaths in anticipation of an aversive stimulus is indicative of a coping response. This suggestion seems accurate given that the HR of the psychopaths increased when they were anticipating the mandatory tone presentation while there was no significant increase in HR when they were able to press the button and avoid hearing the tone. As predicted, once the psychopaths were able to avoid an aversive stimulus by means of an

external method, there was apparently no need for them to cope internally.

The data to examine the ninth hypothesis are not as clear. This hypothesis stated that psychopaths would display greater increases in HR across the countdown than the non-psychopaths in the mandatory tone task. The results from the analysis of groups delimited by psychopathy and socialization scores supported this hypothesis. That is, the increases in HR for the Hi-P group were greater than those for the Lo-P group. However, the results from the analysis using High, Medium and Low psychopathy groups did not substantiate this hypothesis. In this case, the psychopathy X task X countdown interaction was not significant, indicating that the HR of psychopathic and non-psychopathic subjects did not differ significantly from each other along countdown and across tasks. Furthermore, in this analysis, the Lo-P group displayed slightly higher increases in HR than did the Hi-P group, which is contrary to the present hypothesis.

Interestingly, while the analyses for groups of subjects delimited by psychopathy and socialization scores were supportive of the hypothesis, the

significant interactions of concern did not include the So scores. Therefore, the differences in results between the two analyses appear to be a result of the group selections based purely on Psychopathy Checklist scores. Groups of psychopaths and non-psychopaths were delimited by a median split of Psychopathy Checklist scores in the first analysis, while subjects in the second analysis were divided into three groups, based upon divisions suggested in other studies (Wong, 1984). The discrepancy in results between the two analyses may be a result of a Type II error due to the low number of subjects in high (N=7) and low (N=12) psychopathy groups used in the second analysis. This seems true given that the expected results were obtained when the same data were analyzed by a median split of Psychopathy Checklist scores.

While it seems clear that some of the results generally tend to support this hypothesis, the equivocality of these results must be addressed in future research projects by increasing the number of subjects in psychopathy groups.

Finally, in support of this hypothesis, the increase in HR for Task 3 was actually greater than in

Task 1 for part of the coutdown for subjects in the Lo-P group (see Figure 6, p. 112). This is clearly the opposite of what occurred within the Hi-P group. Thus, while subjects in the Lo-P group displayed some increases in HR, those increases remained similar whether or not they were given the option of preventing the onset of the aversive stimulus. Also, as previously mentioned, some of the results were acually opposite between the Hi-P and Lo-P groups. Accordingly, the theoretical implications for increases in HR displayed by non-psychopaths may not be the same as the implications for HR increases in psychopaths.

In order to explain the possible theoretical differences between the HR patterns of psychopaths and non-psychopaths, some discussion of the divisions of the autonomic nervous system (ANS) is necessary. The ANS is divided into two, largely antagonistic, systems. The first division, the sympathetic nervous system (SNS) is thought to mobilize the resources of the body for use when special demands are placed upon the organism. Conversely, the other division, the parasympathetic nervous system (PNS) seems to conserve and store bodily resources. These divisions tend to be

somewhat general, since the two systems never act completely independently of each other. The SNS tends to act more diffusely as a whole and is thought of as regulating bodily functions during emergency situations. One of the functions of sympathetic activity apparently is to increase the heart rate in order to help prepare the body to deal with an emergency situation. The second division of the ANS, the PNS, is seen as a more highly differentiated system, more capable of independent activity in each of its parts. In contrast to the SNS, the functions of the PNS seem to be fairly specific and, as said above, are thought to be related to conservation of bodily resources.

Skin conductance activity is regulated by the SNS while cardiac activity is regulated by both the SNS and PNS (Grossman, 1967; Hare, 1970; Sternbach, 1965). Thus, increased SC occurs as a result of diffuse activation of the organism, while increased HR may be indicative of either a diffuse or specific activity. According to Hare (1970), the increase in HR demonstrated by psychopaths and non-psychopaths is not qualitatively equivalent and could be the result of

regulation by the PNS and SNS respectively. That is, the increase in HR exhibited by the psychopaths in Task 1, but not Task 3, may be the result of specific differential regulation by the PNS in order to maintain the body at a relatively stable level while being confronted by an aversive stimulus. This seems valid since the psychopaths did display a slight increase in SCR in Task 1. Indeed, this pattern of showing an increase in HR in anticipation of an aversive stimulus, accompanied by a very slight increase in SCR may well be indicative of a successful coping response regulated by the PNS. Thus, as a result of a successful coping response, psychopaths exhibit lower levels of anxiety both during anticipation of the aversive stimulus and following presentation of it. However, in the present situation when psychopaths were able to prevent an aversive stimulus by simply pressing a button, there was no need for them to employ a coping response. Accordingly, as demonstrated by the present results with Task 3, pscyhopaths' levels of HR may be stable in non-threatening situations while it may increase in threatening situations, such as that found in Task 1.

Conversely, the non-psychopaths did not exhibit differential HR responding between Task 1 and 3. However, they did show substantial increases in SCR both in anticipation of and following the onset of the tone. Therefore, increases in HR and SCR manifested by non-psychopaths may be the result of more diffuse physiological activation regulated by the SNS.

In general, while non-psychopaths may show some diffuse increases in HR, such increases may be the result of a different regulatory process than those, more consistent ones, displayed by psychopaths. The increases in HR displayed by psychopaths in Task 1 but not Task 3 lend further support for the hypothesis that psychopaths have a more effective coping response.

The results support the tenth hypothesis since the increases in HR did not differ significantly between the groups in the optional tone prevention task. As already discussed, these data also lend support to the hypothesis that the increases in HR accompanied by very slight increases in SC shown by psychopaths are related to an efficient coping response.

The results obtained in this study did not support the final hypothesis. This hypothesis predicted that

the psychopathic subjects, as compared to the non-psychopathic subjects, would rate the aversive tone as being less intense. This did not occur; indeed, no differences were realized across groups concerning this dependent measure. At first glance, these results may seem to dispute the hypothesis that psychopaths display a better coping defense. However, the scale used to measure subjects' perceptions of the tone's aversiveness may not have been a valid measure. The scale simply asked subjects to rate tone intensity. While the psychopaths' and non-psychopaths' ratings of tone intensity did not differ, there is no way to determine whether the subjective level of tone aversiveness actually differed. Certainly, the psychopaths may have perceived the tone as quite intense; however, they may not have thought it was aversive while the non-psychopaths may have perceived the tone as being both quite intense and quite aversive. Since the scale did not ask for subjects' perceptions of tone aversiveness, no firm conclusions can be drawn regarding this hypothesis. Future researchers should attempt to specifically assess subjects' perceptions of tone aversiveness to

investigate whether psychopaths rate the stimulus as less aversive than non-psychopaths do.

4.3 Clarification and Implications of Task 2

The results obtained for Task 2 were of particular interest. This task was included to determine the level of arousal subjects displayed to the motor task of pressing the button. In this task, subjects were explicitly told that they would not hear the tone, and that their only task was to press the button immediately following the countdown. The intention was to use the results from this task to account for the proportion of variance in Task 3 that might be due to the motor behaviour of pressing the button. However, the results for Task 2 appear inconsistent and difficult to explain. In some cases, the level of arousal created by Task 2 was even higher than that created by Task 1 where subjects received a mandatory tone.

During debriefing, subjects were asked for their reactions to the experimental tasks. Many reported that Task 2 was somewhat ambiguous since they did not know what to expect. In Task 1, subjects were told

that they would receive the tone, and in Task 3, they knew they would have the option of preventing the tone. However, in Task 2, the contingencies were not clear to them. Several subjects mentioned that they thought they were being "tricked" or deceived in Task 2, and that they were actually going to receive the tone. Other subjects stated that they thought they were being tested to see how quickly they could press the button. Thus, the inconsistent patterns of arousal resulting from Task 2 may be related to cognitive variables which cannot be clarified from the information available in this study. Nevertheless, the subjects' comments may provide some insight into the nature of the cognitive variables.

In trying to explain the inconsistencies seen in the subjects' responses to Task 2, an interesting question occurred to the author: What would the subjects' psychophysiological responses be in a countdown situation alone? In other words, how much of the psychophysiological activity displayed by the subjects was due to the procedural demands of the countdown, per se? After they had been resting quietly in a quiet, darkened, room for several minutes, the

countdown itself may have been somewhat startling to the subjects. In order to fully understand the nature of the responses elicited by studies of this nature, research to investigate the specific properties of the procedures clearly needs to be done.

4.4 Conclusions

The overall results from this study indicate that reliable differences in psychophysiological responding may be found in comparing psychopaths and non-psychopaths. Psychopaths appear to have an overall lower level of SC, which corresponds to the contention that they are generally less anxious than non-psychopaths are. Given the larger and more distinct differences in psychophysiological responding found between psychopathy groups in the present study compared to earlier ones, the Psychopathy Checklist appears to a valid method to use in differentiating groups of psychopaths and non-psychopaths. The Psychopathy Checklist appears to have compensated for the deficiencies of global rating scales in delimiting groups of psychopathic and non-psychopathic subjects.

Therefore, the So scale is probably no longer required to "purify" groups of psychopaths and non-psychopaths.

The present results provide some evidence to indicate that the differences between groups delimited by So scores in this study compared with a previous study (Hare et al., 1978) may be, in part, due to differences in levels of intelligence found between these groups. Future research projects should attempt to clarify this point in order to determine whether intelligence may be a possible confound in psychophysiological studies of psychopathy. Future research should also attempt to further investigate the psychophysiological responsivity associated with the specific procedural demands of the countdown employed in this and other studies.

Since psychopathic subjects in the present study did not show marked increases in SCR in anticipation of the stimulus or during stimulus presentation, their recovery times could not be accurately assessed. In order to do this, future studies may need to employ a different stimulus than that used here.

The results as discussed previously lend considerable support to the hypothesis that psychopaths

display an effective coping response in anticipation of an aversive stimulus. Specifically, the pattern of increased HR accompanied by small increases in SCR shown by psychopaths in other studies was also found in the present study. The fact that the psychopaths did not display their typical increase in HR when the need for internal coping was removed, provides strong support to the hypothesis that psychopaths display efficient coping responses. Unlike the psychopaths, the non-psychopaths tended to display more diffuse increases in HR in both threatening and relatively non-threatening situations. The information discussed concerning the ANS indicates that the differences in responding between psychopaths and non-psychopaths may occur as a result of primary regulation by the PNS and SNS respectively.

Thus, the physiological response pattern displayed by non-psychopaths appears to be a diffuse SNS reaction to an aversive stimulus whereas, the pattern displayed by psychopaths appears to result from specific PNS responding which allows psychopaths to cope effectively with the threat of an aversive stimulus. Accordingly, the psychopath remains calm and conserves bodily

energy, while the non-psychopath becomes anxious and begins to deplete bodily resources when confronting aversive stimuli. As articulated by Hare (1978), the pattern of responding displayed by non-psychopaths appears to be indicative of a diffuse activation or orienting response, while the psychopaths' response pattern is the result of active attempts to cope with an impending stressor.

Since psychopaths appear to react with low levels of anxiety to threatening stimuli, the suggestion that this may explain their increased levels of involvement in violent and aggressive crimes seems reasonable. Human behaviour tends to be regulated, to a large extent, by the value systems an individual has internalized and the anxiety experienced. Humans tend to avoid behaving in ways that increase their levels of anxiety. We humans are not likely to perform acts not in accordance with our value systems because such behaviours would cause us to become anxious. Likewise, we will avoid situations in which the consequences may be particularly aversive, due to the anticipatory anxiety we experience in these situations. Psychopaths, however, seem to experience lower levels

of emotion and anxiety and accordingly, may be more likely to participate in activities which would cause other people to develop intense feelings of anxiety. Psychopaths may not be as capable of regulating their activities as other people without the benefits of anticipatory anxiety. As a result, their behaviour appears more impulsive or inappropriate and often results in their becoming incarcerated.

It may be important to emphasize that the behaviour of psychopaths may also be influenced by an attenuation of other emotions. As indicated by the common characteristics of psychopathy, psychopaths tend to show a lack of affect in general. Psychopaths seem to not express, or feel, any substantial emotion. Perhaps then, just as their behaviours are unfortunately not regulated by anxiety, they are also not fortunate enough to be motivated by the positive emotions that most humans feel: Emotions such as love, contentment, self-satisfaction and happiness. Thus, one should not assume that the ability the psychopath appears to have in attenuating anxiety is a necessarily desirable quality.

Since the behaviour of psychopaths appears to be, at least in part, due to their ability to cope with impending stressors, one might wonder whether the psychopath would still display inappropriate behaviour and affect if he or she could stop the coping process. In an attempt to test this out, a psychopath, who seemed motivated to try and experience emotions, was given biofeedback for his SCR during the countdown procedure employed in this study.[1] His task was to try and increase his level of SCR, by imagining the situation as being as aversive as possible. While the subject left the institution before a second session could be held, in the one session, he was able to display a voluntary increase in SCR. This information implies that the defensive coping response shown by psychopaths may be put under voluntary control since this man was apparently able to reverse the coping process to some extent. While this suggestion is entirely speculative, it may provide some foundation for future research.

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1. This was done by the author and his supervisor, Dr. Stephen Wong.

Clearly, the line of research pursued in this thesis provides theoretically meaningful results. Justas clearly, however, future research is needed in line with the suggestions made earlier. Since the psychophysiological differences found in previous studies and elaborated herein appear reliable, it may be productive to carry out research involving a large variety of realistic stimuli in a variety of situations to test the generalizability of these findings to everyday situations. As well, the cognitive variables associated with subjects' responding should be the focus of other work in order to try and more clearly understand the basis of research findings such as those presented here. When specifically asked to describe how they felt and what they were thinking during the countdown in Task 1 in this study, psychopathic subjects tended to say that they were "preparing" for the tone since they knew it was coming while non-psychopathic subjects generally said that they felt "helpless" since they knew that they would be presented with the tone and there was no way that they could prevent it. Controlled studies investigating cognitions such as these over a range of situations employing more realistic stimuli and situations may at last put our understanding of psychopathy on a detailed and comprehensive foundation.

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Appendix A

Handedness Inventory (Briggs and Nebes, 1975)

Indicate Hand Preference	Always Left	Usually Left	No Preference	Usually Right	Always Right
1. To write a letter legibly.					
2. To throw a ball to hit a target.					
3. To play a game requiring a raquet.					
4. At the top of a broom.					
5. At the top of a shovel.					
6. To hold a match to light it.					
7. To hold scissors to cut paper.					
8. To hold thread to guide through the eye of a needle.					
9. To deal playing cards.					
10. To hammer a nail into wood.					
11. To hold a tooth-brush while brushing.					
12. To unscrew the lid of a jar.					

Appendix B

CPI Socialization (So) Scale

Name: _____ Date: _____

INSTRUCTIONS: This is NOT a test, and there are no right or wrong answers as such. We are interested in your present feelings. Please circle your honest response, either TRUE (T) or FALSE (F), beside each of the following items.

1. I often feel that I made a wrong choice in my occupation.
2. When I was going to school I played hooky quite often.
3. I think Lincoln was greater than Washington.
4. I would do almost anything on a dare.
5. With things going as they are, it's pretty hard to keep up hope of amounting to something.
6. I think I am stricter about right and wrong than most people.
7. I am somewhat afraid of the dark.
8. I hardly ever get excited or thrilled.
9. My parents have often disapproved of my friends.
10. My home life was always happy.
11. I often act on the spur of the moment without stopping to think.
12. My parents have generally let me make my own decisions.
13. I would rather go without something than ask for a favor.
14. I have had more than my share of things to worry about.
15. When I meet a stranger I often think that he is better than I am.

16. Before I do something I try to consider how my friends will react to it.

17. I have never been in trouble with the law.

18. In school I was sometimes sent to the principal for cutting up.

19. I keep out of trouble at all costs.

20. Most of the time I feel happy.

21. I often feel as though I have done something wrong or wicked

22. It is hard for me to act natural when I am with new people.

23. I have often gone against my parents' wishes.

24. I often think about how I look ans what impression I am making upon others.

25. I have never done any heavy drinking.

26. I find it easy to "drop" or "break up with" a friend.

27. I get nervous when I have to ask someone for a job.

28. Sometimes I used to feel that I would like to leave home.

29. I never worry about my looks.

30. I have been in trouble one or more times because of my sex behavior.

31. I go out of my way to meet trouble rather than to escape it.

32. My home life was always very pleasant.

33. I seem to do things that I regret more often than other people do.

34. My table manners are not quite as good at home as when I am out in company.

35. It is pretty easy for people to win arguments with me.

36. I know who is responsible for most of my troubles.

37. I get pretty discouraged with the law when a smart lawyer gets a criminal free.

38. I have used alcohol excessively.

39. Even when I have gotten into trouble I was usually trying to do the right thing.

40. It is vey improtant to me to have enough friends and a good social life.

41. I sometimes wanted to run away from home.

42. Life usually hands me a pretty raw deal.

43. People often talk about me behind my back.

44. I would never play cards with a stranger.

45. I don't think I am quite as happy as others seem to be.

46. I used to steal sometimes when I was a youngster.

47. My home as a child was less peaceful and quiet than most other peoples.

48. Even the idea of giving a talk in public makes me afraid.

49. As a youngster in school I used to give the teachers lots of trouble.

50. If the pay was right I would like to travel with a circus or carnival.

51. I neveer cared much for school.

52. The members of my family were always very close to each other.

53. My parents never really understood me.

54. A person is better off if he doesn't trust anyone.

Appendix C

Psychopathy Checklist Interview Format

(Adapted from Serin, 1984)

Name: _____ FPS # _____

Date: _____

Age: _____

Current Offense(s): _____

_____

Length of term: _____ When did term begin? _____

To begin, I would like to ask some questions about your background.

12. Early Behavioural Problems

As a child, before you were 12 years old, did you have major difficulties at home or at school? YES NO

If yes, can you share a little bit of them with me?

Were you ever removed from home as a result of these problems?

Were you seen by a psychologist, psychiatrist or social worker for these problems?

Were you a very active child? Were you ever diagnosed as being hyperactive?

18. Juvenile Delinquency

Were you ever in trouble with the law prior to the age of 15? YES NO If yes, please tell me a bit about what you did.

Did you go to juvenile court as a result? If so, what were you charged with. Were you found guilty?

3. Need for stimulation/proneness to boredom.

Do you get bored easily? Have you always become bored easily?

How far did you go in school/job taining?

What sort of jobs have you held?

Approximate number of positions held?

Longest time in any one job?

Do you like ot be on the go all of the time or do you prefer to be less active?

Do you generally work at something for a long period of time or do you tend to jump from one thing to another?

13. Lack of realistic, long-term goals.

What kind of job would you like to pursue when you get out of prison?

When you are on the street do you tend to plan your time or live day by day?

14. Impulsivity

Do you tend to plan things or do themon the spur of the moment?

Have you quit jobs in the past without another job to go to?

Have your criminal offences been premeditated or spontaneous?

16. Failure to accept responsibility for own actions.

In general, what factors do you feel have been responsible for your own involvement in criminal behaviour?

What factors will help keep you out of trouble in the future?

Can you describe your current offense to me? [This is helpful for determining whether there are inconsistencies between the file and the individual's own report].

6. Lack of remorse or guilt.

What are your feelings toward the vicitm (if there was one)?

If remorseful: Have you attempted to do anything to apologize or make it up to the person?

How did your own family react when they found out about this?

Do you feel that your sentence is a "fair" one? If not, why not?

19. Revocation of conditional release.

Have you ever received day parole, probartion or a temporary abscence?

Did you honour them?

Have you ever been charged with "fail to appear", "breach of recognizance" or "jumping bail"?

10. Poor behavioural controls.

Do you tend to take offense easily? For instance, do you get very angry for very little things?

Do you take things personally?

How often in a week would you

a) get angry

b) have outbursts

As an adult (age 16 or over) have you ever been so angry that you have "blown-up"?

9. Parasitic lifestyle

When you are on the street how do you support yourself?

Does anyone else assist you in terms of lodging, food, money?

Ever been on welfare or UIC? If yes, how often and for how long?

17. Many short-term marital relationships.

Have you ever been married or lived in a common-law relationship? If so, how often and duration or each:

15. Irresponsibility

When you are on the street, are you late to work, or absent from work often?

Do you have any children? How many _____? Ages: Grades:

Do you support them financially?

Have you ever had problems with your credit rating?

Has anyone ever described you as irresponsible?

Do you feel that you are irresponsible?

11. Promiscuous sexual behaviour.

While you were either living with one person did you ever have affairs with anyone else?

Have you been very sexually active?

Did you ever maintain more than one such relationship at a time?

Have you ever been involved in bisexuality or any other form of sex which may be considered unusual?

4. Pathological lying.

Have you ever been convicted of fraud, forgery, false pretenses, impersonation, perjury, etc.? YES NO

If yes, how many?

Have you ever used an alias? [Is this consistent with his file?]

Do you think that you would find it easy or difficult to tell a lie if it was in your own best interest?

5. Conning/Manipulative

[Did you feel that the individual was trying to manipulate you during the interview?] YES NO

Have other people ever described you as a hustler or a manipulator?

Do you feel that you are conning or manipulative?

7. Shallow affect.

[How emotional did the individual become during the interview?]

Do you ever put on a show of feelings because others expect it, even though you do not feel that way?

8. Callous/lack of empathy?

[Has the individual made contemptuous or indifferent comments about others during the interview?]

Are you patient and tolerant with other people?

Are there some things that bother you about people in general?

Do you feel that your expectations of others tend to create problems? For example, do you ever expect too much of others?

2. Grandiose sense of self worth?

What are your feelings toward the future? Are things going to work out all right for you?

What are your future goals?

Are you concerned that your criminal history may prevent you from accomplishing your goals?

[In interview was he self assured/confident? _____
superior/cocky? _____

---

1. Glibness/superficial charm

[Did the individual present as a verbally fluid person who is not too sincere?]

[Was he witty or amusing and did he get "off track" often and tell rather unbelievable stories?]

20. Criminal versatility.

Number of categories under which the individual committed crimes: _____

Appendix D

Informed Consent Form

Physiological Arousal Study

This is to certify that I have volunteered to participate in a research project to study my physiological response to a loud tone. I understand that my heart rate and skin conductance will be measured while I listen to a number of loud tones which last for one second each. I also had the opportunity to listen to the tone before volunteering for the study. I realize that my decision to participate in this study, or withdraw from it at any time, will not affect myh assessment or treatment at the RPC in any way. Also, I am aware that all of the results from this study will be kept confidential and will not be discussed with any memebers of the treatment staff. I agree that the results from the study may be published only if I am not identified in any way.

If I have any future concerns about the study, I understand that I can direct them to Jim Ogloff in the Psychology/Research Department or to Dr. A. Gordon, Chief of Psychology/Research.

I HAVE READ THE ABOVE INFORMATION AND WAS GIVEN THE OPPORTUNITY TO HAVE ALL OF MY QUESTIONS ANSWERED. I CONSENT TO PARTICIPATE IN THE STUDY.

---------- ----------

DATE SIGNED

WITNESS

Appendix E

Procedure Instructions

1. General Instructions

You are going to hear a series of tones during this study. The whole study is divided into three sections, each of which will have slightly different instructions. I will tell you the specific instructions before we begin each section. All of the tones you will hear during the study, or anything else I will ask you to do, will be preceded by a count-down from nine to zero. As I told you before you agreed to volunteer, the tones are very loud, but will not cause any damage to you.

(attach the electrodes and heart rate monitor to the subject)

Now, we are almost ready to begin with the first section of the study. But, before we do, I would like to ask that you do not smoke during the study, and I would ask that you keep your arms and hands as still as possible, since even the slightest movements can affect the recording. If, for any reason, you wish to contact

me during the study, just press the intercom and I will answer. Also, I will be monitoring you once in a while just to be sure that everything is going well.

Before I begin presenting you with the count-downs, I must wait for your levels of physiological arousal to stabilize. This will take 10 minutes. Once you have relaxed for 10 minutes, you will hear the first count-down. After each count-down and each presentation of the tone, I will, once again, have to wait for your physiological levels to stabilize. This will take a varying amount of time. In order to help speed the initial stabilization time and the time needed for your arousal to reach baseline between trials, I would ask that you close your eyes and try to relax.

2. Task One -- Mandatory Tone Instructions

As I told you earlier, you will hear a count-down from nine to zero. For this section of the study, I would ask that you just try to relax and wait for the count-down. After each count-down you will hear the loud tone. The tone will be repeated a number of

times, and I will have to wait until you become relaxed between each of the trials. Once again, I will ask you to close your eyes and try to relax between trials.

3. Task Two -- Count-Down Without Tone Instructions

For this section of the study, you will hear the count-down which I have mentioned earlier. However, there will be no tone following the count-dwon this time. Insteadm after the count of zero I would like you to press the button on this box. Again, there will be a number of trials, and again, I will have to wait for you to relax between trials. Therefore, I would ask that you close your eyes and try to relax between trials. Also, you must only press the button after the count of zero, and you will have a few seconds in which to do this, so you will have to press it as soom as you can following the count-down. Again, you will not receive any tone during this section of the study.

4. Task Three -- Tone Onset Prevention

For this section of the study you will hear the nine to zero count-down. However, following the count of zero, you will be given a few seconds in which you

may press the button on this box. If you press the button within the allotted amount of time, you will not receive the tone. That is, by pressing the button quickly, you will prevent the onset of the tone. Again, there will be a number of trials, and again, I will have to wait for you to relax between trials. Also, you must only press the button <u>after</u> the count of zero, or you <u>WILL</u> receive the tone. I must tell you that you do not have to press the button. If, for any reason, you do not press the button, you <u>WILL</u> receive the tone.

<u>5.</u> Do you have any questions about the instructions? Would you like me to repeat any or all of the instructions, or to explain any of them?

<u>6.</u> Finally, I would ask that you circle the number on this sheet (tone ratings form) to indicate how intense, or unpleasant, you thought the tone was.

<u>7.</u> Okay, do you have any questions about anything in the study ?

8. Remember, you may withdraw from the study at any tome, and if you need to call me just press the button on the intercom.

Appendix F

Tone Intensity Rating Form

Date:_____ Name:_____

PLEASE CIRCLE THE NUMBER WHICH BEST REPRESENTS THE INTENSITY OF EACH OF THE TONES YOU HEAR.

TONE #	EXTREMELY INTENSE		QUITE INTENSE	MODERATELY INTENSE	NEUTRAL	MODERATELY WEAK	QUITE WEAK	EXTREMELY WEAK
1.	1		2	3	4	5	6	7
2.	1		2	3	4	5	6	7
3.	1		2	3	4	5	6	7
4.	1		2	3	4	5	6	7
5.	1		2	3	4	5	6	7
6.	1		2	3	4	5	6	7
7.	1		2	3	4	5	6	7
8.	1		2	3	4	5	6	7
9.	1		2	3	4	5	6	7
10.	1		2	3	4	5	6	7

Appendix G

Source Table for The Psychopathy X Socialization X Press/No Press ANOVA for HR Across Countdown as a Within Subjects Factor

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	466652.30	466652.30	1	371.93*
Psychopathy:	15591.19	15591.19	1	12.43*
Socializ.:	57.12	57.12	1	.05
Press(Pr):	2525.19	2525.19	1	2.01
P x S:	552.83	552.83	2	.44
P x Pr:	10882.17	10882.17	2	8.67*
S x Pr:	705.30	705.30	2	.56
P x S x Pr:	3459.96	2.76	2	2.76
Error:	190710.66	1254.68	19	
Within Effect				
Countdown:	19952.88	19952.88	8	105.15*
C x P:	539.70	52.97	8	2.84
C x S:	402.07	40.21	8	2.12
C x Pr:	310.25	31.02	8	1.63
C x P x S:	243.79	24.38	8	1.28
C x P x Pr:	263.06	26.31	8	1.39
C x S x Pr:	246.30	24.63	8	1.30
C x P x S x Pr:	222.82	22.28	8	1.17
Error:	28843.51	18.98	396	

* $p < .01$

Appendix H

Source Table for The Psychopathy X Press/No Press ANOVA with Raw HR as a Within Subjects Factor

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	57093.75	57093.75	1	460.35*
Psychopathy:	4069.20	2034.60	1	16.41*
Press(Pr):	550.60	550.60	1	4.44**
P x Pr:	2100.31	1050.16	2	8.47*
Error:	190991.48	124.020	25	
Within Effect				
Countdown:	26004.84	2600.48	8	136.47*
C x P:	897.49	44.87	16	2.36
C x Pr:	392.49	39.25	8	2.06
C x P x Pr:	474.32	23.72	16	1.24
Error:	29344.41	19.05	154	

* $p < .01$
** $p < .05$

Appendix I

Source Table for The Psychopathy X Socialization X Task ANOVA for Resting SCR

Effect	Sum of Squares	Mean Squares	DF	F
Main Effects	571.04	285.52	2	28.83*
Psychopathy:	69.50	69.50	1	7.02**
Socialization:	24.81	24.81	1	2.51
P X S:	34.37	17.19	2	1.74
Error:	277.30	9.90	25	
Task:	5.59	2.79	2	0.79
T X P:	7.29	3.64	2	1.03
T X S:	3.46	1.73	2	0.49
T X P X S:	4.32	2.16	2	0.61
Error:	191.37	3.54	54	

* $p < .01$
** $p < .05$

Appendix J

Source Table for The Psychopathy X Socialization X Task X Countdown ANOVA with Raw SCR

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	21138.89	21138.90	1	32.63*
Psychopathy:	3112.82	3112.82	1	4.81***
Socializ.:	2750.28	2750.28	1	4.25***
P x S:	441.67	441.67	1	0.68
Error:	17490.58	647.80	27	
Task:	4.33	2.17	2	4.30***
P x T:	1.96	.98	2	1.94
S x T:	.77	.39	2	.77
P x S x T:	.79	.39	2	.79
Error:	27.22	.50	54	
Countdown:	3.79	.38	9	2.61**
C x P:	4.00	.44	9	3.17**
C x S:	.87	.09	9	.67
C x P x S:	1.46	.16	9	1.13
Error:	34.92	.14		
C X T:	28.34	1.57	18	1.07
C x P x T:	34.67	1.93	18	1.31
C x S x T:	23.36	1.30	18	.88
C x P x S x T:	38.64	2.15	18	1.46
Error:	712.66	1.47	486	

* $p < .0001$
** $p < .01$
*** $p < .05$

Appendix K

Source Table for The Psychopathy X Socialization X Task ANOVA for Peak SCR

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	2908.54	2908.54	1	38.57*
Psychopathy:	485.38	485.38	1	6.44***
Socialization:	311.35	311.35	1	4.13
P X S:	24.06	24.06	1	.32
Error:	1959.61	75.37	26	
Task:	8.59	4.29	2	2.11
P X T:	7.44	3.72	2	1.82
T X S:	5.36	2.68	2	1.31
P X T X S:	5.49	2.74	2	1.35
Error	110.06	2.04	54	

* $p < .0001$
** $p < .01$
*** $p < .05$

Appendix L

Source Table for The Psychopathy X Socialization X Task ANOVA for SC Recovery Half-Time

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	174630.84	174630.84	1	120.21*
Psychopathy:	151.79	151.79	1	.10
Socialization:	1.03	1.03	1	0.00
P X S:	504.87	504.87	1	.35
Error:	39223.21	1452.71		
Task:	7205.62	3602.81	2	5.47**
P X T:	2076.30	1038.15	2	1.58
T X S:	591.55	295.78	2	.45
P X T X S:	266.91	133.45	2	.20
Erroe:	35560.95	658.54	54	

* $p < .0001$
** $p < .01$

Appendix M

Source Table for The Psychopathy X Socialization X Task X Countdown ANOVA for Range-Corrected SCR

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	3.64	3.64	1	.34
Psychopathy:	.15	0.15	1	.01
Socializ.:	8.56	8.56	1	.80
P x S:	20.28	20.28	1	1.91
Error:	287.42	10.65	27	
Task:	5.14	2.57	2	.29
P x T:	12.26	6.13	2	.69
S x T:	25.17	12.59	2	1.41
P x S x T:	43.39	21.69	2	2.43
Error:	482.71	8.94		
Countdown:	9.19	1.15	8	6.39*
C x P:	4.58	.57	8	3.18**
C x S:	.93	.11	8	.64
C x P x S:	.68	.09	8	.47
Error:	38.85	.18	216	
C x T:	2.02	.13	16	.91
C x P x T:	1.62	.10	16	.73
C x S x T:	1.48	.09	16	.67
C x P x S x T:	2.39	.15	16	1.07
Error:	60.04	.14	432	

* $p < .0001$
** $p < .01$

Appendix N

Source Table for The Psychopathy X Socialization X Task X Countdown ANOVA for Raw HR

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	4747864.69	4747864.69	1	1045.58*
Psychopathy:	19253.42	19253.42	1	4.24**
Socializ.:	201.88	201.88	1	0.04
P x S:	16.07	16.07	2	0.00
Error:	127145.09	4540.90	26	
Task:	747.58	373.79	2	2.26
P x T:	355.67	177.84	2	1.08
S x T:	12.17	6.09	2	.04
P x S x T:	36.66	18.33	2	.11
Error:	9252.84	165.23	56	
Countdown:	2202.71	244.75	9	9.64**
C x P:	249.76	27.75	9	1.09
C x S:	240.43	26.71	9	1.05
C x P x S:	491.84	54.65	9	2.15***
Error:	34.92	.14	252	
C X T:	582.70	32.37	18	1.88***
C x P x T:	185.78	10.32	18	0.60
C x S x T:	139.64	7.76	18	0.45
C x P x S x T:	222.99	12.39	18	0.72
Error:	8657.30	17.18	504	

* $p < .0001$
** $p < .01$
*** $p < .05$

Appendix O

Source Table for The Psychopathy X Socialization X Task ANOVA for Peak HR

Effect	Sum of Squares	Mean Squares	DF	F
Main Effects:	705514.63	705514.63	1	1671.32*
Psychopathy:	2650.03	2650.03	1	6.28**
Socialization:	188.22	188.22	1	0.45
P X S:	177.22	177.22	2	0.42
Error:	11819.64	422.13	26	
Task:	118.04	59.02	2	0.97
P X T:	107.17	53.59	2	0.88
T X S:	128.76	64.38	2	1.06
P X T X S:	19.81	9.74	2	0.16
Error	3401.21	60.74	56	

* $p < .0001$
** $p < .01$

Appendix P

Source Table for The Psychopathy X Socialization X Task X Countdown ANOVA for Range-Corrected HR

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	7480.83	7480.83	1	37.55*
Psychopathy:	779.55	779.55	1	3.91**
Socializ.:	574.61	574.61	1	2.88
P x S:	490.80	490.80	2	2.46
Error:	5577.88	199.21	27	
Task:	180.47	90.24	2	0.66
P x T:	518.52	259.26	2	1.90
S x T:	52.72	26.36	2	0.19
P x S x T:	463.96	231.98	2	1.70
Error:	7648.77	136.59	56	
Countdown:	1593.10	199.14	8	8.51*
C x P:	106.82	13.35	8	0.57
C x S:	169.86	21.23	8	0.91
C x P x S:	451.79	56.47	8	2.41**
Error:	5240.66	23.40	224	
C X T:	661.86	41.37	16	2.27**
C x P x T:	557.71	34.86	16	1.91**
C x S x T:	143.77	8.99	16	0.49
C x P x S x T:	228.68	14.29	16	0.79
Error:	8152.62	18.20	448	

* $p < .0001$
** $p < .05$

Appendix Q

Source Table for the Psychopathy X Task Anova for Resting SC Level

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	23465.21	23465.21	1	160.54*
Psychopathy:	1403.14	701.57	2	4.80**
Error:	4238.78	146.16	29	
Task:	6.31	3.16	2	1.54
T X P:	3.61	0.90	4	0.44
Error:	119.34	2.05	58	

* $p < .0001$
** $p < .05$

Appendix R

Source Table for The Psychopathy X Task X Countdown ANOVA with Raw SC

Effect	Sum of Squares	Mean Squares	DF	F
Overall:	17600.77	17600.77	1	22.73*
Psychopathy:	4536.67	2268.34	2	2.93**
Error:	21676.94	774.18	28	
Task:	3.31	1.65	2	3.26**
P x T:	2.44	0.61	4	1.20
Error:	28.42	0.51	56	
Countdown:	2.87	0.32	9	2.19**
C x P:	2.86	0.16	18	1.09
Error:	36.70	0.15	252	
C x T:	20.77	1.15	18	0.73
C x P x T:	8.51	0.24	36	0.15
Error:	796.66	1.58	504	

* $p < .0001$
** $p < .05$